The London School of Economics and Political Science

# Intersomatic Awareness in Game Design

Siobhán Thomas

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## Declaration

I certify that the thesis I have presented for examination for the PhD degree of the London School of Economics and Political Science is solely my own work.



I declare that my thesis consists of **66,515** words.

## Abstract

The aim of this qualitative research study was to develop an understanding of the lived experiences of game designers from the particular vantage point of intersomatic awareness. Intersomatic awareness is an interbodily awareness based on the premise that the body of another is always understood through the body of the self. While the term intersomatics is related to intersubjectivity, intercoordination, and intercorporeality it has a specific focus on somatic relationships between lived bodies. This research examined game designers' body-oriented design practices, finding that within design work the body is a ground of experiential knowledge which is largely untapped. To access this knowledge a hermeneutic methodology was employed. The thesis presents a functional model of intersomatic awareness comprised of four dimensions: sensory ordering, sensory intensification, somatic imprinting, and somatic marking.

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# Chapter 1: Introduction

> *Human experience is incarnated. I receive the surrounding world through my eyes, my ears, my hands… yet this bodily presence is of a highly paradoxical nature. While in one sense the body is the most abiding and inescapable presence in our lives, it is also essentially characterized by absence. That is, one's own body is rarely the thematic object of experience. (Leder, 1990, p.1)*

Games are not just enacted: they are lived. At the heart of this lived experience is the body. The gaming body is not merely a corporeal construct, but a lived body—a soma—that has memories and experiences and emotions. Gaming is such a carnal process, so obviously somatic, that the body paradoxically becomes prosaic. The reasons for this elision are complicated. As Leder (1990) points out "The body's tendency to disappear from awareness and action [is] a multidimensional phenomena" (p.69). On the one hand, players are inattentive to the somatic nature of their pursuits. The body forms part of the habitual way of being in the world and its unproblematic engagement in the tasks to which it is put render it absent. It is not the focus of our pursuits because, if it were, we could not engage in even the simplest of tasks. On the other hand, the body is absent also because it is complicated. Playing a game involves simultaneously mastering and taming the body, but often the somatic nature of what that points to is incomprehensible. In his seminal work *Pilgrim in the Microworld* (1983), Sudnow explains his attempts to master Atari's *Breakout*:

> This calibration actually involved very little of what we'd call manual dexterity and coordination, potentials thought to reside somewhere in the musculature of the organ itself. I stuck the control in my mouth, not turning the knob but its receptacle, and even this way I could hit shots. Put it on the floor and use my big toes to swing the paddle. Again I hit two shots right. Unbelievable. The distance on the knob to move from any one shot to the

> next is probably on the order of a quarter of an inch at the most, and I could do it with my toes. . . . But that left me with nothing I could use. I couldn't find where to keep my eyes, couldn't see any sense getting the juices flowing to a specific organ. Crack my knuckles, shake my hand to loosen the wrist? Why bother if I could do it with my toes, my mouth, the left hand. I couldn't find a locus for the skill. Mastery seemed to lie somewhere deep inside, instead of on the sort of a surface I know how to intentionally employ. (p. 129–131)

This inability to locate that which is "deep inside," and the subsequent difficulty of mastering it, is a concern that goes beyond that of gameplay. It is clear that design is a somatic mode of attention through which the designer attends *to* and attends *with* her lived body. However, in discussions with designers about their creative practice, the somatic aspects of the design process are largely elided. As Wilson (2012) points out, it is not just "the ways we talk about design" we need to attend to, but the ways "we don't talk about design," for the omissions in our design conversations reflect habitual attitudes that affect the "games, objects, and systems" that are made (p.4).

During the design process, the designer must attend to her own body. She must make her body *do something* in order to make the design happen. In game design, then, the designer's body is engaged in a cyclical process of design and play: a designer designs something; this something is enacted on a computer screen or in a digitally augmented space or in a physical space; the designer plays it to try it out; the designer then alters the design; and finally, the designer replays it. This sequence of activities is never one of being completely alone, however.

Game design also involves the designer attending to other bodies; specifically, these are the bodies of the players. A game is played by players, and the designer designs games for someone or some-bodies other than herself. Game design, then, is an activity which has an output of creating something for other bodies to use. In this way,

game design is an intersomatic process. “Because we are not isolated subjectivities trapped within our bodies, but share an intersubjective milieu with others, we must also specify that a somatic mode of attention means not only attention to and with one’s own body, but includes attention to the bodies of others” (Csordas, 1993, p.139). This attention to others’ bodies through the frame of our own body is called *intersomatic awareness*.

Thus far, the world of game designers has been *terra incognita*. Ignored, forgotten, relegated—the designer has not featured prominently within the game studies corpus. But, there is a deep level of somatic knowledge that designers have quietly relied on for decades and which is a worthy object of study. Game design is a collective memory practice where informational patterns and design archetypes are exchanged in an active process of embodied gameplay. Through a long history of playing games, designers have not only created a library of experiential design tools that they rely upon in their own practices, but also a body-oriented design “consciousness” that becomes a site of shared design practice. The intent of this research is to tease out, understand, and probe this experiential knowledge.

## Research Questions

This phenomenological research was focused on developing an understanding of the lived experiences of game designers from the particular vantage point of intersomatic awareness. The research aimed to answer the following core research question:

- How can we understand the dimensions of intersomatic awareness through an examination of designers’ experiential knowledge and somatic conceptualisations?

Further, the research was guided by several sub questions intended to draw out fundamental knowledge related to intersomatic awareness in game design:

- How can the fundamental tension of the absent body be understood within game design practice?
- How can the highly intuitive and experiential nature of somatic knowledge be identified, understood, and addressed?
- How does intersomatic experience appear in design practice, and how can this experience be represented?

## Research Objectives and Expected Contribution

Little is known about body awareness in games design and what it means for designers. This phenomenological study applied a hermeneutic inquiry to the study of game design practices. As such, it complements existing body-oriented scholarship in games and addresses a need for primary research in which game designers and their practice are the objects of study.

There are several key contributions to be derived from this research. Methodologically, this study demonstrated the feasibility of the reflective interview as a technique for gaining deep insight from the perspective of designers. Data were collected through unstructured conversations with designers, conducted primarily through Skype audio interviews. I found that Skype allowed for informal, in-depth conversations, with most conversations lasting for two hours.

Theoretically, this study makes a number of valuable contributions. First, it applies Leder's (1990) seminal work on the absent body as the basis for the analysis of design practice. This provides a useful working model for others interested in exploring the

concept of the absent body in their work. Second, it applies Csordas's somatic mode of attention. In so doing, it complements Leder's work by clarifying the meaning of a somatic mode. Third, the study introduces a practical design application and an alternate interpretation of Damasio's somatic marker theory.

Finally, the most important contribution of this study is a practical one: the research identifies the dimensions of, and presents a functional model for thinking about, intersomatic awareness in game design. In doing so, it provides signifiers for the identification and recognition of intersomatic awareness in design practice. Ultimately, because the model suggests how this experience can be represented, it facilitates the sharing and understanding of knowledge about intersomatic awareness in design.

## Structure of the Thesis

In this chapter, I introduced the problem domain/ the core research concern of this thesis: the need to understand the dimensions of intersomatic awareness through an examination of designers' experiential knowledge and somatic conceptualisations. Chapter 2 situates the concept of intersomatic awareness within its knowledge domain. Specifically, Chapter 2 provides an overview of existing research within games studies that focuses on the people who make games, contextualising this discussion by characterising the overall nature of the games industry as one of deep complexity and fragmentation. The chapter highlights the invisible nature and status of the game designer within the existing research and suggests a core tension within existing scholarship. The games industry and game developers are incredibly diverse, yet existing research approaches construct games development as a homogenous and monolithic entity. The chapter also remarks on the state of play of existing body-

oriented game studies scholarship, suggesting that while the research is varied and highly interdisciplinary, when considered in aggregate the research comprises a loose domain of scholarship that addresses somatic considerations. Importantly, this chapter provides the essential background in sensation and perception needed to understand the empirical analysis that appears in Chapter 5. The chapter concludes by arguing for the importance of an ecological approach to game design and by defining the key terminology used throughout the thesis.

Chapter 3 presents a theoretical framework for approaching intersomatic awareness, based on phenomenology. The framework consists of four conceptual lenses: Poyatos's (1983, 1988, 2002) semiotic structuralist work, which discusses channels of intersomatic communication; Csordas's (1993, 1994) paradigm of the somatic mode of attention; Leder's (1990) concept of the absent body; and Damasio's (1994, 1996) concept of the somatic marker. At the core of this framework is the following premise: within design work a dialectical relationship exists between habitus and disruption. The habitual state of the body is that of recessiveness—the body recedes from view when it performs unproblematically. However, bodily disruptions, either intentionally or unintentionally designed, cause the body to present itself. It is at this intersection that games function as somatic modes of attention and important moments become somatically marked.

In Chapter 4, I present the methodology for the empirical study. The chapter describes how hermeneutic phenomenology provided the basis for the research approach and how the dialectic of the hermeneutic circle underpinned all stages of the research. The chapter describes procedures for data collection. It explains how in order to draw out designers embedded, intuitive, and body-based lived experiences I conducted

interviews in which designers reflected on their practice. I underscore that a key challenge in data analysis was developing a process that would help encapsulate the sensory and perceptual basis for each game—to understand how each game was differentiated intersomatically—so that I could understand and contextualise the designers' complex comments about body-oriented design practice.

In the results section, Chapter 5, core findings from the analysis are described. Eight game design cases are presented through the voices of the designers who designed them—*Way* (Colin Birks), *Journey* (Jason Chao and Colin Birks), *Diploplia* (Jonny Bewley), *Flowy* (Sylvester Wolfe), *Nevermind* (Emma Ryan), *The Extraordinary Adventures of Baron Munchausen* (John Wellbrook), *The Betrayer's Banquet* (Evan Smith), and *Matching Pennies* (Curtis Murphy).[1] The general format for the presentation of each case is to

- examine the sensory order inherent in each game through an explanation of the game set up and core gameplay
- identify pivotal bodily game moments that the designer indicated as being somatically marked in his or her design memory
- elaborate on any specific body techniques the designer may have employed during the design process

Though each designer has been allocated a pseudonym, within the presentation of the cases particular care was taken to retain the designer's voice and thus the cases have a narrative tone.

The discussion, Chapter 6, begins by examining two fundamental paradoxes in relation to intersomatic games design: the paradox of the absent body and the paradox of

[1] All participants in this study have been assigned pseudonyms.

the designer as experiential centre. It then presents a functional model of intersomatic awareness, suggesting that intersomatic awareness involves four interrelated dimensions: sensory ordering, sensory intensification, somatic imprinting, and somatic marking.

# Chapter 2: Literature Review

# The Designer Gestalt, The Body, and Sensation & Perception

## The Designer Gestalt

> *Rank-and-file game developers bring videogames from concept to product, and yet their work is almost invisible, hidden behind the famous names of publishers, executives or console manufacturers. (O'Donnell, 2014)*

There are few industries more turbulent or high-velocity (Bourgeois & Eisenhardt, 1988) than the games industry (Hotho & McGregor, 2013). Characterised as young, rapidly evolving, and featuring "disruptive innovation," the industry is widely depicted as being staffed by passionate and enthusiastic individuals who love their work to such an extent that they are in employment "nirvana" (Hotho & McGregor, 2013). However, in the academic study of games these individuals have largely been rendered invisible. First, game development as an object of study is largely overlooked. Whitson (2012) highlighted the "paucity of developer-centric research" and draws attention to the need to examine game development in greater depth. She noted, "With the exception of critical political economy research, innovation and organisational studies that focus on managing the creative process, and a few rare ethnographies, considerations of game developers are absent from game scholarship" (p. 123).

Within the games studies literature the focus has been on the analysis of play, players, and games, rather than the people who make them. The work that does address development can be segregated into four categories: studies conducted within game studios; research on the games industry that aims to give an overall picture of the

industry; first-person reflections on design work by game designer themselves; and, studies that look at players as designers.

There are a few researchers who have responded to Whitson's call. O'Donnell's (2014) ethnographic study examined the everyday working lives of game developers in the United States and India and his findings suggest the importance of creative collaborative practice. Further, his comments about the idealisation of the game developers he studied are ones shared by the participants in my study. Van der Graaf's (2012) comparative study of organisation design at Valve and Linden Labs found that the design of an organisation determined how work was accomplished and coordinated. Whitson's (2012) work examined the difficulties development studios face in their struggle to balance creative freedom while avoiding risk. She charted the economic, ideological, and technological influences shaping the games industry, ultimately suggesting that the instrumentalisation of play into an economic form transforms the nature of games themselves.

A number of studies have looked at considerations surrounding game labour. Zackariasson, Styhre, and Wilson (2006) examined knowledge work in video game development from the standpoint of phronesis. They suggested that because personnel hired to make the games were dedicated gamers they offered particular idiosyncratic competencies that could be leveraged during game development. In their empirical study looking at the work practices of game developers in Canada, de Peuter and Dyer-Witheford (2005) examined how game labour is mobilised and counter-mobilised. They proposed that games "are the paradigmatic media of Empire" for two oppositional reasons: game development relies on the mobilisation of the Empire's immaterial labour, which blurs the boundaries of work and leisure, and games rely on the counter-

mobilisation of the multitude, who use "the tools and tendencies of Empire but to different ends" (Dyer-Witheford, 2005). Alongside these studies exploring the working life of game developers are studies which attempt to understand the game industry as a whole.

## Game Industry Studies

Research under the umbrella of industry studies is fragmented (Kerr, 2006). Early research looking at the structure of the games industry suggested that it is one of heterogeneity and fragmentation (Cohendet & Simon, 2007; Johns, 2006; Kerr, 2006; Tschang, 2010; Williams, 2002). This finding is echoed by recent research. For instance, Nieborg & de Kloet's (2013) survey of the European game industry found that while the industry is growing as a whole, the specific challenges each country individually faces are so different that the idea of a cohesive European games industry needs to be questioned. They suggest that governmental policies and state interventions have a significant impact on the industry's growth.

Within the literature looking at the games industry, a range of research focused on the indie games market. Parker (2013) surveyed 11 years of research on the independent games movement,[2] arguing that comprehending the rapidly changing "discourses and practices of indie games require[s] a concentrated collaborative research effort" (p. 2). This a concern shared by Simon (2012), put forward in a special issue of the academic games journal *Loading...* that focused on indie game development, and expressed from the perspective of multiple scholars the diverse and varied contexts of indie games

[2] He argues that as early as 2002, Zimmerman was writing about "the unsolved problem of independent games" (2002, p. 129), and critically evaluating the challenges and opportunities of independent and alternative game production.

production (Fisher & Harvey, 2012; Joseph, 2012; Lipkin, 2012; Parker, 2012; Ruffino, 2012; Stein, 2012; Westecott, 2012).

However, while this research is valuable for gaining an understanding of the culture of the indie games movement, little of the research presents the direct viewpoints of the individual developer or designer. Instead, it addresses concerns such as what it means to be an indie developer, or it presents cultural analyses of the state of play. For instance, Westecott (2012) focused on the culture of independent games development, arguing that the rise of independent game culture and the worldwide expansion of the indie games community indicates several important changes to the conceptualisation of the games industry. Wider access to game distribution routes has meant that game making extends beyond the "for-profit" space. She proposed that developers make and release independent games for numerous reasons including the following: securing work in or gaining attention from the wider industry, self-publishing as a means to sustain one's livelihood, and as a form of self-expression. She argues that although the fragmentation of the games market suggests the potential of fostering diversity and more "equitable game development practices," in practice many gender problems that plague the AAA industry are also in play in the indie games industry.

## On Designers by Designers

Much of the current understanding of designers and design practice within game studies comes from limited first-hand reflections written by designers themselves. The academic literature examining designers' creative practices is often in the form of post-mortem reflections of design projects or design science research which examine design decisions from a critical first-person or design team perspective (see for example,

Bevensee, Boisen, Olsen, Schoenau-Fog, & Bruni, 2012; Bogost, 2007; Fogtmann, 2011; Frasca, 2000, 2001; Greenspan & Whitson, 2013; Pinchbeck, 2008; Salen & Zimmerman, 2004; Wilson, 2012). While these studies reveal important insights from designers themselves, the focus is on exploring a design artifact or procedures of design rather than the designer.

It is noteworthy that outside the domain of academic games research, there is a selection of work within the games industry itself addressing the practice of the game designer. This design literature written by designers on design practice primarily discusses the "how to" of design. Embedded in these discussions are insights into a designer's practice (Brathwaite, 2008; Pagulayan, Keeker, Wixon, Romero, & Fuller, 2003; Rollings & Adams, 2003; Schell, 2008; Swink, 2009).

Perhaps the most significant means of understanding and accessing game designers is through the mainstream gaming press and the larger videogame commons. Interviews with designers, and game post-mortems, can be found on *Gamasutra*[3]. GDC Vault features innumerable talks by game designers and some designers have their own Twitch TV channels. They also communicate on Twitter about their work. *Kotaku*, *Polygon*, *Edge,* and other gaming news sites regularly run features on designers.

## Player as Designer

The boundaries between designer and player are becoming increasingly blurred since players not only play games, but, in some instances, also make them. The practice of modding has long been recognised as a source of innovation for development companies (Postigo, 2007, 2010). Ostensibly, this interlocking circuit of design and play

[3] http://www.gamasutra.com/

serves to integrate the consumer into the process of production (Kline, Dyer-Witheford, & Peuter, 2003). As Behrenshausen (2007a) suggests, the "practice of videogaming serves to successfully fold the player-as-consumer back into the ongoing game development process as player-as-producer" (2007a, pp. 21–22). There is also a body of literature examining co-creative practices of game players, which examines how players act not just as consumers but producers of play (Banks, 2011; Burn, 2013, 2014; Castell & Jenson, 2007; Garrelts, 2014; Seth Giddings, 2003, 2007b, 2014; Nousiainen, 2009). This literature coincides with the rise of user-generated content in games and, consequently, innovative play-design practices. This blurring of the lines between playing, producing, and consuming sees overlaps and collaborations between players, and between players and professional developers. In fact, one researcher has gone so far as to suggest that there is a radical democratisation of videogame production occurring through the "videogame commons" (Redmond, 2014).

## Definition of Designer

A common thread in much of the research related to the game studio or industry studies related previously was that even when individuals appeared as the object of study, they were bundled under the classification of "developer." This signals an ongoing gap in the games scholarship, namely, the need to look at specific job roles (e.g., programmers or artists) in future studies. Further, this overarching rubric also impedes understanding of how a particular group perceives a specific phenomenon. Since the object of my study is designers, I believe it is therefore important that I define who I mean when I refer to designers. Encapsulating all development-related job roles under the classification of developer is expedient, but it conceals that the games industry

is filled with heterogeneous and complex roles. Within mid to large game studios, the role of the designer is becoming increasingly specialised: what was once considered a wide, encompassing role has been broken out into specialisms. Design work is completed by level designers, system designers, scripters, combat designers, and creative directors, amongst others (see Table 1 for a description of each role). Regardless of moniker, the designer is charged with creating the ideas and rule structure that make up a game (Rogers, 2014). When video game teams create games they are known as developers or development teams. A game studio that makes a game is considered the game's developer. The entity that distributes the game is called the publisher.

**Table 1. Game Design Specialisations**

| | |
|---|---|
| **Level designers** | Create paper maps, build "grey box" levels (preliminary versions of a game level that contains gameplay but lacks visual detail), and populate the levels with everything from enemies to treasure. |
| **System designers** | Develop how the game elements relate to one another, whether it is the game's economy or technology tree. |
| **Scripters** | Use tools to write code that allow things to happen within the game, from springing a trap to choreographing the camera movement. |
| **Combat designers** | Specialise in the player's combat experience, whether against an AI or human opponent, and "balancing" the player's experience. |
| **Creative directors** | Maintain the vision of the game while supervising the other designers, often offering suggestions for improving their work. |
| Source: Rogers, S. (2010). *Level Up!: The Guide to Great Video Game Design*. John Wiley & Sons | |

To help others better understand the tasks that designers undertake, England (2014) devised the "door problem":

> Game design is one of those nebulous terms to people outside the game industry that's about as clear as the "astrophysicist" job title is to me. It's also my job, so I find myself explaining what game design means to a lot of people from different backgrounds, some of whom don't know anything about games.

The starting premise for the door problem is that "you are making a game." England then presents a series of questions related to the task of making the game, each of which would be resolved by a designer. The first question is "Are there doors in your game?" Follow-up questions she puts forward include:

- "Can the player open them?"
- "Can the player open every door in the game?"
- "Are some doors only for decoration?"
- "How does the player know the difference?"
- "Are doors you can open green and ones you can't red? Is there trash piled up in front of doors you can't use? Did you just remove the doorknobs and call it a day?"
- "Can doors be locked and unlocked?"
- "What tells a player a door is locked and will open, as opposed to a door that they will never open?"[4]

England further illustrates, by way of contrast, how other job disciplines address "doors." A concept artist might say, she writes, "I made some gorgeous paintings of doors." A project manager might say, "I'll put time on the schedule for people to make doors." Finally, she suggests, a gameplay programmer might say, "This door asset now opens and closes based on proximity to the player. It can also be locked and unlocked

[4] http://www.lizengland.com/blog/2014/04/the-door-problem/

through script." The door problem provides an easy-to-understand means of understanding job specialisations within game development.

## The Body

Though a pervasive force when people play games, the body is often marginalised, or of little interest in game studies scholarship. The field is highly interdisciplinary in nature and the researchers who do work in this area cannot really be said to define a body-oriented game studies domain in its own right. Still, scholars such as Nielsen (2010, 2012), Nørgård (2010a, 2010b, 2011, 2012), Giddings (2003, 2007a, 2007b, 2007c), Burn (2013), Lahti (2003), Behrenshausen (2007a, 2007b), and Westecott (2008) highlight the importance of addressing embodiment in the academic study of games. Their specific areas of gaming research involve the body, and even though these researchers themselves may not classify this research area as somatic, they do address somatic considerations. Some of the conceptualisations they offer are particularly relevant to the discussion of intersomatics and are presented here.

### The Body as Physical Entity

The first body of research lies in design studies, which situates the body of the player as a physical object capable of being measured and monitored. This work is prevalent in human computer interaction (HCI) and takes the shape of design proof-of-concepts, prototypes, or experimental projects. These feature the connection of digital technologies, such as a novel hardware implementation or a new software system, to the body's anatomical and physiological systems, and then measure and document player responses (Loke & Robertson, 2011). While this work has made important inroads in

understanding the body from a functional and structural perspective—and provides important information about players' sensory and perceptual responses that can then, in turn, be implemented in game design—it does so at the expense of an understanding of how such work is affected by the player's way of *being-in-the-world*. Human factors research, which emphasises usability and ergonomics, productivity, and optimised performance, suffers from the same challenges. However, there is also a growing movement in HCI, influenced by Dourish's (2001) early work on embodiment and Shusterman's (2008) work in somaesthetics, to develop integrative frameworks and methodologies that are based on the principles of whole-body interaction. This research trajectory would offer a more complete understanding of somatic experience.

There are two unique strands of gaming that focus explicitly on the body from a similar physical measurement standpoint as that employed in HCI. The first is serious game and health; the second is exergaming/ exertion games. In the past five years, there has been an increased interest in the body from a serious games perspective, particularly those related to medical and health concerns. Exertion games are a particular category of games that exploit the body's sensorimotor capacities under intense physical exertion. Mueller, Agamanolis, and Picard (2003) introduced the term "exertion interface" to denote interfaces that require intense physical effort, and more than a decade later there is a recognisable body of research examining the development of games that require this intense level of physical prowess (Fogtmann, 2011, 2012; Fogtmann, Fritsch, & Kortbek, 2008). Exergames have been used as tools not just for measuring physical fitness, but to also help increase physical activity levels, address social inequalities, treat depression, and monitor body states (Duclos, Miéville, Gagnon, & Leclerc, 2012). However, much of this research involves an explicit focus on the physical corpus—the

measurable, monitorable, corporeal aspects of the body rather than its wider experiential underpinnings.

Some games sit in a hybrid space, leveraging the codifiable aspects of body movement with the social situation in which the games transpire (Márquez Segura, Waern, Moen, & Johansson, 2013; Swalwell & Wilson, 2008; Wilson, 2012; Young, 2005). Segura et al (2013) refer to such games as body games, arguing that in these games the pleasure of the game is derived specifically from the bodily engagement that occurs when the body is brought to the forefront. Key to their approach is Simon's (2009) concept of "gestural excess": a hyperbolic body state that comes from bodies twisting, contorting, and performing in a manner that exceeds the kinaesthetic expressions which the game might expect.

## Game Kinaesthetics

There is growing interest in the kinaesthetic study of games. Karhulahti (2013), for instance, proposes that there are kinaesthetic and nonkinaesthetic challenges in games. He argues kinaesthetic gaming challenges arise from nontrival psychomotor effort. In contrast, nonkinaesthetic challenges arise if the challenge is addressed solely by cognitive means. The binary distinction between the two is problematic if one subscribes to the notion, as I do, that all games have a kinaesthetic basis. However, Karhulahti provides useful food for thought in his attempt to develop a videogame rhetoric that flies contrary to established meaning-centred approaches to rhetoric.

Paterson's (2007) work *The Senses of Touch* addresses haptics and affect in a wide range of technologies, but notably, he examines the tangible and kinaesthetic aspects of play and virtual reality as they apply to games. Parisi (2009) applies Mauss's (1973)

concept of body technique to the analysis of videogame peripherals, arguing that game hardware such as the Wiimote, Dance Mat, and Guitar Hero guitar can be conceived as bodily interfaces of which there are three aspects: mode of capture, haptics, and button remappping. Behrenshausen (2007b) makes a case for the "embodied, carnal, sensuous, and powerful (kin)aesthetic of video gaming" (p. 353). Notably, Fogtmann (2011; 2008), whose work crosses the boundaries between games and HCI, argues that a kinaesthetic understanding of bodies in games requires attending to kinaesthetic empathy. To this end, he has developed a taxonomy for kinaesthetic empathy interaction, a type of multiplayer interaction that occurs when players are co-located and share a common goal (Fogtmann, 2012).

## The Normative Body

Some studies also critique the hegemony of the *normative* gaming body through close analysis of representations of disability in specific games. For example, Carr's (Forthcoming, 2011, 2013, 2014a, 2014b, 2014c) research work examines the entrenched approaches to and persistent models of ability and disability in the AAA games *Dead Space* and *Deus Ex: Human Revolutions.* Her work suggests that when disability appears in games it is "employed in conventional ways," "leveraged for affect," and "used to embody loss and deviance" (Carr, 2014b). Joyal's (2012) work applies two disability studies[5] concepts—the supercrip and the normate body—to her discussion of *Mass Effect*, suggesting that through the "supercrip" it is possible for disability to be viewed as something other than "physical suffering."

[5] See Paterson and Hughes (1999) for an overview from the standpoint of phenomenology.

Related work in the area of disability studies looks at the body and accessibility (Sánchez, Vela, Simarro, & Padilla-Zea, 2012; Thomas, 2009; Westin, Bierre, Gramenos, & Hinn, 2011; Yuan, 2009; Yuan, Folmer, & Harris, 2011) and typically puts forward an agenda of inclusiveness. The research looks at the possibilities and limitations games offer players with visual, hearing, motor, and/ or cognitive impairments, often suggesting particular accommodations or modifications that can be made to a game (e.g. Hernandez, Ye, Graham, Fehlings, & Switzer, 2013; Kurschl, Augstein, & Stitz, 2012; Morelli, Foley, & Folmer, 2010; Morelli, Foley, Lieberman, & Folmer, 2011; Morelli & Folmer, 2014; Ramos & Folmer, 2011; Rector, Bennett, & Kientz, 2013; Torrente, Serrano-Laguna, Vallejo-Pinto, Moreno-Ger, & Fernández-Manjón, 2014). In doing so, they place a particular emphasis on the lived experiences of the player.

If the body in general can be considered a marginalised interest in game studies, research that addresses gaming bodies outside the norm are even more marginalised in this field of study. Such research calls into question the human-based parameters that define players and thus causes us to rethink who we categorise as a body. Research in the emerging HCI subfield of animal computer interaction (ACI), for example, takes up such questions. Acknowledging Burghardt's (2005) and Bekoff's (2002, 2005; 2009) work that emphasises the fundamental forms of play and games running through both human and animal interaction, some scholars in the ACI field are looking specifically at interspecies gameplay. This animal ludens research (French, Mancini, Sharp, & Smith, 2014; Pons & Jaen, 2014; Westerlaken & Camilleri, 2014; Westerlaken & Gualeni, 2014; Wirman, 2014) not only addresses how animals interact with computer-mediated systems but suggests possibilities for human-animal interaction games. A notable

outcome from this body of research is the important and emergent play relationships that can be fostered across species (see, for instance, the game *Pig Chase*[6]).

## Somatic-oriented Work

The two most comprehensive treatments of the somatic in games, thus far, are Nørgård's grounded theory analysis of gameplay corporeality and Nielsen's work addressing somatic experience in play. Nørgård (2012) argues that understanding the corporeal-locomotive activities of players are integral to understanding the experience of gameplay. Rather than subscribing to traditional conceptions of gameplay, which posit that there is a divide between onscreen and offscreen worlds, she conceives of an "onscreen-offscreen gameworld." Her definition of gameplay is the primary definition of gameplay that I adopt in this thesis:

> Gameplay is made up of an indivisible stream of (kin)aesthetic, expressive, and experiential corporeal locomotion wherein the gameplayer is absorbed, immersed, and engrossed during gameplay and through which the gameplayer is present in and engages the onscreen-offscreen gameworld. (Nørgård, 2012, p. 7)

The essential linkage I want to make between Nørgård's definition and my discussion of intersomatics in game design is that bodily engagement involves an *indivisible* stream of activities occurring in an ecological gaming gestalt[7]. This plenary gestalt is comprised of both onscreen (ingame) and offscreen (real world) actions. All of these actions are integral to understanding the somatic experience of gameplay.

For Nielsen (2010, 2012), playing a computer game is simultaneously a *somatic experience* and an *experience of the somatic*. Drawing on Shusterman's (2008) theory

[6] http://www.playingwithpigs.nl/

[7] Linderoth (2013) has discussed the ecological approach to gameplay. Here, I am tying this concept in explicitly with Ihde's plenary gestalt (see next section).

of somaesthetics, Nielsen proposes that playing a game involves performative, representational, and experiential dimensions. While the internal relationships amongst these dimensions vary between games, between genres, and potentially between gaming sessions, Nielsen argues that what underlies all of these dimensions is a "sensational trend." Videogames are transformative experiences that offer the sharpening of sensory perception and the "reshaping of somatic form" (Shusterman, 2008). It is to a discussion of sensation and perception that I turn in the next section.

## Sensation and Perception

> *Experience…is multi-sensory; qualities of matter, space and scale are measured equally by the eye, ear, nose, skin, tongue, skeleton and muscle. (Pallasmaa, p. 30).*

Because sensation and perception are the ways we become aware of the world, it is necessary in a discussion of intersomatic awareness to consider these concepts in detail. There are two key points to be made. First, most importantly, the senses are considered to be perceptual systems (Gibson, 1966). Secondly, perception is understood as enacted (Dreyfus, 1979; Ihde, 2002; Merleau-Ponty, 1982; Noë, 2006).

The study of sensation, if one subscribes to a scientific viewpoint, involves examining the initial contact between an organism and its environment. In this way sensation is concerned with the basic aspects of experience, such as the sound of a car or the colour of a leaf. Perception, in contrast, "deals with the attempt to identify objects and relationships in the external world" (Coren, Ward, & Enns, 1999, pp. 13–14). In practice, however, it is impossible to make a distinction between the two because they are inextricably linked. As early as 1850, Reid elaborated:

> The external senses have a double province; to make us feel, and to make us perceive. They furnish us with a variety of sensations, some pleasant, others painful, and others indifferent… The conception and belief which nature produces by means of the senses, we call perception. The feeling which goes along with perception, we call sensation. The perception and its corresponding sensations are produced at the same time. In our experience we never find them disjoined. Hence we are led to consider them as one thing, to give them one name, and to confound their different attributes. It becomes very difficult to separate them in thought, to attend to each by itself, and to attribute nothing to it which belongs to the other. (Reid, 1850, p. 17 as cited in Gibson,1966)

This joining of sensation and perception is what is meant by the idea that the senses are considered as perceptual systems (Gibson, 1966). The quotidian assumption in the Western World[8] is that there are only five senses (touching, tasting, smelling, hearing, and seeing). However, although the enumeration of the senses has been of great historical debate—see Table 2 and Table 3 for an example of two points of historical differentiation—Geurts (2002) suggests that scientists working in the field of sensory research would largely agree on a taxonomy involving nine sensory systems:

1. ***visual apparatus***, responding to luminous and chromatic impressions
2. ***auditory apparatus***, responding to tonal impressions
3. ***olfactory apparatus***
4. ***gustatory apparatus***
5. ***tactile apparatus***, responding to mechanical impressions
6. ***tactile apparatus***, responding to thermal impressions
7. ***tactile apparatus***, responding to kinaesthetic impressions
8. ***labyrinthine apparatus***, governing balance
9. ***affective apparatus*** (pleasant and painful)…

(Geurts, 2002, p. 8)

[8] Geurts (2002), for instance, has identified different senses in different cultures

In addition to this nine-system taxonomy, Sherrington (1920)[9] put forward a complementary taxonomic scheme that segregates the systems into three overarching categories:

- ***exteroceptive:*** senses of distance, such as seeing and hearing, that are related "to stimuli outside the body" (Shusterman, 2008, p. 2).
- ***proprioceptive:*** those senses "initiated within the body and concerned with the orientation of body parts relative to one another and the orientation of the body in space" (Shusterman, 2008, p. 2); and
- ***visceral or interoceptive:*** those sensations originating within internal organs and often related to pain

Despite the ability to categorise the different senses, it must be underscored that "the Body… is the medium of all perception" (Husserl, 1983, p. 61). As such, the emphasis in this thesis is on the entirety of the somatic sensation complex. These somatic sensations are the essence of the experiential perceptions of our body, and Shusterman (2008) suggests "they include distinct feelings, observations, visualizations, and other mental representations of our body and its parts, surfaces, and interiors" (p. 53). These sensations are generated from both our external or distance senses and the internal bodily senses such as proprioception or kinaesthetic feelings.

As discussed in Chapter 3, this is the organising structure Leder (1990) relies on in his seminal work *The Absent Body*.

[9] *The Integrative Action of the Nervous System (1920)*.

**Table 2. Gibson's Taxonomy of the Perceptual Systems**

| Name | Mode of Attention | Receptive Units | Anatomy of the Organ | Activity of the Organ | Stimuli Available | External Information Obtained |
|---|---|---|---|---|---|---|
| The Basic Orienting System | General orientation | Mechano-receptors | Vestibular organs | Body equilibrium | Forces of gravity and acceleration | Direction of gravity, being pushed |
| The Auditory System | Listening | Mechano-receptors | Cochlear organs with middle ear and auricle | Orienting to sounds | Vibration in the air | Nature and location of vibratory events |
| The Haptic System | Touching | Mechano-receptors and possibly Thermo-receptors | Skin (including attach-ments and openings)<br>Joints ( including ligaments)<br>Muscles ( including tendons) | Exploration of many kinds | Deformations of tissues<br>Configuration of joints<br>Stretching of muscle fibers | Contact with the earth<br>Mechanical encounters<br>Object shapes<br>Material states<br>Solidity or viscosity |
| The Taste-Smell System | Smelling | Chemo-receptors | Nasal cavity (nose) | Sniffing | Composition of the medium | Nature of volatile sources |
| | Tasting | Chemo- and mechano-receptors | Oral cavity (mouth) | Savoring | Composition of ingested objects | Nutritive and biochemical values |
| The Visual System | Looking | Photo-receptors | Ocular mechanism ( eyes, with intrinsic and extrinsic eye muscles, as related to the vestib-ular organs, the head and the whole body) | Accommoda-tion,<br>Pupillary adjustment,<br>Fixation, convergence<br>Exploration | The variables of structure in ambient light | Everything that can be specified by the variables of optical structure (information about objects, animals, motions, events, and places) |

Source: Gibson, J. J. (1966). *The Senses Considered as Perceptual Systems*. Boston: Houghton Mifflin, p.50.

**Table 3. Piéron's Taxonomy of the Senses**

| *Categories of Impressions* | *Fundamental Qualities* | *Accuracy of localization* |
|---|---|---|
| I<br>Visual Apparatus } Luminous | Sensations of *brightness*.[1] | Very accurate |
| Visual Apparatus } Chromatic | About 100 hues (or shades) which seem to be reducible to the fundamentals, the latter being necessary and sufficient to produce, by their combinations, all the elementary hues. } Red, Green, Blue | Very Accurate |
| II<br>Auditory Apparatus } Tones[2] | About 4,500 *tonalities* reducible to a combination of pitch itself, with a community of harmonics (the latter determining the relationship of the various "notes" in the different octaves) | None. (The locus of excitation in the cochlea may determine the total quality) |
| III<br>Olfactory Apparatus } Olfactory | An ill-defined number of smells, reducible to a certain number of fundamentals[3] } Fragrant(floral), Fruity (ether-like), Empyreumatic, Caprylic | None |
| IV<br>Gustatory Apparatus } Gustatory | An undetermined number of tastes, reducible to four fundamentals } Sweet, Salty, Acid, Bitter | Moderately accurate |
| V<br>Tactile Apparatus } Mechanical | A. Touch[4]. Impressions mediated – without precise distinction- through several receptor systems, of which two are cutaneous and another belongs to deep supporting organs (muscles, bones, aponeuroses) } Contact and pressure, Cutaneous displace-Ments<br>B. Prick. Impressions characteristic of a "point" and affected pain element } Prick | Accurate |
| VI<br>Tactile Apparatus } Thermal | Two categories of impressions with receptors for Warmth and Cold | Accurate |
| VII<br>Tactile Apparatus } Kinaesthetic | Three categories possessing differentiated receptor systems } of position and movement of the joints; of *strength* of muscular contraction; of *resistance* (tension on the tendons) | Rather accurate |
| VIII<br>Labyrinthine } (a) Static<br>(b) Dynamic | Direction of the force of gravity — Directions of the vertical<br>*Translation*, *Rotation* — Directions } forwards-backwards; right-left; above-below; | Very accurate<br>Moderately accurate |
| IX<br>Affective (of pleasant or painful character) | Impressions of Voluptuosness, tickling, itching, painful irritation (dessication, burning, distension and stretching, pinching and pressure), general coenaesthia } Reducible to an undetermined number of fundamentals ( the affective repercussions being more important than the sensory specificity) | Inaccurate. Or very inaccurate |

[1] The "leucies" which make up the series of grays between black and white, appear to us as particular luminous qualities which can be ascribed to objects, and are relatively independent of brightness. But they are not elementary qualities: they are complex impressions, based upon the relation of the illumination received by the objects to the amount of light they reflect by diffuse scattering.

[2] *Timbre* is not an elementary quality, but is a complex perception of the "shape of sound", defined by the sound spectrum (this spectrum giving the composition of the complex sound in terms of elements of definite frequency, each with its particular auditory intensity). The complex sound has a dominant Tonality (the "relief" of which is more or less marked). It appears as broad or thin, clear or damped. If there is no dominant tonality, it becomes a noise. "Vocality" is one aspect of the timbre.

[3] A composition based on three fundamentals has been but forward by Stefanini, on six by Henning, on eight by Wartenberg, on nine by Zwaardemaker. The four fundamentals given in the table are those given by Crocker and Henderson in their experimental study.

[4] The common qualities of uneven or smooth, hard or soft, mellow or rough, etc., are complexes of exploratory perception combined with kinaesthetic elements.

Source: Piéron, H. (1952). The Sensations: Their Functions, Processes and Mechanisms. London: Frederick Muller.

While taxonomies of sensation are a useful means of providing analytical categories, it is important to remember perception involves the whole body. "Experiential modes cannot be reduced to a set of immediate sensory qualities" (Leder, p. 73). Ihde (2002) suggests that there is a sensorial synthesis of all of our whole-body perceptions as we interact with the world. Thus, sensations are never separable or discrete and, phenomenologically, our experiences are structured by all of our senses (Ihde, 2002). Because "whole-body, ordinary activities occur within complex environments in which much is simultaneously occurring" (Ihde, 2002, p. 38), attention involves focusing on a specific aspect. Ihde (2002) explains:

> We therefore must focus our attentions upon those aspects of this complex field in such a way that our intended actions may be carried out. Thus, if I am a bird-watcher, I will focus upon the goshawk chasing the kingfishers over my pond, rather than attending to the music coming from the floor below (although the focus cannot eliminate the sound of the music, it pushes it into the background). Similarly, though in a more controlled form, the instructions that determine what it is that I am to look at or see in the constructed experiment rely on this ability to perceptually focus. In this case the very ability to focus helps to enhance the quasi-illusion of a pure visual phenomenon by subduing the other sensory dimensions. (Ihde, 2002, p. 38)

For Ihde, perception occurs in a "plenary gestalt": As a whole body activity, a person's perception is enacted in relation to the environment he or she is experiencing. To understand better the perceptual process implications of what Ihde puts forward, we can turn to Noë (2006) and his concept of action in perception. Noë argues that our perceptions are determined by the things we do and the things we know how to do. Thus, perception requires self-awareness. Noë underscores that this self-awareness is enactive. This enactive approach provides a useful way of thinking about the gestalt of perception: it underscores a theoretical starting point where intersomatic awareness is framed as perceptual phenomena to be analysed and developed through bodily action (Dreyfus, 1979; Ihde, 2002; Merleau-Ponty, 2014). Sensation, thought, and movement

are so integrated that, in the face of a stimulus, sensations are modulated instantly and innately. In short, we act:

> A sharp sound makes us turn in the direction from which the sound emanates. A ball rushes toward us and we reflexively duck… In this sort of way, and in countless ways like this, sensory impressions are immediately coupled with spontaneous movement. (Noë, 2006, p. 6)

This kind of sensorimotor integration is inherent to and pivotal for games. It is at the basis of what Nørgård (2012) means when she refers to corporeal-locomotion. It is what Shusterman (2008) refers to when he argues that the body is our most primordial tool. He says:

> Just as skilled builders need expert knowledge of their tools, so we need better somatic knowledge to improve our understanding and performance in the [action of design]... . More discerning awareness of our somatic medium can improve its use in deploying all our other tools and media; for they all require some form of bodily performance, even if it is a mere pushing of a button or blinking of an eye. (Shusterman, 2008, p. 4)

The case I am making in this thesis is that for game designers this discerning awareness is intersomatic awareness.

## An Ecological Approach: The Design Ecology of Enactive Perception

From a design perspective, at the centre of this notion of enactment in a plenary gestalt is an "ecological design" approach. Two theorists are most useful to inform the discussion of ecological design in the context of intersomatic awareness: Bateson and Gibson. Bateson's (1972) contribution to cybernetics, and thus gaming, has been examined in the literature (see Harvey (2009)), but I want to draw specific attention to his concept of "ecology." An exemplar from his work is his discussion of the large-scale industrial pollution in the 1960s of Lake Eerie (a North American lake bounded by Canada and the United States), which saw significant areas of its body declared dead by

the 1970s. “You decide that you want to get rid of the by-products of human life and that Lake Erie will be a good place to put them,” writes Bateson. “You forget that the eco-mental system called Lake Erie is a part of your wider eco-mental system—and that if Lake Erie is driven insane, its insanity is incorporated in the larger system of your thought and experience.” For Bateson, an imbalance of mind and the body are related to unhealthy ecological conditions. What I want to underscore here is not the potential for imbalance, but the conceptual shift in thinking about the relationship between body and environment from a functional relationship to a relational one. It is not that the body of water is anthropomorphised, and thus is a body, but that this anthropomorphisation creates a lived relationship where the actions of one body on another body change the way we feel about the relationship.

Gibson emphasises that an ecological approach necessitates acknowledging that there is a meaningful relationship between the animal and its environment (Gibson, 1950) and that the term “environment” includes not only material objects, situated and with sociomaterial relationships, but other “bodies.” The emphasis is on considering what affordances the environment offers these situated bodies and, importantly, the interrelations between them. The concept of affordances has been applied in game studies to discuss games and gameplay (Gee, 2003, 2008; Linderoth, 2013; Linderoth & Bennerstedt, 2007; Rambusch, 2011) and Linderoth (2013) has presented a useful definition of ecological gameplay; namely, “to perceive, act on and transform the affordances that are related to a game system or other players in a game” (p. 8). This definition can be extended to the domain of intersomatically aware design by highlighting the bodily enactment inherent in this definition. It is worth considering too the lived bodies that exist in this conception of intersomatic awareness. Intersomatic

awareness involves attending to the communicative exchanges between bodies. An intersomatically aware design approach privileges interbodily relationships. In the case of this thesis, this privileging focused on "designer<--->player" or "designer<--->player-player" bodies.

Considering the relationships between lived bodies and ecological design is relevant and important to this investigation into intersomatic awareness. Equally important is the holistic underpinnings of the concept of "intersomatic." Intersomatic is, put simply, "between bodies," but intersomatically-aware design requires the designer to understand that these bodies are part of a larger ecology: a design "whole." Nelson and Stolterman (2012) address this very concern, when they write:

> Thinking in terms of emergent wholes is important for every design no matter the scale or consequence…. The notion of the whole is a foundational property of design that is realized through the careful and creative ordering and organizing of elements through intentional relations and connections. (p. 102)

## Terms and Definitions

Several terms circulate through this thesis that require some clarification, as they have both everyday meanings and meanings that pertain specifically to this research context. Here, I will review these terms so that it is understood what I mean when I use these terms:

**Soma/ Lived Body:** This research begins with the proposition that the "body" under examination here is not a mass of flesh, muscle, and tendons segregated from the mind or its environment, but is a "lived" body, a soma. Throughout this thesis I will use the term somatic to emphasise the lived and experienced *unity* of mind and body. While my preference is to use the word somatic or soma, following the example of Leder

(1990), the term body will be used to mean a shortened form of the phenomenological concept of the "lived body" to be interchangeable with soma or somatic.

**Somatics/ Somatic Awareness:** The concept of somatics emphasises design "as a compilation of body-oriented practices," but equally suggests that design occurs in a wider ecological system. In order to engage in these practices the designer needs to be somatically aware. Somatic awareness—"the ability to perceive, interpret, and act upon the basis of one's own internal bodily sensations" (Bakal, 2001, p. 232)—is a powerful design tool. It is present during the design process but often not the explicit focus of the designer.

**Corporeal/ Corporeality.** This term will refer to the player's and designer's physical real world body. As such corporeality will be used specifically to refer to engagement of the physical corpus.

**Embodiment.** Embodiment is an overarching term used throughout this thesis to signify attention to the phenomenal lived body (soma). Where the term embodiment appears there is a recognition of the body as the "subjective source or intersubjective ground of experience" (Csordas, 1999, p. 143).

**Intersomatic.** Intersomatic means in the context of this thesis "between bodies." It is useful to articulate what constitutes an intersomatic relationship. Intersomatic is meant to represent that the somatic experience of playing and designing a game involves the player and designer interacting with multitude bodies, in the game and outside of the game; off-screen and on-screen. I purposely conflate the traditional perspectives on "in-game" and "out-of-game" worlds— this is to signify that my underlying philosophical approach is one where gaming ecology is pivotal.

**Gaming Ecology**. I understand this to mean the overall context in which the player functions and the relationships between physicality and virtuality in regards to the player's and designer's experience. To speak of a player playing a game involves the entirety of the game gestalt: player, environment, controller, other bodies, game, and game bodies.

# Chapter 3: Theoretical Framework

## Attending to the Somatic Modes of the Absent Body

The overall objective of this thesis is to examine intersomatic awareness in the perceptions and practice of game designers. In the previous chapter, I identified the key gaps in the literature, highlighting the need for research which examines intersomatic awareness in design from the standpoint of designers themselves. I concluded the review by underscoring that knowledge of sensory and perceptual engagement is core to this intersomatic understanding. However, data on such phenomena are often difficult to acquire because the body is usually hidden and embodied experience is often hard to research. This inaccessibility creates a dilemma, with which some theorists have attempted to engage, and which therefore offer some possible avenues to shed light on these complex experiences. This chapter, then, presents the theoretical framework that guided the methodological and analytical decisions I made during the research and which sought to build understanding of how designers attended to gameplayers' somatic experiences. It describes how the experiences of the designer can be represented and analysed. The framework consists of four theoretical components:

1. Poyatos's semiotic structuralist work, which discusses channels of intersomatic communication (Poyatos, 1983, 1988, 2002)
2. Csordas's paradigm of the somatic mode of attention (Csordas, 1993, 1994)
3. Leder's concept of the absent body (1990)
4. Damasio's concept of the somatic marker (1994, 1996)

I will close the chapter with a summary of the framework, and point to how it will be applied to empirical data later in this thesis.

## Intersomatic Communication

Prior to discussing the components and processes of intersomatic awareness, it is useful to situate the concept theoretically within its wider knowledge domain. This necessitates considering "intersomatics" and "awareness." In the phenomenological sense, a soma is a lived body, one that *experiences*; awareness is experiential understanding. Intersomatic awareness is a type of body awareness that involves understanding how somas communicate intention and meaning. And though lived bodies communicate through verbal and nonverbal means, the emphasis in this research is on the nonverbal, the bodily-based forms of communication through which bodily knowledge is shared.

### Nonverbal Communication

While outside the scope of this thesis, it is important to realise that there is a long history of multidisciplinary research considering bodily-based communication, which has generated various labels to designate this area of study (Katz, Katz, Knapp, Wiemann, & Daly, 1983, p. xviii), such as body language (largely considered pseudo-scientific), kinesics (Birdwhistell, 1970), coenesis or coenetics (Harrison & Knapp, 1972; Wescott, 1966), and semiotics (Sebeok, Hayes, & Bateson, 1964). However, out of all of these labels—and despite concerns that "the formula 'communication minus language = nonverbal communication' is clumsily negative, simplistic, and

obscurantist" (Sebeok, 1977, p. 10)—nonverbal has gained the most traction and today there is a "coherent field of 'nonverbal behaviour'" (Kendon, 1994, p. 321).

While the term nonverbal communication was used earlier than the 1950s, the publication of the pioneering work of Ruesch and Kees's (1956), *Nonverbal Communication: Notes on the Visual Perception of Human Relations*, marked a critical juncture. This was so not only for the use of the term, but because it was "based on cybernetics and the mathematical theory of information (which regarded all intended or unintended behaviors as informative)" (Poyatos, 2002, p. xvii). This turn towards cybernetics then led to the development of a structural approach to the analysis of the body (1974) amongst key theorists in the field of nonverbal communication (e.g. Ekman & Wallace, 1969; Kendon, Harris, & Key, 1975; Raffler-Engel, 1980; Sebeok et al., 1964). This approach focused on bodily action, and thus, the favoured unit of analysis came to be interaction (Morrison, 2010).

Typically, the study and analysis of bodily communication from a structural approach involves considering the multiple channels through which communication occurs (Burn, 2009; Burn & Parker, 2003; Carr, Buckingham, & Burn, 2006; Hurdley & Dicks, 2011; Kress & Van Leeuwen, 2001; Norris, 2004). Katz and Katz's (1983) early anthology on the subject, for instance, identifies five core communication channels: proxemics (the use of space); kinesics (motion or action behaviours); haptics (touching behaviours), objectics (communication through objects), and paralanguage (vocal utterances including aspiration). Each channel provides a "stream of information" and the researcher will:

> interpret/decode the event not from one stream only, not from the total of them, but from their juxtaposition. By sifting through the pattern of streams, the pattern of patterns, reacting to individual bits of information, and to the larger pattern of

> congruence versus incongruence, which is the pattern of all the patterns, the observer will finally reach a judgement. (Katz & Katz, 1983, p. xvi)

Thus, they argue that understanding the nonverbal is a process of disintegrating and re-integrating. Disintegrating involves organising communication channels into manageable modes—always while acknowledging that these communication channels have a tendency to overlap. Reintegrating is a holistic process, which involves identifying patterns of congruence and incongruence.

Within the literature on nonverbal communication, intersomatics is primarily addressed by Poyatos in his comprehensive three-volume work, *Nonverbal Communication Across the Disciplines* (2002). According to Poyatos:

> The mechanisms of personal interaction based on intersomatic exchanges—without neglecting our exchanges with other species and with the environment—is not only the living foundation of all social achievements in the history of civilizations, but the basis of any behavioral analysis in many fields of study. (Poyatos, 2002, p. 32)

Intersomatics is the foundational structure of his paradigm and he suggests that intersomatic communication is the starting point for which all discussions of nonverbal communication must begin. At the core of Poyatos's (2002) discussion is the identification of intersomatic communication channels through which sensory interaction exchanges occur.

## Intersomatic Communication Channels

Poyatos (2002) argues that the emission and perception of intersomatic constructs and expressions occurs via a net of interbodily channels, which the researcher must acknowledge. Poyatos (2002) states:

> For only then can we realize to what extent our interaction with others—and how we conceptualize it, depends on exchanges of signs and messages on a somatic

> level and, beyond the bodies themselves, between us and whatever surrounds us, that is, on their coding and decoding between at least two individuals and their environment. (p. 57)

This analysis of interbodily communication requires consideration of sensory perception, contextualised in both space and time. According to Poyatos there are two basic dimensions of sensory interaction: the proxemic and the chronemic. Proxemics, a term coined by Hall (1966), refers to the spatial relationship between bodies[10] (Poyatos, 1972). Chronemics, a term coined by Poyatos in 1972, addresses the temporal[11] (Poyatos, 1976). Communicating bodies have a proxemic, as well as a chronemic relationship. For instance, the relationship between bodies can involve both physical and temporal distance: the length of "interpersonal silences" or the duration of "human or environmental olfactory memories" (Poyatos, 2002, p. 31). The receiver's perceptual systems involve the intersomatic channels of vision, audition, olfaction, gustation, dermal, and kinaesthetic sensations. The emitter (human, animal, or environmental) sends information that is kinetic, acoustic, chemical, thermal, or dermal in nature, and that can be further characterised (where relevant) in terms of size, shape, strength, consistency, colour, and weight.

Each communication exchange involves direct and synaesthesial sensory perceptions (see Figure 1). According to Poyatos (2002) there are 21 direct processes

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[10] Poyatos defines proxemics as "people's conception, use and structuration of space, from their built or natural surrounding to the distances consciously or unconsciously maintained in personal interaction" (1983, p. 139).

[11] Poyatos defines chronemics as "our conceptualization and handling of time as a biopsychological and cultural element lending specific characteristics to social relationships and to the many events contained within the communicative situation, from linguistic syllables and fleeting gestures, through meaningful glances and silences, to the duration of a whole encounter" (1983, p. 139).

(indicated by the solid lines in Figure 1), which occur when a body generates a stimulus and activates the receptors of another body:

> sound waves transduced into neural impulses within the auditory system results in hearing; a chemical stimulus impinges upon the olfactory nerve and produces a smell sensation; temperature changes in one body are perceived through the other's dermal senses; the irregularities of a road are felt kinesthetically transmitted through one's shoes or the mediating bicycle seat, automobile seat or horse's saddle and body. (p. 34)

The entirety of Poyatos model is represented in the figure on the following page, which depicts the complexity involved in intersomatic exchange.

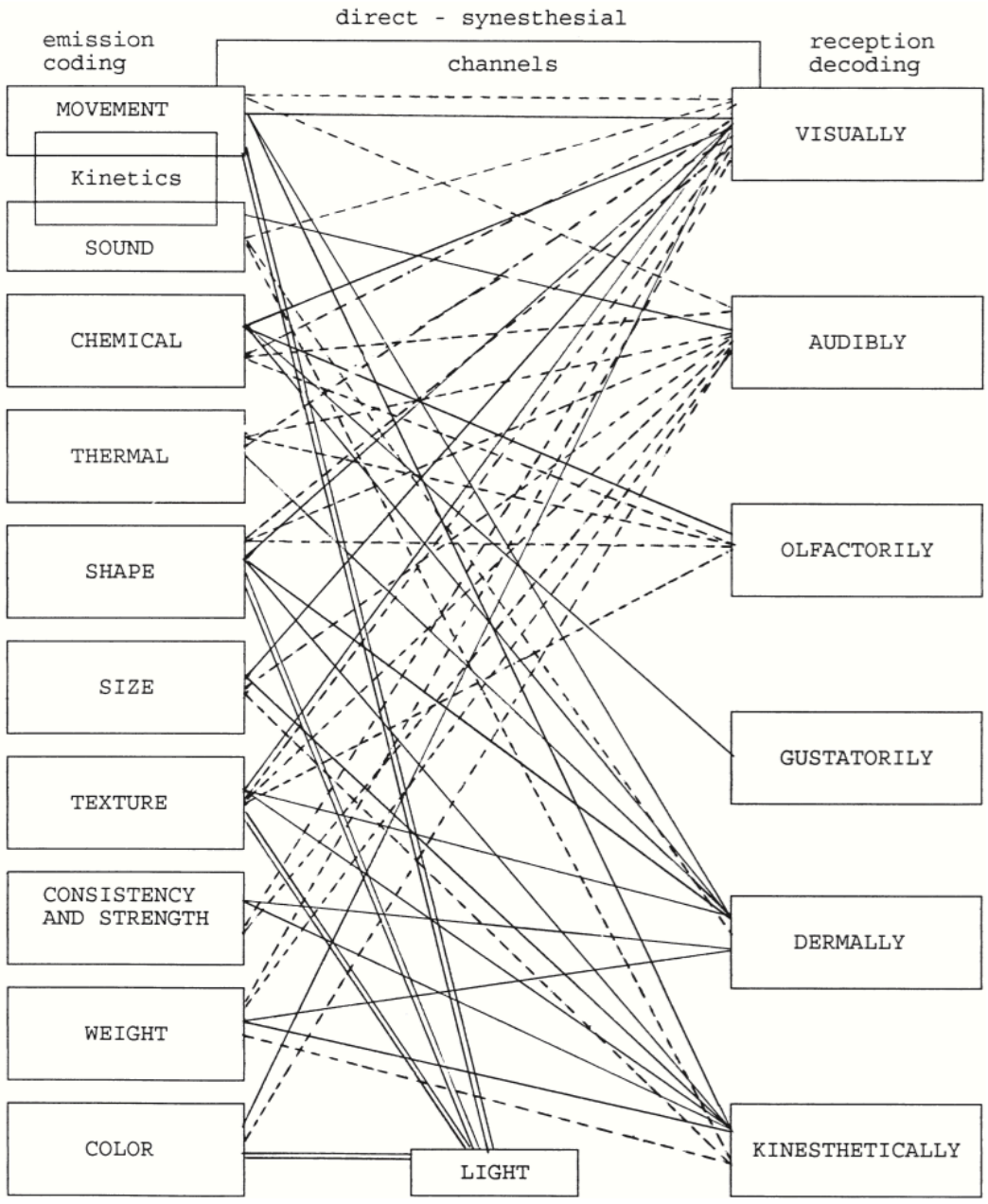


**Figure 1. Channels of Intersomatic and Environmental Sensory Perception.**
Source: Poyatos (2002)

Out of all the direct ways of perceiving bodies and the environment, Poyatos considers kinaesthesia—"the perception of the position of our own body and its members in space and with respect to the substratum and whatever we come in contact with, through muscles, tendons, nerves and joints" (Poyatos, 2002, p. 34)—to be the most effective:

> Kinaesthetically, we feel people's bodies in all sorts of social situations and behaviors: in the subtle tremor of a shiver, in a handshake, in a romantic or emotional encounter, while dancing…. As well, we receive kinesthetically all kinds of sensations of the environment, from an airport's moving travellator under our feet to the very ground we tread or drive on, to the act of tugging at a bell's chain as we ring it. (Poyatos, 2002, p. 34)

Poyatos's framework also contains 23 dotted lines indicating synaesthesial perception. He defines synaesthesial perception as "the physiological sensation on a part of the body other than the stimulated one; or put otherwise, the psychological process whereby one type of sensory stimulus produces a secondary subjective sensation from a different sense" (Poyatos, 1983, p. 36). The ability to see such things as the smoothness of a glass without actually touching it or to see a movement from hearing a set of footsteps is, for Poyatos, a pivotal component of sensorial experience. Furthermore, memory is an important component of synaesthesics. To make these types of associations requires having already experienced the sensory interaction that synaesthesia connotes.

During an intersomatic encounter, the body is a "continuum of possible communicative activities" (Poyatos, 2002, p. 50) that involve direct and synaesthesial emission perception along myriad channels. At this point it is useful to underscore, as with all nonverbal communication, the complexity involved in considering the

relationships between intersomatic channels. The fact Poyatos divides his intersomatic model into 21 direct and 23 synaesthesial channels is indicative of the complexity of explaining intersomatic, sensory interaction. However, it is worth noting that his approach is exhaustive and is a core constituent of an equally exhaustive and comprehensive three-volume series on nonverbal communication that encapsulates his life's work.

For this research study, the value of Poyatos's work comes not from painstakingly incorporating every element of his model, but rather from the contribution his work makes more generally to the discourse on intersomatics. Specifically, what is most pertinent here is his identification of intersomatic channels as 1) they can be applied in the analysis of the empirical data, and 2) they offer a vocabulary that can be usefully applied in the analysis of intersomatic awareness in game design. His categorisation scheme is also of value because it delineates aspects of interbodily communication that can be attended to—channels that the researcher should be aware of and which informed my data analysis.

However, while Poyatos's approach provides a working vocabulary and a system of categorisation, it does not explicitly address *how* these categories can be applied in analysis. Nor does it elucidate the perceptual and practical decisions the designer makes when choreographing interbodily relations in the process of design. To understand and address these gaps, we must turn to phenomenology and, in particular, to Csordas's concept of the "somatic mode of attention."

## A Paradigm of Embodied Awareness: The Somatic Mode of Attention

For Csordas (1993), embodied experience is the "starting point for analysing human participation in the world" (p. 135). His somatic paradigm suggests the conjoining of Merleau-Ponty's "continuum of perception" and Bourdieu's "socially informed body," a marrying of perception and practice. Merleau-Ponty's attention to analyses in the "domain of perception" and Bourdieu's attention to the body, addressed in the "domain of practice" allows the researcher to define a dialectic between "perceptual consciousness and collective practice" (Csordas, 1993, p. 137). This dialectic of understanding sees the augmentation of perception from a bodily process to a somatic mode of attention. For Csordas (1993) a somatic mode of attention is a culturally elaborated way of "attending to and with one's body in surroundings that include the embodied presence of others" (Csordas, 1993, p. 138).

Perception begins in the body. Merleau-Ponty (1964b) suggests that it is our "bodily situation" which allows us to "grasp" external space:

> A "corporeal or postural schema" gives us at every moment a global, practical, and implicit notion of the relation between our body and things, of our hold on them. A system of possible movements, or "motor projects", radiates from us to our environment. [Our body] is our expression in the world, the visible form of our intentions. Even our most secret affective movements... help to shape our perception of things. (p.5)

The shaping of our perception of things is the point at which Csordas's concept of attention can meaningfully fit. Attending to a bodily sensation does not involve attending to the body as an isolated object but rather attending to how the body is situated in the world, argues Csordas. "The sensation engages something in the world because the body is 'always already in the world'" (Csordas, 1993, p. 139). If attention involves bodily sensation, then attending to the body's situation in the world involves considering the intersubjective milieu we share with others that gives rise to that

sensation. One pays attention *with* one's body *to* another's body (Csordas, 1993). As Merleau-Ponty puts it:

> In so far as I have sensory functions, a visual, auditory and tactile field, I am already in communication with others taken as similar psycho-physical subjects. No sooner has my gaze fallen upon a living body in the process of acting than the objects surrounding it immediately take on a fresh layer of significance: they are no longer simply what I myself could make of them, they are what this other pattern of behaviour is about to make of them. Round about the perceived body a vortex forms, towards which my world is drawn and, so to speak, sucked in. (Merleau-Ponty, 1982, p. 411)

Csordas (1993) further argues that "because we are not isolated subjectivities trapped within our bodies, but share an intersubjective milieu with others, we must also specify that a somatic mode of attention means not only attention to and with one's own body, but includes attention to the bodies of others" (p. 139). Merleau-Ponty conceives the body as "an effective agent," and one which does not feature an ontological separation of mind and body. For Merleau-Ponty, the body has two sides. It is sentient and it is sensible. Crossley (1995b) explains: "It sees and can be seen, hears and can be heard, touches and can be touched…. [so that] perception is based in behaviour [and is] constituted by an active relation of the body to the world" (Crossley, 1995, p. 46, 48). At the heart of this relation is "intercorporeality" (Merleau-Ponty, 1964a). Crossley (1995b) suggests that this intercorporeality denotes a "primordial carnal bond between human beings" (p. 58). A "carnal intersubjectivity" (Merleau-Ponty, 1964a, p. 173) where "thoughts, feelings, and intentions… do not belong to an inner realm which is only accessible to a solitary subject. They manifest in conduct in intermundane space and are therefore accessible to all" (Crossley, 1995b, p. 58). This involvement in the social world brings us to the second aspect of Csordas's paradigm: that a somatic mode of attention "includes culturally elaborated attention to and with the body in the immediacy of an intersubjective milieu" (Csordas, 1993, p. 139).

To articulate further this concept of "culturally elaborated attention" Csordas turns to Bourdieu, citing, in particular, Bourdieu's notion of "habitus," a concept that sees the socially informed body as the ground of collective life. According to Csordas (1993), Bourdieu's focus on the body as considered through the domain of *practice* offers a complement to Merleau-Ponty's work in the domain of *perception*. Habitus, a "conductorless orchestration" of practices, connotes for Csordas that "embodiment need not be restricted to the personal or dyadic micro-analysis customarily associated with phenomenology, but is relevant as well to social collectivities" (Csordas, 1993, p. 137).

It is *body hexis*, the performative side of habitus, that "denote[s] the various socially inculcated ways an individual moves, carries, and positions his or her body in the lived world" (Throop & Murphy, 2002, p. 188). In Bourdieu's view, body hexis is closely associated with both systemic and individual "pattern[s] of postures" that express our bodies' motor function, and that exist with a larger "system of objects" (Bourdieu, 1977, p. 87). "What is 'learned by the body' is not something that one has, like knowledge that can be brandished, but something that one is" (Bourdieu, 1990, p. 73). To explicate:

> These habitual body postures, movements, and expressive orientations serve to guide sensual perceptions of one's own body and the bodies of others. *Body hexis* as the collection of ways in which our bodies are conditioned to habitually stand, speak, walk, and move is therefore a central means by which our identities become somatically informed and grounded. *Body hexis* is in other words a form of body memory, which is crystallized through practical interaction with the structure of the environmental surround. The "practical mimesis" underlying *body hexis* is based on the idea that "schemes are able to pass directly from practice to practice without moving through discourse and consciousness." (Calhoun, LiPuma, Postone, & Krais, 1993, p. 74)

Given the extent to which game designers' "work is bound up with the body" (Aalten, 2007, p. 111), I needed a theoretical approach which could be usefully applied to an

examination of the bodily practices of design. Csordas's somatic mode of attention and, in particular, the dialectic relationship between perception and practice, offers a useful means of understanding body knowledge practices and reveals useful ways for thinking about game designers and the process of design.

## The Absent Body

> *Human experience is incarnated. I receive the surrounding world through my eyes, my ears, my hands. The structure of my perceptual organs shapes that which I apprehend. And it is via a bodily means that I am capable of responding. My legs carry me toward a desired goal seen across the distance. My hands reach out to take up tools, reconstructing the natural surroundings into an abode uniquely suited to my body. My actions are motivated by emotions, needs, desires, that well up from a corporeal self. Relations with others are based upon our mutuality of gaze and touch, our speech, our resonances of feeling and perspective. From the most visceral of cravings to the loftiest of artistic achievements, the body plays its formative role. (Leder, 1990, p. 1)*

While Csordas' work gives us the concept of the somatic mode of attention, and thus provides us with an embodiment paradigm for understanding both the self and the other that can be usefully applied to design, Leder (1990) offers a more particular understanding of the parameters of a "somatic mode" and, in doing so, points to how the incorporeal or unseen aspects of the body become corporeal (Smith, 2002). Leder's seminal text *The Absent Body* (1990) identifies a fundamental paradox of bodily presence: "While in one sense the body is the most inescapable and abiding presence in our lives, it is also essentially characterized by absence. That is, one's own body is rarely the thematic object of experience" (Leder, 1990, p. 1).

At the heart of Leder's (1990) discussion is the concept of absence. Absence, in Leder's usage, refers to the "being-away of something" (p.22). The Latin roots of the word points to its meaning: *esse* connotes "being" and *ab* means "away." The absent

body, therefore, is the being-away of the body. Leder divides the phenomenon of absenting into two modes—*dis*appearance and *dys*-appearance—and, in doing so, highlights the dialectical relationship between awareness and concealment. Disappearance, suggests Leder, can be considered a primary absence; dys-appearance, a secondary absence.

Disappearance is the body's default state. It has two aspects: ecstatic awayness and recessive awayness. Ecstatic awayness involves the sensorimotor surface of the body and the exteroceptive sensations (sight, touch, hearing, smell, taste). Recessive awayness involves the internal body and the interoceptive sensations. Underlying both aspects of awayness are the proprioceptive sensations.

## Three Types of Disappearance

There are two etiological factors involved when the *ecstatic* body disappears from thematic awareness: focal disappearance and background disappearance (Leder, 1990, p. 28). They are considered etiological factors because they have an inverse relationship with each other: the forefronting of one causes the backgrounding of the other. In focal disappearance, the body disappears precisely because it is the *focus* of experience. This is the self-forgetting that is essential to body function. In order to be able to accomplish a task, such as walking, typing, or playing a game, we have to be able to use a part of the body without consciously thinking about that part (Collins, 2010; Dreyfus, 1990; Polanyi, 1966, 1969). We forget the body precisely because we are engaging it intently.

In contrast, background disappearance involves the backgrounding of bodily regions within the corporeal field. This occurs because these regions are not the focus of our sensorimotor engagements with the world. Unused sensory capacities "recede from

apprehension" and are overlooked in our explicit awareness "not because they are focal points from which [we] act and experience but because at this moment they are precisely *not* bodily foci" (Leder, 1990, p. 25). These body parts are "relegated to a supportive role, involved in irrelevant movement, or simply put out of play" (p. 26). When we play a console game using the standard controller, the hands are the focus of our input. Our feet, the torso, "the panorama of the senses" (p.122) are backgrounded in the corporeal gestalt.

The sensorimotor surface of the body "envelops a mass of internal organs and processes" (Leder, 1990, p. 36). These visceral processes (for example, respiration, circulation, and digestion) are generally "unavailable to... conscious awareness and command" (p. 36). Leder (1990) argues that these interoceptive processes have been neglected in phenomenological discussions of the lived body. To counter this omission he presents a third form of disappearance, disappearance within the body's corporeal depths, a disappearance he terms *depth* disappearance. Because the internal workings of the body are not easily perceived, used, or acted upon through the direct senses, they recede from awareness. "In contrast to the ecstatic body, which 'stands out,'" writes Leder (1990), "I will term this the body recessive; etymologically to re-cede means to 'go or fall back'" (p. 53). Thus, in its normal functioning, this aspect of the body "falls back into unexperienceable depths" (Leder, 1990, p. 53). In design terms, this recessiveness makes the interoceptive aspects of the body hard to discern and measure and they are thus often beyond the designer's purview.

Each of these three modes of disappearance—focal, background, depth—are subject to dys-appearance. Dys-appearance is when the body *feels* distant from oneself, as "something problematic and foreign" (Leder, 1990, p.70). In dys-appearance the body

is away from a desired or ordinary state and is "marked by being away, apart, asunder" (p. 87). Dys-appearance is caused by bodily disruption and discomfort. It can be triggered when normal physiology reaches certain functional limits. Difficulty reading the text displayed on a TV screen because of poor eyesight, or neck pain caused by awkwardly holding up a book in bed for hours on end, represent bodily protests at the end of the body's functional limits. Each such problem makes a telic demand: to remedy it, a somatic change must occur. But the body-consciousness indicative of dys-appearance goes beyond functional limits. It also characterises the limits of affectivity. Rage, lethargic depression, or anxiety, argues Leder, are emotions that hold sway over the body as an alien presence that is difficult to shake. To illustrate, Leder relates a particularly anxious moment reading a paper at a significant conference:

> I discover my hands becoming clammy, my voice beginning to crack. My heart is racing and my breathing takes on a choked quality. Try as I might to focus on my talk, my attention is pulled back to these physical manifestations. I watch and try to control them, breathing deeply to calm myself and modulating my voice so that my nervousness will not show. This anxiety is undoubtedly mine, but is also something from without, fighting my efforts at mastery. (Leder, 1990, p. 85)

Such adverse states call corporeality into explicit awareness. Equally so, bodily disturbances may be triggered "by dysfunction in the motor sphere" (Leder, 1990, p. 85). A poor golf swing, for instance, renders a player self-aware. When shot after shot follows the wrong trajectory, the player innately reflects on her bodily performance. Based on the proprioceptive, kinaesthetic, and visual feedback she has received, she adjusts an element of her swing. She might open and close her hands on the grip or straighten her arm in the backswing to initiate change.

This motor dysfunction feedback loop is apparent in videogames as well. A player's inability to complete a motion—to manage a jump onto a platform, for

example—triggers a cycle of awareness, modification, and replay—as with each successive failed attempt she becomes more aware of the bodily input required to complete the move successfully and move forward in the game.

## Dys-appearance and Incorporation in a Game Context

Dys-appearance also presents itself when there are breakdowns in sensorimotor synergy. A novice videogame player confronted with navigating 3D space using first-person controls, inevitably faces a breakdown in coordination between the left and right hand. It is a difficult synergy to master the left hand's control of the camera on the left analogue stick and the right hand's control of avatar movement on the right analogue stick. Often, early attempts result in walking into walls, an inability to navigate stairs, random and unintended plummets off narrow ledges, or simply moving while staring at the ground for considerable amounts of time. These misjudgements and accompanying affective frustrations divert the player's attention back to the real-word body awareness in order that the body can be sufficiently tamed for gameplay to continue.

Dys-appearance also occurs with skill acquisition or technological incorporation. *Incorporation*, from the Latin "corpus" or body as Leder (1990) means it, involves a bringing *within* the body. This process is most notable in skill acquisition involving tools. When a tool is mastered we begin to feel through it "the experiential field it discloses" (Leder, 1990, p. 33). This incorporation involves a simultaneous mastery of skill and the acquisition of a new sensorimotor schema. Ihde (1979) describes this as an embodiment relation, "in which the machine displays some kind of partial transparency so that it itself does not become objectified or thematic, but is taken into my experiencing of what is other in the world" (p. 8). Further, with such transparency there

is always an "echo focus" (Ihde, 1979, p. 8), a subliminal awareness of the instrument at the boundary of the body. Incorporation not only involves a spatial but a temporal reach: a novel technology is mastered by the body "by incorporating its own history of hours and days spent in practice [and it is] via incorporation that abilities sediment into fixed habits" (Leder, 1990, p. 32). These fixed habits are ongoing somatic patterns that have a tendency to repeat.

When a technology makes no demands on the body, it fosters bodily concealment (Borgmann, 1984). However, should a tool, device, or technology malfunction, incorporation is disrupted. Both the body and the technology are thematised, and through this process of thematisation their differences become evident and they become not one unit, but two. With this disruption can come unexpected transformations.

To explain, Leder relates an important concept Ihde (1979). makes in *Technics and Praxis* (1979) regarding the human-machine relationship. Technology exerts an "amplification-reduction" effect on the body For instance, the telephone amplifies the auditory sensory channel of voice; however, because speaking on the telephone is a communication mode devoid of direct sight and touch, the telephone, as a technology system, simultaneously reduces the visual and tactile sensory channels. Because of these sensory transformations, each technology can be said to impart a "telic inclination"—a goal-focused (telic) inclination (Ihde, 1979). We speak in different ways on the phone than we do in person, and these telic inclinations can produce dys-appearance. In much the same way, our telic inclinations differ via the somatic modes of gaming. A game controller, the game itself, other players: all involve differing forms of corporeal relations and thus make varying and disruptive demands.

There is a final point to be made about Leder's explication of incorporation, as he emphasises the concept of *mutual* incorporation. He gives an example:

> I am walking in the forest with a friend. As we stroll we point out various things to one another: the color of the leaves, a passing bird, the changing of the seasons. I adjust to my friend's pace and she to mine. I find myself enjoying things more and in a different way than when I had come alone. We speak of other topics beside the scenery: of politics, mutual friends, movies each has seen. But then we lapse into silent enjoyment of our surroundings. (Leder, 1990, p. 94)

Leder points out that he comes to view the forest not only through his own eyes, but as his friend sees it: "Via gestures and word descriptions she opens me up to things that I did not previously perceive…. My perspective upon the world is extended through hers" (Leder, 1990, p. 94). This extension of perspective is an example of mutual incorporation. Merleau-Ponty emphasises the inherent nature of this coexistence in our way of being in the world: "Insofar as I have sensory functions—a visual, auditory, and tactile field—I already communicate with others" (Merleau-Ponty, 2014, p. 369). We discover the world through another's body:

> [A] miraculous prolongation of my own intentions, a familiar way of dealing with the world. Henceforth, as the parts of my body together comprise a system, so my body and the other person's are one whole, two sides of one and the same phenomenon, and the anonymous existence of which my body is the ever-renewed trace henceforth inhabits both bodies simultaneously." (Merleau-Ponty, 2014, p. 370)

It is important to emphasise that the two never combine to become *one*, but are always in a certain "dis-relationship."[12] They are distanced from each other's perspectives. The limits of corporeality are the basis of separation, but it is this separation that facilitates one person's perspective being supplemented by another person's. As Leder (1990) points out, "mutuality is impossible in the absence of distance" (p. 95).

[12] Leder borrows this term from Zaner (1981), who in turn has borrowed it from Kierkegaard (1992).

Mutual incorporation, like all of the other modes of bodily disappearance, can give rise to dys-appearance. This form of dys-appearance is a split created by the "incorporated gaze" of another. It is here that Leder points precisely to the nature of intersomatic awareness that I will address in the following chapters. It is through another's gaze, through the feedback she offers, that we can begin to see ourselves. But when this gaze becomes one of objectification, one of looking at, rather than looking with, dys-appearance occurs. We become self-consciously aware of our bodies when the other person conveys problematisation. These problematisations are pivotal body moments in intersomatically aware design.

## A Diagrammatic Summation

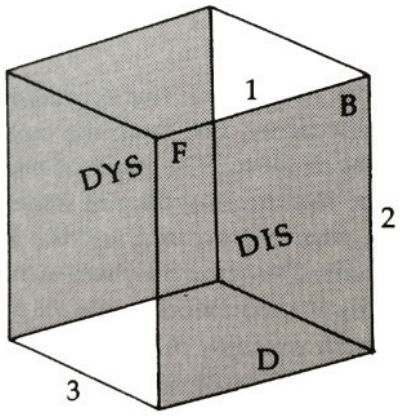


**Figure 2. Necker Cube Illustrating the Rapid Transversals between Disappearance and Dys-appearance. Source: Leder, 1990, p.104**

In his work, Leder presents four modes of absence:

1) Disappearance (DIS) which is characterised by three modes of absence: focal disappearance (F), background disappearance (B), and depth disappearance (D);
2) and dys-appearance (DYS).

To illustrate the slipperiness and flux of all of the modes, Leder provides an intriguing diagrammatic summation of the modes of absence he addresses in his phenomenological anatomy (see Figure 2). This diagram schematises the four modes of absence and three complemental series he discusses in his work. As impetus for his diagram, Leder takes inspiration from Ihde's (1986) discussion of the value of the Necker Cube in his book *Experimental Phenomenology*.

The Necker cube, according to Leder, is an apt figure to illustrate the complemental series, as it represents a reverse of itself illustrated in three dimensions. The top horizontal axis (axis 1) denotes the disappearance of the sensorimotor surface of the body. It represents the complemental series of focal and background disappearance (F&B). Axis 2 is representative of depth disappearance, denoting the complemental series between the exteroceptive disappearance of the body and the interoceptive (bodily depths). Dys-appearance is denoted by the switching of perspectives to the opposing cube face along axis 3.

At any time, moments of disruption can cause a switch between the normal disappearing mode of the body and the dys-appearing mode. With disruption—functional limits, affective disturbance, breakdowns in sensorimotor synergy, or dysfunction in the initial acquisition of body schemas—the face of dys-appearance (marked by DYS) stands out. The utility of this diagram is that it underscores the easy perceptual slippage (the rapid back and forth/ reversal) between the two modes of the absent body.

## The Somatic Marker

The term "somatic marker" was introduced by Damasio (1994, 1996) as a means to reject theories which limited human reasoning and decision-making to cognition or conditioning alone. These markers arise in "bio-regulatory processes, including those which express themselves in emotions and feelings" (Damasio, 1996, p. 1413). It is for this reason that Damasio argues the markers are considered "somatic": they are changes in body-state structures originating in the "musculoskeletal, visceral and internal milieu components of the soma" (1996, p. 1414). Typically, the somatic marker hypothesis is used to explain decision-making that runs counter to a productive outcome:

> The theory argues that affective somatic states associated with prior decision outcomes are used to guide future decisions. For example, when a choice followed by a bad outcome occurs, an affective reaction becomes associated with that choice. Once the affective reaction is sufficiently well-established, the reaction occurs before a choice is made. Anticipation of a bad outcome before the bad choice is made prevents the bad choice and leads, instead, to a better choice. Thus, a somatic marker of good and bad options guides and sustains optimal decision making. According to this theory, optimal decision making is not simply the result of rational, cognitive calculation of gains and losses but, rather, is based on the good or bad emotional reactions to prior outcomes of choices. (Hinson, Jameson, & Whitney, 2002, p. 342)

However, the concept of the somatic marker can also be applied in nuanced ways. Linquist and Bartol (2013), for instance, suggest that there are two key "myths" that pervade discussions of the somatic marker hypothesis. First, they challenge the assumption that there is a single somatic marker hypothesis, positing that the concept, in fact, admits multiple interpretations (they identify 38 distinct somatic marker hypotheses from the literature). The second myth concerns the accepted view that somatic markers play a role at each of the core stages of the decision-making process: generation, evaluation, and selection between alternative courses of action. They present, instead, a somatic marker model, which is distinct from the hypothesis in that it distinguishes a

"general account of the functional association between autonomic tags—somatic markers—and mental representations" (Linquist & Bartol, 2013, p. 457).

The most important point that Linquist and Bartol (2013) make, for the purpose of this research, is that somatic markers are related to functions beyond those of practical decision-making, despite the fact that decision-making is the context in which they are usually discussed. Further, while the frequent suggestion is that the somatic marker hypothesis explains the influence of "emotion" or "feeling" on cognition this is not Linquist and Bartol's core assumption. They are careful to point out that the intention of their model is not explain the role of emotion or feeling on cognition and that it is questionable that somatic markers are putatively equated with emotion (see also Prinz, 2006). This thesis then extends these two key premises— that somatic markers participate in more than just practical decision making and that somatic marker is a term that goes beyond signifying an emotional construct—by focusing on the use of the term "somatic marker" to demarcate a somatic state change or, in other words, a somatically marked moment.

## Summary of Theoretical Framework

The intent of this research study is not to diminish the value of existing approaches to design and analysis that foreground the cognitive or material aspects of game design and that emphasise the ergonomic or usability of design. Rather, the study examines intersomatic awareness in game design by offering a complementary perspective to these approaches.

Game design involves the generation of "bodily knowledge that is often subconscious and not easily translatable into words" (Tarr, 2008, p. 477) . While

designers may use words to illustrate their practices, that to which the words refer involves the body, and this presents a tension ever-present in research that engages with the somatic. Analysing the bodily practices of game design involves the development of seemingly objective analytic categories. Though certainly a designer's perception and practice can become "objective through a reflective moment within the process of analysis" (Csordas, 1993, p. 145), it is necessary to be aware that the definition of somatic modes of attention is a subjective process and that categories are in flux.

This chapter presented a theoretical framework that aids in the understanding of game design and intersomatic awareness. It comprises four branches that together create a framework in which to consider my research question concerning how the dimensions of intersomatic awareness can be understood through an examination of designers' experiential knowledge and somatic conceptualisations. The theoretical framework combines Poyatos's semiotic approach, which helps identify intersomatic channels or modes present in designers' practice, and Csordas's paradigm, which offers a useful lens to understand embodied experience. Through Leder we can find a "phenomenological resolution" to the question which underscores this thesis: "Why, if human experience is rooted in the bodily, is the body so often absent from experience?" (Leder, 1990, p. 69). While Csordas' work gives us the concept of the somatic mode of attention, and thus provides us with an embodiment paradigm for understanding both the self and the other that can be usefully applied to design, Leder offers a more particular understanding of the parameters of a "somatic mode" and, in doing so, points to how the incorporeal or unseen aspects of the body become corporeal (Smith, 2002). Leder's concepts of the disappearing body are helpful conceptual tools to explore designers' and players' experiences.

In Damasio, I have found a means to begin to understand the importance of a somatic marker. A somatically marked moment "calls us to the now," it issues a telic demand, and in doing so becomes a "hermeneutical" and "pragmatic" moment, that "gives rise to a search for interpretation and understanding" (p.78).

In the following chapter, Methodology, I discuss how reflective design conversations (interviews with designers) and the close analysis of videogames were the key tools for gathering empirical data.

# Chapter Four: Research Methodology

## Investigating Designer Experience

> *A phenomenological approach manifests itself as a way of living in the world that integrates intellect with sensory experience and does not flinch from that which seems to be paradoxical or ambiguous; it can be used to construct meaning, to celebrate the mundane as well as the extraordinary, or to critique thought, attitudes, or social structures. (Kozel, 2007, p. 2)*

The previous chapter laid out the theoretical foundations of this thesis, demonstrating the value a phenomenological perspective supplies for the understanding of intersomatic awareness in design practice. When employed as a method, phenomenology specifically addresses lived experience. Kozel (2007) argues that the strength of phenomenology is that it permits "a listening to the senses and insights that arrive obliquely, unbidden, in the midst of movement experiments or quite simply in the midst of life" (Kozel, 2007, p. xvi). Phenomenology offers the researcher a means to account for inner voices and sensations, thoughts, images, and ideas that have arisen out of the experience of designers themselves.

Rather than encompassing a static body of knowledge, game design, like all design, is a dynamic process of knowing (Jahnke, 2013). Game designers have an immense body of collective knowledge concerning how to address somatic processes in design. The problem is that this knowledge is not just tacit and intuitive, but is also often obscured behind an industry focus on game mechanics and technological considerations of measurement. Because of the intuitive nature of body knowledge, extracting it from the whole of a designer's practice requires an approach that emphasises reflection and dialogue. In order to examine designers' awareness of intersomatic factors, and the

resulting strategies in their design practice that flow from this awareness, it was important to adopt a methodological approach that allowed for the open exploration of concepts. Thus, I wished to facilitate the expression of diverse perspectives. In light of this, an approach which allowed for a reflective dialogue about design practice was needed. Hermeneutics, with its underlying dialectic basis, is one such approach.

## The Hermeneutic Paradigm

Hermeneutics, as a term, is indicative of a broad range of interpretive approaches rather than a unified philosophy (Patterson & Williams, 2002). The origin of hermeneutics[13] can be traced to the 17th century, where the term hermeneutica[14] was introduced by theologian Johann Dannhaeur to reflect that the Renaissance's so-called new science of interpretation was nothing more than a complement to the modes of interpretation set out in Aristotle's *Organon* (Grondin, 1995, p. 19). However, it was not until the 19th century, and with the work of Dilthey and other philosophers, that hermeneutic inquiry emerged as a domain for the study of human behaviour.

According to Patterson and Williams (2002), there are four commonly recognised philosophical orientations in hermeneutics. *Hermeneutic divination*[15], the guiding characteristic of which is that the interpretation of a text is arrived at through a divination of authorial intent. *Hermeneutic re-enactment* or reproductive hermeneutics[16] which relies on empathetic understanding as a means of directing interpretation. Empathy arises through a process of bracketing, whereby the researcher sets aside or suspends her preconceptions in order to reproduce the actual or potential lived

[13] See Grondin (1995) for a comprehensive, and highly readable, review of the origins of hermeneutics.
[14] According to Grondin (1995), Dannhaeur based the name on Aristotle's *Peri hermeneias*.
[15] Hermeneutic divination is associated with philosopher Frederic Schleiermacher.
[16] Dilthey is considered to have originated this research tradition.

experiences of another (Russell, 1988; Stewart, 1983; Wertz, 1983). *Hermeneutic reconstructionism* or critical hermeneutics[17] argues that "science must develop theory and techniques sensitive to social and authoritarian (power) structures in order to understand human action" (Patterson & Williams, 2002, p. 12). Finally, *productive hermeneutics*, the branch of hermeneutics linked to Gadamer, Heidegger, and Riceour, maintains that it is not possible for a researcher to bracket her preconceptions. Instead, productive hermeneutics sees the researcher playing an active role in the construction of an interpretation, producing meaning through the process of analysis. In this thesis, I will follow the hermeneutic research tradition of productive hermeneutics.

## Research Process

To subscribe to a hermeneutical perspective is to envision the research inquiry in its entirety as a dialogic encounter (Gadamer, 1975; Warnke, 1987). Because the emphasis of this research was on drawing out embedded and intuitive, as well as body-based, lived experience, I needed a method that allowed for the discussion of concepts and the open expression of participants' thoughts. The dialectical basis of the hermeneutic circle provided a useful mechanism for understanding the somatic practices of game designers. The hermeneutic circle is a concept which acknowledges that in any event of interpretation there is a reciprocal relationship between the whole and its parts (Snodgrass & Coyne, 1997). Phenomena are perceived by the interpreter as the parts that depend on the preconceptions about the whole; reciprocally, an understanding of the whole depends upon the meaning of the parts (Terwee, 1990).

Drawing from Heidegger, Snodgrass and Coyne (1997), explain:

[17] Karl-Otto Apel; Jungen Habermas

> The hermeneutical circle has to do with the circular relation of the whole and its parts in any event of interpretation. We cannot understand the meaning of a part of a language event until we grasp the meaning of the whole; and we cannot understand the meaning of the whole until we grasp the meaning of the parts. That is, we cannot understand the meanings of the words that make up a sentence until we can locate them in the context of the sentence as a whole; and we cannot understand the meaning of the whole sentence until we understand the meanings of the words that it comprises. By extension, the meaning of a concept depends on the context (or the horizon) within which it occurs; but this context is made up of the concepts to which it gives meaning. Any act of understanding language involves an interplay of text and context. The whole and the part give meaning to each other; understanding is circular. (Snodgrass & Coyne, 1997, p. 12)

Snodgrass and Coyne point out that although the power of the hermeneutic circle comes from its deceptive simplicity, rather than facilitating reductionist "truthful portrayals," the circle reveals powerful complexities. In this way the hermeneutic circle facilitates the development of a clearly articulated, plausible account of something that was previously puzzling and obscured (Packer & Addison, 1989).

## Data Collection

It is important in a phenomenological study that all participants have experience of the phenomenon being explored and, further, that they can articulate their lived experiences (Creswell, 2007). Thus, designers were selected for this study using a criterion sampling strategy. All participants needed to have engaged in game design. The aim was to interview a range of designers who engaged with the body in different ways in their work.

**Table 4. Study Participants**

| Participant Number | Pseudonym | Length of Interview | Interview Mode | Gender | Age |
|---|---|---|---|---|---|
| On-site Interviews at Games Event | | | | | |
| 1 | Brent Rexall | 30 minutes | Face-to-face | Male | 25 |
| 2 | Gregory Bradbury | 15 minutes | Face-to-face | Male | 26 |
| 3 | Evan Greenwood | 57 minutes | Face-to-face | Male | 28 |
| 4 | Adam Sedgwick | 16 minutes | Face-to-face | Male | 40 |
| 5 | Yin Kastlewood | 27 minutes | Face-to-face | Male | 29 |
| 6 | Martin Rivers | 21 minutes | Face-to-face | Male | 58 |
| 7 | Michael Jeffreys | 34 minutes | Face-to-face | Male | 32 |
| Interviews | | | | | |
| 8 | Adain Hargrave | 1 hour 26 minutes | Face-to-face | Male | 32 |
| 9 | Sydney Gramer | 1 hour 26 minutes | Face-to-face | Male | 37 |
| 10 | Richard David | 2 hours | Face-to-face | Male | 44 |
| 11 | Jason Chao | 1 hour 22 minutes | Skype | Male | 33 |
| 12 | Andrew Atwood | 1 hour 35 minutes | Skype | Male | 25 |
| 13 | Sylvester Wolfe | 2 hours 18 minutes | Skype | Male | 27 |
| 14 | Catherine Monday | 3 hours 1 minutes | Skype | Female | 45 |
| 15 | Martin Blakey | 2 hour 10 minutes | Face-to-face | Male | 29 |
| 16 | Curtis Murphy | 2 hours 18 minutes | Skype | Male | 29 |
| 17 | John Wellbrook | 1 hour 38 minutes | Skype | Male | 47 |
| 18 | Evan Smith | 2 hours 30 minutes | Skype | Male | 28 |
| 19 | Edwin Rosberg | 2 hours 26 minutes | Skype | Male | 34 |
| 20 | Colin Birks | 3 hours 13 minutes | Skype | Male | 27 |
| 21 | Evelyne Downing | 2 hours 29 minutes | Skype | Female | 32 |
| 22 | Daniel Mitchell | 1 hour 21 minutes | Skype | Male | 29 |
| 23 | Brian Smithwick | 2 hours 18 minutes | Skype | Male | 27 |
| 24 | Emma Ryan | 2 hours 4 minutes | Skype | Female | 30 |
| 25 | Sadwin Sullivan | 2 hours 7 minutes | Skype | Male | 33 |
| 26 | Sully Mockridge | 1 hour 44 minutes | Skype | Male | 31 |
| 27 | Aladin Docherty | 2 hours 44 minutes | Skype | Male | 32 |
| 28 | Alvin Tomkins | 1 hour 55 minutes | Skype | Male | 30 |
| 29 | Tim Thomas | 1 hour 46 minutes | Skype | Male | 31 |
| 30 | Annie Seimman | 1 hour 16 minutes | Skype | Female | 26 |
| 31 | Darwin Winchester | 57 minutes | Skype | Male | 31 |
| 32 | Jonny Bewley | 1 hour 15 minutes | Skype | Male | 26 |
| 33 | Benjamin Hillman | 1 hour 20 minutes | Skype | Male | 26 |
| 34 | Nicholas Goffin | 1 hour 33 minutes | Skype | Male | 27 |
| 35 | Angel Hammersmith* | 1 hour 34 minutes | Skype | Female | 42 |
| 36 | Michaël Samyn | | Skype | Male | 45 |

**Two-person interview*

Data collection, which also included gameplay of various games discussed (see Appendix A for list of games), occurred over a 10-month period (May 2013 to March 2014) and was divided into three phases:

- A **focus group discussion** held at an industry games event in May 2013; the event attracted 42 attendees, of whom 18 took part in the discussion. Three of the 42 participants subsequently participated in the in-depth interviews.
- Seven **face-to-face interviews held on-site** at the same gaming event.
- Twenty-eight **in-depth interviews** with 29 game designers[18] (4 female and 25 male), 3 of which were held face-to-face and 25 of which occurred over Skype.

All interviews were recorded. Most interviews lasted an hour or longer. Seven of the 35 interviews lasted between 1.5 to 2 hours. Nine interviews were between 2 to 3 hours long and two interviews exceeded 3 hours in length.

In total 75 game designers participated in this study. Of the 36 designers interviewed (see Table 4), the designers ranged in age from 25 to 58 years. Sixteeen interviewees were between 25 to 30 years of age; 13 interviewees were between 30 and 40 years of age; and seven interviewees were 40 years of age or older.

In interpretive phenomenology, the researcher aims to hear, understand, and present the voices of participants (Benner, 1994, p. 100). It is understood that these voices are a dialectical construction, managed by a process of extracting both experience and reflection on that experience from the "lived understanding" of an individual. Thus, the interviews were unstructured and conversational to encourage dialogue and reflection. The role of the interviewer in a hermeneutic study is to "lead the respondents to certain themes without directing them to express specific meanings" (Kvale, 1983, p.

[18] One Skype interview was a discussion with two designers (a husband-and-wife team).

190). During the interviews designers were asked to reflect on the trajectory of their craft and to identify how the body appeared in and influenced their work practices. As recommended by Charmaz (1991), in order to avoid imposing my conceptions on the designers and to allow the exploration of the topic of awareness from the designer's standpoint, the interviews were unstructured. In this way the emergent themes guided the exploration of the phenomena. "This type of nonstandardized approach to interviewing is possible within hermeneutics because analysis begins at an individual rather than aggregate level" (Patterson & Williams, 2002, p. 27). During the interviews, I took notes and I asked the designers to follow up on any themes they may have brought up.

Prior to discussing their design work, designers were asked two baseline questions: 1) their age and 2) whether they participated in any sports or any body practices that they felt gave them a level of body awareness (such as Yoga, Pilates or competitive sports). In contrast to my expectation that the designers interviewed would not be physically active, the designers interviewed had varied body experiences which they drew on during their game design practices (see Table 5).

**Table 5. Body Awareness Practices as Reported by Designers**

| Participant | Body Awareness Activity |
|---|---|
| 8* | Parkour |
| 9 | Cricket, squash, running |
| 10 | Fencing |
| 11 | Played Starcraft professionally. Awushu, kio karate, some kendo, tae kwon do and jujutsu |
| 12 | Badminton, running, swimming |
| 13 | Yoga/ meditation |
| 14 | Ballet |
| 15 | Gym, swimming, did street dancing once |

| | |
|---|---|
| 16 | Tennis/ golf recreationally |
| 17 | Cricket |
| 18 | Alexander Technique, Singer, Feldenkrais, Tai Chi, As a child went to Royal Ballet School, used to run a circus troop, specialises in Poi. Drummer, piano, guitar, singing, flute |
| 19 | Throat singer/ trombone player/ piano/ beatbox/ dances (freeform) |
| 20 | Jazz and tap up until 11 or 12. Played professional *Counterstrike*. Basketball |
| 21 | Capoeiria. Qigong |
| 22 | Alexander technique. Theatre practitioner. Month-long dance training |
| 23 | Ballet (as child). Plays drums |
| 24 | Yoga. Meditation techniques |
| 25 | Competitive counter strike. Ice hockey. Plays bass high level. Cross-fit. Unicycle. Archery. Hacky Sack (high school) |
| 26 | Insanity Workout. Marital arts: Tae Kwon Do and Wushu |
| 27 | Played and coached rugby. Used to do karate |
| 28 | Combat games |
| 29 | Hapkido (been doing for 12 years)--almost black belt. Yoga (for flexibility but he is more interested in breathing techniques) |
| 30 | Yoga, played competitive tennis |
| 31 | Grew up playing soccer and basketball |
| 32 | No sports, at the computer all of the time… Played tennis as a kid! |
| 33 | Kendo, kick boxing, circus skills, and fire spinning |
| 34 | Pilates. Karate as a kid |
| 35 | Yoga |
| 36 | Sex… |

**Interviewees at the on-site gaming event were not asked about their body awareness practices.*

One of the challenges that arose during the interviews was the breadth of the design work designers had completed. Designers did not discuss only one game they worked on, but instead, presented examples from numerous games that they had designed over their careers. Further, designers were often currently working on more than one game simultaneously: this included a professional work project for their employers or clients, and their own personal game projects in their spare time. Varied too were the parameters of what represented design work. Designers referenced games that were

- unfinished and long-ago abandoned
- finished but never released and thus unnamed

- never intended to be released as they were only small-scale experiments with a particular type of mechanic
- simply not to be talked about because they were prohibited by non-disclosure agreements (NDAs)

During the interviews, designers also did not restrict themselves to discussions of digital games. In fact, many of them cited the importance of non-digital games[19] to the development of their design practice. For them, non-digital design techniques not only informed their digital design practice and vice versa, but were also an integral aspect of their overall somatic experiences. Complicated too was the fact that for designers, talking about design not only meant talking about the games they themselves had designed but also involved talking about the games they played and that were memorable to them in a bodily way. A list of games (257 in total) discussed during the interviews[20] appears in Appendix A.

When necessary, in order to understand the examples designers gave, I played the games mentioned during the interviews. The emphasis during my game-playing sessions was to record through my own body the way playing the game felt (Pink, 2009). In addition, in some gameplay sessions, audio recordings[21] were used to note body-oriented experiences and sensory responses. I also wrote field notes where possible, after key moments in gameplay— such as during cutscenes or in places where the game could be paused. These notes also included analytical memos, which I wrote before and after each gameplay session. In situations where it was not possible to play the game, I

[19] Non-digital refers to physical games, LARP, board game, and table top games, etc.
[20] These are games that have been released, i.e., are in the public domain. In total, approximately 350 games projects were discussed during the interviews.
[21] Audio, rather than video recordings, were used intentionally to reduce the complexity of data collected.

watched YouTube videos of game playthroughs and Twitch TV feeds, read game walkthroughs, and reviewed commentary on gaming websites. All of this material was then used to inform the data analysis. This was a time-consuming endeavour, but necessary. The value of contextualising designer commentary by these means should not be underestimated methodologically by those wishing to pursue similar research.

## Data Analysis

As a hermeneutic study, the first step in analysing the data centred on the development of an organising system (Tesch, 1990). An organising system helps the researcher identify the core themes which allow the narrative accounts (i.e. the interviews) to be interpreted and presented in a meaningful way (Patterson & Williams, 2002). In this research the process of identifying an organising system for understanding intersomatic awareness can be considered the "process of analysis" and it is this process that is outlined in the remainder of this chapter. The final organising system, "the product of the analysis" (Patterson & Williams, 2002, p. 45), is presented in the following chapter, Results and Analysis.

In accordance with guidance provided by Patterson and Williams (2002), a five-step process to data analysis was followed. First, because the hermeneutic process of analysis is characterised by the "hermeneutic circle," the interviews were transcribed as a starting point for beginning a dialectical discussion with the data. Transcripts were then proofed, while re-listening to the interviews, in order to identify any transcription errors—particularly those surrounding the technical and specific vocabulary of game design—and to review the transcriber's approach to the punctuation. During this

proofing, in order to begin a dialogue with the data, preliminary notes were made on each interview transcript.

Next, each interview was reread in order to gain an initial understanding of the interview content so as to begin coding. Once the interviews were reread, units of meaning—interview segments that were comprehensible on their own—were identified in each transcript. In the case of this research, these meaning units were groups of sentences that provided insight into designers' intersomatic and somatic practices. In order to tease out the importance of the designers' comments it was often necessary to reread each interview. This demonstrates the circular relationship between the parts and the whole. Finally, the data were interpreted by grouping the coded meaning units under thematic labels, and considering these labels as part of the larger organising whole. Visual aids were constructed to help me organise the themes and to demonstrate how they were related.

During the analysis, it became clear that, as well as generating thematic labels, it would also be necessary to try to encapsulate the overall sensory and perceptual basis for each game. This was necessary to understand how each game was differentiated, intersomatically, from other games. Thus, a sensory ordering analysis was conducted for the games. To aid in this analysis I adapted an architectural schematic (see Figure 3) developed by Malnar and Vodvarka (2004) to chart the sensory characteristics of a space. Called a sensory slider because of the eight "sliding" bars which make up its analytic categories, the adapted tool became a useful visual aid to analyse the somatic characteristics of a game. The main adaptations made were to reduce the complexity of Malnar and Vodvarka's analytic categories and to make the slider categories relevant to games. Because the sensory ordering analyses revealed the overall interoceptive/

exteroceptive qualities of each game, it became a useful tool to identify edge cases: games in which designers' body-oriented design practices represented the extreme parameters of intersomatic design practice. These games are presented as cases in Chapter 5.

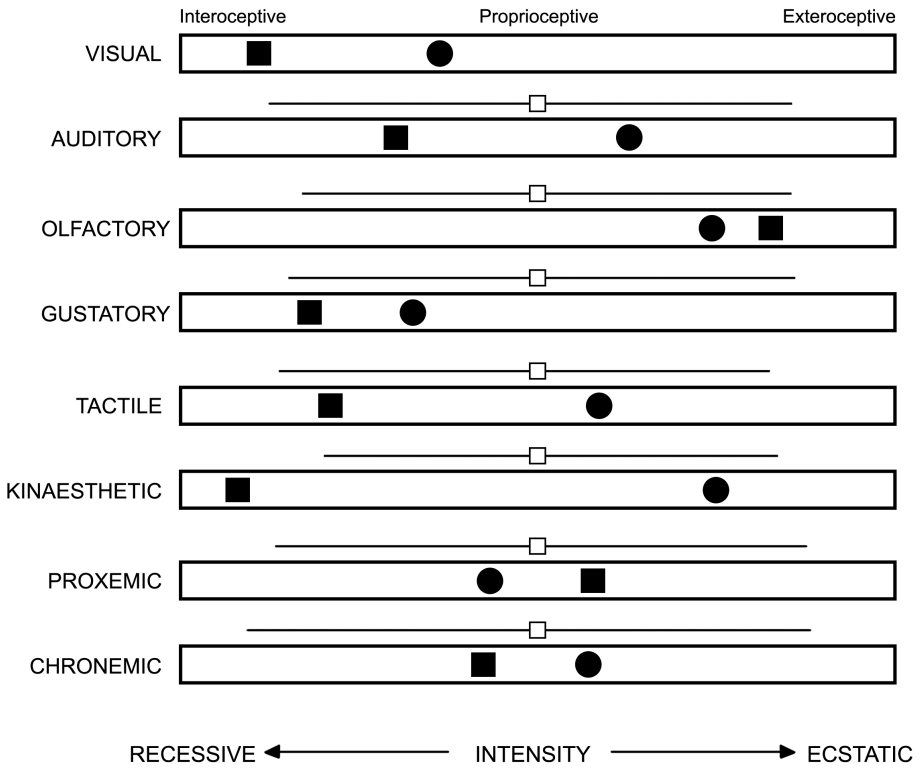


**Figure 3. Sensory Slider**

## Credibility of the Interpretive Account

There is no existing constellation of objective procedures that ensures the validity or reliability of an interpretive account (Benner, Tanner, & Chesla, 2009). However, certain "validation strategies" were undertaken to ensure the credibility of the research (Creswell, 2007, 2009, 2009; Phinney & Chesla, 2003), including recording and transcribing the interviews. Designers were included who offered a wide range of

insights into body-oriented design practices. Data collection was systematic, and the data collected were robust and offered a significant level of depth. This allowed new understandings, revealed by participants, to be incorporated within subsequent interviews and across interviews. Finally, multiple sources of data—focus group, interviews, gameplay, and industry material—allowed evidence from different sources to be collected that could confirm and contextualise findings (Anzul, Ely, Freidman, Garner, & McCormack-Steinmetz, 2003; Creswell, 2009).

## Limitations of Study Design

The benefit of this study is its reflective foundations: designers discussed and reflected on work that had happened in the past and thus made comments across a body of work, reflecting on their practice in its entirety. Nonetheless, one of the recognisable limitations of this study is that it did not address reflection-in-action, that is to say, the active task of game-making. While this was outside the scope of this study, future ethnographic studies could be conducted that involve participant observation during game-making or participant self-report interruption studies (Csikszentmihalyi, 1965).

# Chapter 5: Results and Analysis

## Themes, Ecstasis and Recessiveness

This chapter presents the results of the data analysis. It is structured into two sections. The first section presents three themes identified during the analysis: 1) the transcoding of experiences, 2) collective memory practices, and 3) design habitus. In the second section I present eight edge cases through the voices of the designers[22] who designed them—*Way* (Colin Birks), *Journey* (Jason Chao and Colin Birks), *Diploplia* (Jonny Bewley), *Flowy* (Sylvester Wolfe), *Nevermind* (Emma Ryan), *The Extraordinary Adventures of Baron Munchausen* (John Wellbrook), *The Betrayer's Banquet* (Evan Smith), and *Matching Pennies* (Curtis Murphy). The general format for each case presentation is to examine the sensory order inherent in each game through an explanation of the game set up and core gameplay; identify pivotal bodily game moments that the designer indicated as being somatically marked in his or her design memory; and to elaborate on any specific body techniques the designer may have employed during the design process.

Throughout this chapter particular care has been taken to retain the designer's voice and present the designer's comments in a way that reflects the conversational nature of the interviews.

The outcome of this chapter is a collection of situated design examples, derived from conversations with designers, which highlight important intersomatic aspects of game design. By the end of the chapter the reader will be able to link the related

[22] All names of designers have been made anonymous by assigning each a pseudonym.

vocabulary, concepts, and theory presented in Chapter 3 Literature Review and Chapter 4 Theory to design practice. This chapter, then, provides the essential praxeology for the development of an understanding of the dimensions of intersomatic awareness. In the following Discussion chapter, I will mine these example conversations, and use the resulting data to create a functioning model of intersomatic awareness.

## Algorithmic Mimesis: Game Designers Transcode Experiences

A key starting-point for understanding intersomatic awareness in game design is understanding the effect the systemic nature of games has on the design process, and the subsequent somatic considerations the designer must make in her work. A game is fundamentally a system comprised of numbers, managed by rules and algorithms (Bogost, 2006; Juul, 2005), which designers transform into meaningful and expressive experiences. "Ultimately anything on a computer is just a whole load of numbers," said Blakey, and a game is "millions of numbers that turn into [an] experience." Salen and Zimmerman (2004) emphasise the systemic and artificial nature of games, arguing that whether a game is physical or digital it is essentially "play with rules." They define a game as a "system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome" (Salen & Zimmerman, 2004, p. 80). Fundamental to this definition is that games take place as an artificial construct defined by rules. "I really see game design in terms of rules, basically," said Smith. "Here is a system with some rules and then you try and encourage good interactions, or interactions that are not frustrating… You take an interaction and you structure it in a, well not necessarily in an unnatural way, but in an artificial way." The artificiality aspect of this definition is important in the context of examining intersomatic awareness. Designers were careful to

point out that games are experiences transcoded from reality. They are not exact simulations of real world experience but simulacrums, approximations.

Transcoding an experience is complex because it is not just one experience, but is, in fact, a series of communicative exchanges that occur along multiple sensory channels that are each open for translation into the game environment. One of the challenges of bodily game design, then, is that game inputs and outputs are limited in comparison to the considerable expressive possibilities of the human body. "This is hugely difficult," said Hillman. "You've got such a large expressive range of what you can do with your body… and then you've got this very limited vocabulary of expression. You're trying to squeeze that fullness of intent that you recognise in your own body into this little, tiny... and have it mean something in this virtual avatar."

So the first point is that it is not possible, even if the designer wanted to, to exactly replicate an experience from the real world. Game design is a process of algorithmic mimesis: it involves extracting the kinaesthetic sensations from experiences to create the effect the designer desires. Greenwood explained: "You can't recreate the feeling of being tired after a jog but you can exhaust the player and make them feel like they've made an effort." Transcoding an experience involves a kinaesthetic connection—the intent to share a moment or sensory experience:

> Very often the work of art starts with the sensation that happened in the real world, something that you found remarkable or interesting that you want to share with a person. If you're a painter you're going to then paint that landscape or that situation. And if you're a game developer you're going to try to recreate that computer simulation in that situation to share that moment or that sensation with people. (Hammersmith)

Pallasmaa (2009) suggests, "A powerful identification and projection takes place in creative work; the entire bodily and mental constitution of the maker becomes the site of the work" (p. 123). Transcoding an experience involves the game designer

considering the feeling that he or she is trying to articulate, identifying the types of bodily impulses that will be generated from attempting to transcode the feeling into the game environment, then intensifying those sensations. “It’s a question of rhythm, really,” said Greenwood. Ecstasy, for instance, could be translated by attending to kinaesthetic rhythm in the phrasing of a set of mechanics in a level: “you present a challenge, then the player overcomes it, the challenge escalates, finally you reach climax and then there’s a period of calm afterwards where the player is allowed to wind down” (Greenwood).

The process of transcoding an experience is, inevitably, a process of simplification and amplification. Smith points out, “You say here’s the thing you desire and here’s a very straightforward way to get it.” This “straightforwardness” in games comes from the fact that rules are extant. Whereas achieving desire in real life can be overwhelming and multi-dimensional, in games the designer presents, through extant rules, a simplified route to achieving pleasure. Game design is very much about constructing space, about trying to understand how the rules work and making those rules easy for the player to negotiate by attending to the physicality of desire:

> Games are very sensual, very visceral pleasures about almost tricking your brain into feeling like you’re performing an activity that’s only simulated. I try to design something that I perceive as pleasurable in a very physical sense, not just the mental sense. I try to think of my games as things that feel good to do… I find it very pleasurable to experience a simulation of something that I can’t do. (Greenwood)

There is a certain idealism that goes along with conceiving game design in this way: although game development is often a team endeavour, designers have a vision they want to realise. “I get so paranoid and terrified about not doing the game justice and not doing the idea justice,” said Birks. “So if I’m going to make something and put

it out there, I need to make sure that it's good and that it's considerate and thought through. And if it's not then I should have just left it for the other guy." This designer-focused idealism, which involves determining whether a design vision is viable and the best approach to achieving it, means that most designers are focused on designing for themselves as players, at least initially in the design process. "I make games that I want to play," said Smith. "And I think, you know, a little part of me will die [if] I stop trying to do that and I start just making *Candy Crush*."

There are pragmatic reasons for this designer-focus. Wellbrook pointed out "it is difficult when you're first coming up with a concept of a game to think of anything other than yourself as the character. There's kind of an implicit thought that, you know, you are at the centre of the game because you are the designer. You are your own default." Hargrave agreed: "You're just sort of forging through this stuff and trying to figure out what doesn't feel right before anybody else gets to it so that they have an easier path into that expression space." There is a somatic quality to this default. Bradbury suggested, "I think it would be great if you could design for an actual individual body but unfortunately you generally don't get the luxury of designing a videogame for one specific person. But if you are designing for one specific body it's probably yours. Because you're the one who is moving the stick and feeling, seeing how it feels and then adjusting it."

Idealism in design, then, is not a solipsistic pursuit, where the designer has no intention of engaging with the player, but rather about authenticity. Awareness involves connections and shared space. "To be honest," said Rosberg. "I'm designing things that I would want to use. And there's something very authentic about it. It doesn't have to be narcissistic, you can find things in yourself that are connections to other people that you

know other people would be able to relate to." Sullivan referred to this authenticity as integrity. "Integrity is probably the founding core principle of everything that I do… Going as deep as possible into a mechanic and trying to explore it and trying to make the player free to explore it as opposed to applying arbitrary constraints... I regard [arbitrary constraints] as a breach of the integrity of the system, I guess."

Wellbrook, too, underscored the importance of this system integrity. He talked about game design as being a process of continual reflection and constant reappraisal, underscoring the necessity of an ecological validity in game design where the focus is on the relationships to, or interplay of system elements within, the game environment. "It's a constant looking back," said Wellbrook. "You go 'Well, will this rule work with all the other rules? Is it going to fit together? How is this one going to potentially unbalance or throw those ones off? Will it work as a whole?' Because games have to be—a set of game rules has to be a holistic whole, it has to be a complete engine, and if one element is out of balance, it will throw the whole thing off."

## Collective Memory Practices

Game design is a collective memory practice where informational patterns and design archetypes are exchanged in an active process of embodied gameplay. Through a long history of playing games, designers not only create a library of experiential design tools that they can use in their own practices but also a design "consciousness" that becomes a site of shared design practice. Designers play games as designers, critically evaluating game elements because, as Hillman pointed out, "once you've been designing and working on games for a while you train yourself to see things." Wellbrook said, "As a designer, every game you play becomes another element in your

tool kit." He pointed out that game design is "intensely iterative" and based on what "has gone before." These gameplay experiences—a designer's experiential knowledge—leave bodily traces. A game mechanic is patterned in the designer's body. Body knowledge becomes tacit knowledge. "So, if one is drawing on memories of how particular games solve problems, I think what is integral to that is drawing on the memories of playing those games," said Wellbrook. Design is not a solely cognitive process, isolated from bodily experiences, but, instead, designers rely on a set of somatic memories developed over years of practice:

> So, what you're bringing when you bring a mechanic from another game into a current design is your memory of how that game played and the mood, and the atmosphere, and the tone, and what one was doing at the time, how one was seated, how one was arranged around the table, and in some cases whether the seat was hard or soft, whether the room was hot or cold, whether the pizza was good, whether one hadn't eaten pizza yet… and the mood of the game session. I tend to bring in mechanics from games that I have fond memories of than from bad games with interesting points, or games where simply the game session was less involving. (Wellbrook)

Wellbrook argued it is not merely a particular mechanic or game element that a designer is influenced by, but the entire ecology the gaming moment fits into. The design element is part of a greater, embodied, lived experience and pivotal design moments are marked bodily in memory, lived experiences between bodies: intersomatic memories.

Another consideration for intersomatic awareness in the context of design memory is understanding design intent. Removing a mechanic from its original context transforms it. Bentley explained:

> Obviously we all play each other's games and rip each other off in lots of exciting and interesting ways. But what can happen when a mechanic is taken without understanding the objective of the mechanic—this happened when recharging health became a thing and every game now has recharging health and it was only because it was in, well it was in a few games, but I think *Halo* popularised it or *Gears of War* arguably took it on but this idea

> that I hide for a minute and then I regain health was a specific objective choice because of the manner in which they wanted the pacing of their game to work. They knew they didn't want to have save game in there so they had to have a repeated moment of play which would be about a minute long and that's what recharging health does. But then that's been renegotiated by a lot of designers who've not thought about the original purpose of it and just take it and use it without thinking about the—so the meaning isn't imported.

Inherent in Bentley's comments is the recognition that game design is about attending to connections and relationships between system entities and the game environment as an ecological whole. An unconscious adoption of a mechanic that is successful in one game without understanding the meaning behind it is in a sense a matter of authorial voice.

Designers discuss the establishment of intimacy and designer presence within games. There are these "geeky discussions that sometimes come up in groups of friends and game industry friends" said Ryan. "Should you be completely hands-off and create an experience where you're completely detached? Or is it really this intimate connection between you and the person playing your game and you need to have a presence there? Different people have different opinions on it and I think in different games, one side is maybe more appropriate than the other depending on the experience you want to create." After playing more mainstream games, such as *Grand Theft Auto V*, explained Ryan, you often do not feel the designer's presence. "You wouldn't come away and say 'I really feel like I know the lead designer on this game'…. It's just the game itself [that] people remember." In contrast, after playing games with a deeper level of intimacy, "you feel like you've experienced the moment with that person and had some insight into who they are":

> The Jason Rorher[23] games are very personal, I think to him, and so it's him communicating a facet of his life that people can relate to... it feels very much like you've had a conversation with him, [through] the game. And with the That Game Company games that Jenova creates… you can see a lot of him in the games. So you feel like you've, again, had this moment with him when you play *Flower* or *Flow* or *Journey*, of course. (Ryan)

In this way games create an empathetic connection between player and designer. Through playing the game, an intimacy is established between designer and player. There is a shared connection made through the game space. The energy the player invests in the game determines the ability of the player to be able to comprehend the significance of what the designer is attempting to communicate. Player and designer conversation through a game requires not just a commonality, but a depth of experience.

> There's a great quote from Derek Yu, the creator of *Spelunky* in the Indie Game, the movie, in the special edition bonus material or something. And Derek says how it's only after you see all of the things and the variables inside *Spelunky* and familiarise yourself with them that you can really start to have a conversation with him in the way that he thinks about *Spelunky*. Because for him … the rabbit hole goes so deep… I mean, he's obviously having a conversation with new players and teaching them and it's not like he doesn't have a relationship with them but to really I think see and appreciate *Spelunky* takes all of that work and time to really familiarise yourself and then you really start to understand and appreciate what *Spelunky* is about. And it really takes a lot of work and effort in seeing and discovery to get there. (Birks)

## Design Habitus

There is a game designer habitus derived from play and design experiences. These experiences develop essential somatic knowledge that relies on the exchange of physical cues and on sentient and sensory information (Zuboff, 1988). This somatic knowledge is "action oriented and . . . likely to be only partly explicit" (Blackler, 1995, p. 1024). Intersomatic awareness includes such things as understanding bodily reflexes and response rate, the ability to recognise spatial and movement patterns and anticipate and

[23] Developer of *Passage*, *The Castle Doctrine*, *Diamond Trust of London,* and *A Game for Someone*.

act on them. Further, it involves a sensorial perception of position, movement, or tension, and involves an awareness of the player's "orientation in space and the passage of time and rhythm as it occurs in" the phrasing or beats within a scene (Smith, 2002, p. 131). The basis of intersomatic design comes from kinaesthetic awareness. Designers have a movement sensibility that gives them the ability to sense spatial locatedness, temporality, and energy through bodily movement and to incorporate this movement into their design practice (Fraleigh, 1996) and to differentiate their experiences from those of their players.

A designer needs to be aware of the bodily benchmarks that dictate player capability. Innately a designer understands perceptual fusion in regards to framerate: the illusion of motion can be sustained at a frame rate of 10 frames per second—but the player will perceive this as sluggish—so a design target of at least 30 frames per second is perceptually better. Temporality is also applicable to player response times. When designing combat systems there are "hard limits" to what a designer can expect from a player. "Perhaps the highest skill level of fighting game requires players to respond to a prompt on screen within less than sort of one seventh of a second or something like that… a practiced player can respond in kind of 0.15 of a second, and maybe an amazing player can respond in the tenth of a second or less," said Downing. "But you can't start out level one expecting the game to revolve around responding to enemies acting on screen where you need to react faster than that."

Important, too, is understanding the design implications of a player's bodily preferences in how he or she engages with a game. For instance, a basic preference revolves around the haptic-proxemic relationship between a player's thumb and the buttons on a standard controller: when a player puts her thumb over the face buttons on

the controller, does she press with the "tip" or the "fat" of her thumb? "Most people would use the tip," said Tomkins, "but if you use the tip then you can't press two buttons at once." As a result, designers need to consider these preferences when they design control schemes. Similarly, a player's response rate is affected by whether she holds her middle and index finger over both shoulder buttons or her index fingers, or, in rarer cases the little fingers or holding all four fingers over the shoulder button at the same time.

Designers must also be aware of bodily conventions inherent in the game they are designing and the bodily preconceptions players might bring with them. For instance for a "hack and slash game" a player might expect the game action of "jump" to be on the "X" button; attacks on the "triangle"; for the square buttons and circles to be used for a range of attacks; and anything the player needed to "hold" would be inputted via the shoulder buttons.

Designers can also have an innate understand of the relationship between body time and computer time, or the time of CPU processing. "One skill I've learnt from making games," said Bradbury, "is I now have a rough sense of about how long .3 of a second is." According to Bradbury this skill results from a "narrowing" of attention (Baars, 1998; LaBerge, 1995; Raskin, 2000) of the feeling of a button press or a joystick input, but it is not a conscious process of attention. Instead, it resembles Polanyi's conception of indwelling: a "sentient expression" we "incorporate it into our body – or extend our body to include it – so that we come to dwell in it" (Polanyi, 1966, p. 16). "It's the same way you might notice a jump in framerate," explained Bradbury, giving an example of a designer adjusting a parameter in a game and experiencing a discontinuity-signalling spike in the frame rate. It is perceivable because it "doesn't feel

quite right," and there is at this point a consequent narrowing of focus. Measuring time through a button press or a joystick input, said Bradbury, "feels like a fairly bodily process and it is really feeling that… having a real sense of how heavy the springs are on it." This narrowing of attention on the physical feedback afforded by the game input gives the sense of time a "volumetric" quality (Foster, 2010).

A designer can also acquire awareness of anatomy, biology, and physiology. Ryan, for instance, needed to gain a deep understanding of the cardiovascular system in order to make her game. Wolfe learned about the physiology of respiration. Bewley researched the biological and perceptual basis of sight, and Murphy needed to understand chimpanzee hand capabilities. There is, thus, a basic level of technical body awareness that is involved in game design.

This body awareness can also involve attending to the possibility of bodily pain and physiological disruption. The designer benefits from, for example, knowing that holding a controller at a 90 degree angle for long periods of time is not possible for a player and causes "gorilla arm"; understanding the correlation between player height and screen input on the Wii; the complexity of controlling gestures in space with the Kinect or Leap Motion; recognising that pushing down on the thumbstick in combination with the fine motor control necessitated by manipulating buttons on a game controller gives players thumb cramps; an appreciation that lag on the Oculus Rift causes nausea. All of these examples are indicative of the somatic, and consequently, the intersomatic knowledge a designer may need to have.

Designers also develop a bodily knowledge derived specifically from playing the games they are designing, and quite often there will be a considerable mismatch between the respective capabilities of designer and player within the same game.

> You obviously know what the player character can or can't do and so you know how far they can jump and what would be a hard jump and what would be an easy jump… Obviously, when a player is playing through a level, they might not know from just counting tiles how long a jump is, they might just intuitively go, "Okay, this is— I can probably do this one," or "I probably need a run up to this one." (Tomkins)

Finally, the designer must understand the habitual uses of the body in game design practice and how this contributes to the felt sense of a game: what Sullivan refers to as "game feel." "There are no standard measures for game feel. We as players and designers do not attempt to measure game feel or to compare the feel of one game to another at a level deeper than is necessary for casual conversation and game production," said Sullivan. "From players, we have vague descriptions like floaty, loose, tight, and responsive. Some enlightened game designers measure response lag and move timings, but to most, game feel tuning is intuition." Parviainen (2002) highlights the paradox in discussing bodily knowledge:

> I am trying to articulate a phenomenon that happens only in bodily awareness. This articulation cannot translate bodily knowledge to a literal form; it can only indicate the existence of bodily knowledge. As a Zen philosopher would say, the finger that points at the moon is not the moon. In a sense it is living knowledge, transmitted from a body to a body very often through learning-by-doing. (Parviainen, 2002, p. 22)

## Controls and Mapping

One of the core habitual processes evident in game design is determining how the game will be played. A designer must make decisions about the game's core mechanics and determine how the player will enact these mechanics: essentially how the player will "control" the game. One element of the design path that provides a clear example of somatic experience is control-system mapping. In design, there is an understanding of algorithmic transformation in the context of the game's control system: the designer is aware, for instance, of how a button input through a controller offers a particular "felt

sense." For example, in the game *Ico* in order to maintain a connection with Yorda, the girl the player has just rescued, the player must hold her hand, and the player uses the right trigger to do this. The design decision to use the trigger, an organic analogue hand movement which requires pulling with the finger, versus mapping Yorda and Ico's handhold to the push of a button on the controller, whether that be pushing down on the thumbstick or pressing and holding the triangle, square, or x buttons, fundamentally changes the experience of being with Yorda. The interaction is an intimate relationship, one of pulling towards. The player brings Yorda into his space, and this allows the designer to create a tension for the player. Allowing the player to pull Yorda close, conversely, gives rise to the possibility of Yorda pulling away. In this way, a simple controller input allows the designer to foster kinaesthetic empathy.

> Game feel is a craft unto itself. But I think the most primary things you want to be considerate of are things like "Hey, what is the action I'm doing? How am I performing it and how can I most closely map that to this super crude interface that I have with like keys in metal or a plastic button in this controller or whatever." (Birks)

The controller is a memory device. Once held by the designer it both conjures up old habits and captures new memories, simultaneously triggering hand movements learned from years of play and repatterning ingrained hand behaviours through new consequences of play. The controller calibrates and recalibrates the player's body and in doing so creates an intimate connection with the game. The homunculus of the designer's body is the hand; it is the dominant instrument that fuels the controller. With each hand movement, the player caresses and squeezes and pushes and pulls the device, all as means to talk with the game.

Mastering the controller is a rite of passage that is involved in playing every videogame. As Wellbrook pointed out:

> It's an amazing and complicated piece of equipment that we, as gamers, assume everyone can use because we've been using them forever. But… learning to use an Xbox or PlayStation controller fluently is as hard as learning to type, and yet, we just completely overlook that…. A typical video game controller has as many input buttons and switches as a flute.

Through the controller, a synergy of body and screen is achieved, each button or trigger recording each movement the player sends in, to be digitally translated. A fundamental component of controller mastery is mapping.

According to Hargrave, mapping involves a direct one-to-one correspondence between the designer's body and the player's. He considers mapping a process of "reducing the bandwidth" down to something tight. "It's through this translated bridge… it's [about] taking all your intention and all the body movements you'd like to do and filtering it down just to what you're allowed to express to this system."

In a sense, mapping is a soft metric of intersomatic understanding. Encapsulated in the mapping process are myriad intersomatic channels: proxemics, chronemics, dermal and cutaneous haptic communications—the smoothness of a button, the precision of a trigger, the proximity of buttons to each other, the amount of time it takes to press a button and the amount of time it takes a player's button press to be acknowledged by the game system.

Through mapping, a game system communicates its intentions to the player (and, crucially, the designer shares his or her interpretation of the capabilities of the player's body). Mapping signifies an awareness of the intersomatic capabilities of the player, and the considerations a designer makes to effectively map the player's inputs to actions onscreen bely a complex somatic understanding. An object on-screen flies towards the player; the player toggles the joystick right to move. An object appears in the air; the

player presses the "X" button to fire. Mapping contributes to body awareness through a system of incorporation.

Novel implementations of mapping systems point to a designer's understanding of the functional limits of the gaming body. There are games whose mapping intentionally disrupts play. *Punch the Custard* sees players frenetically punch a bowl of custard to accrue more (literal) hit points than their opponent. In *QWOP* the player controls a character in a running race; however, Bennett Foddy, the designer, has mapped the game so that the player controls individual parts of the legs —thighs with Q and W; calves with O and P— and the result is an absolute breakdown in sensorimotor synergy. Players are pushed to their functional and affective limits, so much so that the designer received hate mail due to his absurdly amplified[24] control scheme.

All of these events, in and of themselves, constitute moments of intersomatic awareness: The designer needs to understand the multisensory possibilities of the game, and to do so she must understand the bodily capabilities of the player. She relies on her patterns of body memory, derived from a gameplay collective memory, to manipulate and calibrate the game-mapping, to perform algorithmic mimesis so that she can transcode experience. In doing so she creates sensory intensifications that become somatically imprinted in the game's gestalt.

[24] This is an intentional play on the term "absurd amplification" which Giddings and Kennedy (2008; 2010) coined.

## Edge Cases

During the interviews, designers were encouraged to discuss their design trajectory, explicating how their craft has changed over the years, with special focus on the lived body. Designers found the interviews a useful reflective frame that allowed them to consider their craft through a somatic filter. “Well, it’s just really interesting to me as a reflective exercise to think about, using [the body] as a lens on the arc of what I’ve been doing,” said Rosberg. “In what way is it *really* about the body? Because at least that isn’t the first thing that comes to mind if I were to try and describe overall what I work on. But looking at it that way, it totally makes sense.” The design conversations offered designers the opportunity to reflect on their work using an unfamiliar frame of reference. While the games the designers made were fundamentally intersomatic many of them had never explicitly discussed this aspect of their work. As Greenwood pointed out when asked how he knew he needed to attend to the body in his design, “I take that as granted. Games are so sensual, physical and visceral that it’s a given.”

Distinct somatic usage patterns are fostered by the corporeal structure of games. The interplay between hands, eyes, controller, and screen, for instance, has created a particular gaming body praxis. However, the hand-controller-screen relationship of gaming is not an invariant. “One of the strengths of designers is to reconceptualize, recontextualize, and question what heretofore was assumed fixed and to thereby prove these limits to be malleable and artificial as, of course, they are” (Krippendorff, 2005, p. 28). In the cases that follow, I elaborate on core ways the body is disrupted from the habitual patterns of gameplay as a means of showing edge cases of intersomatic

awareness. The narratives presented here highlight new ways of approaching bodily codification, and demonstrate how game technologies and body techniques also have the potential to be sites of dialogic structure. Bodily praxis, involves attention to and attention with the body, and is developed according to "overlapping regions of possibilities, tendencies and implied uses" (Leder, 1990, p. 151). In these cases we see the recording and systematising of patterns of somatic input and responses. They are practical cases of how design functions as a somatic mode of attention. For each of the games discussed there is an attention by the designers on how they can access, measure, and monitor a player's somatic state and on the game mechanisms and design practices the designer can employ to not only manipulate and alter these body-states but to reliably invoke them, to make them recognisable and repeatable (Schiphorst, 2009).

The goal of a hermeneutic analysis is to develop an organising system that allows data collected to be meaningfully presented (Tesch, 1990). The organising system for this analysis was based upon two themes, both drawn from Leder's work: the ecstatic and the recessive. The ecstatic involves games whose sensory emphasis is the bodily surface by which players engage with the world (Leder, 1990). The recessive focuses on the typically obscured sensory aspects of the body in gaming. Within each category the games are further organised into: 1) game system set-up and manner of body measurement (sensory ordering and sensory mapping); 2) how the system measures the body, what it measures, and how these measurements are integrated into gameplay practices (sensory intensification and sensory imprinting); and 3) pivotal design moments, illustrations of the challenges that the designers faced, and important considerations that designers took away from the process (somatic marking). The cases are presented as reflective narratives and are intended to be accessible and readable

encapsulations of a complex design experience that, in accordance with the interpretive phenomenological approach of this research, emphasises the individual designer's lived experience in this discussion of his or her practice. The objective of the chapter is not only to identify a set of generalities shared among the designers in their understanding of the body in their work, but to a set of definable body techniques that can be learned and shared.

## Ecstasis, or Games that Emphasise Exteroception

The cases that follow feature games that emphasise the ecstatic nature of the body in game design: *Way* (Colin Birks), *Journey* (Jason Chao and Colin Birks), and *Diploplia* (Jonny Bewley). They are games in which the designer has emphasised the visual, tactile, and proprioceptive sensory systems in the construction of bodily engagement. Further, for the multiplayer games in this section—*Way* and *Journey*—the exteroceptive nature of intercoordination between players is also discussed.

### Way

> *Tsukiji. T-S-U-K-I-J-I. It's the fish market. Basically where all the fish come into Tokyo. It's a massive place…. This is back when I was just going into my junior year of college. Or maybe senior year.*
>
> *Anyways, it's over the summer. But it's my first morning there with these other students and we're told when we get there "be back at this place—it's a shrine—at such and such time" because there's going to be a bus that comes at this time and we need to be on that bus to get back.*
>
> *So I go into the fish market and it's just amazing. And I'm there with my friends and we're just getting lost in it. We're getting all this good food and seeing all this fish that we never knew existed before. And it's this amazing place and cultural centre. We lose track of time and then we discover "Oh, my God. We have to be back at the shrine in four minutes. And we have no idea where we are and this place is massive.*
>
> *I had fortunately taken a photograph of the shrine on my phone… So I just said, I go like, "Sumimasen," which means "excuse me." And I say it just to anybody who will*

> *listen. And there's this [old] woman talking to this guy in a truck and she turns to me and I have the image of the shrine on my camera. I hold it up to her and I point at it and I just shrug…. She can see the nervousness in my face. And she immediately goes back to the guy and bows to him. She comes back to us and she just grabs me by the hand and starts running.*
>
> *And so we're now running together and my friends are following behind me for four blocks, which we never would have made unless we knew exactly where we needed to go. It was a beeline, this straight shot for where the shrine is. And we got to the shrine. And then she bows and smiles and we're all thanking her and wave and bow and stuff. And then she leaves, forever.*
>
> *You know, I'm never going to see her again in my life. But in a lot of ways I think* Way *is a sort of love letter to that moment and to her.*
>
> *---Colin Birks, designer of* Way

Colin Birks's memorialisation of a lost moment with a Japanese woman comes in the guise of a two-person online, collaborative game called *Way*.

The premise of the game is much like Birks's experience in the fish market: two anonymous strangers must communicate through bodily means to reach an end-goal. The game is an exemplar of intersomatic awareness in game design. Using the game's puppetry system, players communicate through shared body states. The game is entirely non-verbal—there is no text communication or voice chat—and features a wide range of gestures created by players. The movement mapped to the controls is not restrictive, but, instead, is highly expressive and offers multiple axes of communication. A player can wave her arms, cover her eyes, and tilt her head. The range of gestures is entirely up to the player and is deeply personal.

Players are anonymous and remotely located (i.e. they do not share the same physical space), and are matched together by the game when they join a server. Players play one of two characters, randomly allocated by the server (see Figure 4) and then are tasked with journeying alone through the game world. The game is split-screen. One

player plays in the top half; the other player in the bottom. Players navigate the world in opposite directions: one player journeys left-to-right, the other player journeys right-to-left.

**Figure 4. Characters in *Way*, with Example Gestures**

However, players never really journey alone. Because of the split-screen game view (see Figure 5) each player can see the path the other is taking. The intersomatic quality of the game comes from the inter-relations that occur between the players: Player A can see information that Player B cannot, and vice versa, and each player is forced to depend on the other to navigate obstacles that they cannot see (see Figure 5). Players cannot talk to each other; instead, they communicate through a process of kinaesthetic mimesis. Each player mimes actions for the other player to undertake. At key points in the game, then, players choreograph each other's moves. Thus, the players

are intimately connected and depend upon a dialectic between intersomatic channels to successfully navigate the game-world.

**Figure 5. Split Screen View of *Way***
Player B (bottom of screen) mimes for Player A (top of screen) how to move a box so that she can then jump on platforms.

The game has a simple control scheme. The player controls her character using the mouse: a left mouse click controls one hand; a right click, two hands; and the head is controlled by clicking on it and moving it around. "It's pretty much a simple platformer," explained Birks, "but because you can wave your arms really crazily and move your head a bunch, suddenly there's so much life in that." Birks intensified the tactile and proprioceptive systems through his sensory mapping decisions. Because the player uses the mouse to control arm movement, the entire movement chain from hand to arm gesture in virtual space is incorporated into the player's body. "It's literally taking your hand, and when you move your hand in physical space, that translates to the

character moving his hand in digital space, it's full of real physical life and motion, because all of the motion is actually derived from the person's own physical body."

For Birks, the fact that players communicate through gestures, rather than through voice or text, opened up interesting communication possibilities and increased the game's expressive potential. "For *Way* it was about communicating with this puppetry system and knowing that I could do like things like invisible platforms that created interesting rules that would leverage that conversation between this person and this other," said Birks. "So it was all about how can I make you communicate and how do you communicate in an interesting way… I think that's where it started for me. How do I just get you feeling connected to a person and giving you a way to express yourself that is communicative and interesting and doesn't come off cold or almost mathematical?" According to Birks, the gameplay in *Way* is "so expressive and human" that each player knows in a bodily way what the other player is trying to say. "When they're nodding really fast up and down and they're jumping up and down and waving their arms, you can see when they're mad. You can see when they're happy."

Player A

Player B

**Figure 6. Hidden Platform Mechanic in *Way***

Split screen view of both Player A screen (left figure) and Player B screen (right figure). Player A cannot see how to get from the box she is standing on to the ledge above because the platforms are invisible. Player B can see the platforms. Player B can thus gesture where and in which direction Player A should jump.

*Way* affords an endless variety of "indexical practices." Players "make discriminations, and highlight, emphasize, elaborate, and interpret [the game] world and orient each other to it" (Streeck, 2009, p. 59). The orientational gestures the players employ in *Way* are not only incorporative, but are illustrative of the spatial process of "clearing" (Dreyfus, 1990; Heidegger, 1962). Through clearing, an uncomprehended setting, in this case the game space with hidden platforms and affordances, "is transformed into a field that is jointly known and understood by the [players]. Where there was opacity, there is now transparency: we can see what is the case, what is going on, what is wrong, and what needs to be done" (Streeck, 2009, p. 59)

One of the design objectives of *Way*, said Birks, was to explore how the unified notion of time and place can be interpreted. "Time and place is a collection of, or a map of, moments through time, and it's not just independent in that it only exists in the present, but that present is a cumulative result of all of its past as well, and is also tied to the future." Players' understanding of space is bound by time, and, equally, their understanding of time, is bound by place. Birks thus binds proxemic and chronemic relationships along a path of somatic moments, a felt path.

Birks underscored the importance of rhythm in players' construction of this spatio-temporal meaning. Rhythm amplifies the intersomatic exchanges between players in the game. "It's like someone's sending out a signal and someone else is taking that in and they can play with it or they can send it back," said Birks. "And there's something very dance-like to that." Birks's reference to dance is not unexpected. Like his experience with the old woman in the Japanese market, his early experiences as a dancer influenced the puppetry system of *Way* and contributed to his understanding of temporal cues and

temporal signalling. “I can’t say that had I not danced I wouldn’t have made *Way*… but [through dance] I learned to communicate in some ways with my body. And certainly that is paramount in a game like *Way* where people are actually… trying to inhabit a puppet and communicate through their bodies to each other. When you’re dancing, it’s not body awareness in a sense of you alone in a space but also you in a space with other people in space,” said Birks.

One of the core mechanics of *Way* relies not just on the intercoordination of bodies in space, but in uncovering through intersomatic means the hidden information the other player has. Because, in *Way*, each player sees the world differently, things that might look like traps to one player might represent opportunities to the other person. Things that one player cannot see, the other can. At the moment players realise they are seeing the world differently and that they have to understand the other person’s viewpoint in order to progress through the game, they come together in a kind of kinaesthetic empathy. Birks suggested that this empathetic relationship becomes an anchor by which players orient themselves to, and understand the trajectory of, the game. Each player depends on the cooperation of the other to succeed.

Understanding this mechanic of kinaesthetic and affective intercoordination involves a process of calibration and re-calibration of the management of the novel and the habitual. “If we come in and surprise you or throw a new mechanic at you or put you in a space where you don’t necessarily understand what the rules are, it’s going to feel chaotic and messy at first. But you spend some time there and you start to understand the structure a little more. And you have that calibration process and the next time you step in, you know there might be a much more natural transition into that new space.” When the player’s habitual way of being in the space is disrupted through sensory

intensification, the body becomes thematised: the somatic norm of disappearance becomes dys-appearance. As the process of calibration occurs, the body recedes back into the somatic mode of disappearance. But once the player sinks into habitus, there must, eventually, be a further recalibration to ensure the game continues to be engaging. To keep players interested the designer must disrupt their bodily expectations again. Birks explained:

> One puzzle has you communicating time. And so actually in this puzzle… So this is actually the one puzzle that doesn't function [in the way the others do]. In this puzzle both players see everything the same way.... Imagine there are three platforms ascending like a staircase in both players' worlds. And what you discover is when you jump on one, it will quickly fall. But it doesn't just fall in your world. It falls in their world too.

According to Birks, most players struggle with this puzzle. Players must jump up the stairs quickly, because the platforms fall as soon as they stand on them. However, not only do players need to jump on the stairs quickly, they also need to jump in time with the other player. For the players, the challenge of the puzzle is to communicate, without using words, when to start the jump sequence. According to Birks, most players approach the puzzle by gesturing with their hands. They might raise their hands and lower them, as if they were counting "one, two, three," and then they will jump. Or players might move their hands around like the hands of a clock, to literally communicate start time. Other players just point and some players "brute force it," trying over and over and running at it until they "luck out."

For Birks this puzzle represents one of the pivotal design moments of the game. *Way* is, at its heart, a game about empathy. "One of the big messages of *Way* is making players consider what they're saying and how they're saying it, and if there is another way to say something," said Birks.

> I didn't realise this when I made the puzzle but the best solution I ever saw for this puzzle… I was watching a playtester play… and he holds up his hands to the other guy because, you know, it's without words, and he basically says "stop." And he points to the ground, he says wait here, which is basically "wait at the first platform. Don't jump on it, just stand by it and wait." And then he runs to the opposite side of the screen. So he's at the edge of the screen away from the platforms in his world and basically puts his hand up and then kind of like a football player ready to punt a ball… So like a kickoff. And then points and starts running toward the platforms. And what you realse is "oh," just like in football you know the exact moment when that kicker's foot is going to hit that ball, because you have all of the time ahead of it, all this anticipation time built in and it's very clear because he's moving at a very set speed that when he reaches this point he's going to jump.
>
> So the other player knew the exact instant when he was going to start jumping versus trying to do this sort of like messy thing like "one, two, three" and not have it work out. He took away all that noise and made it very much about communicating one thing… "How do I communicate the exact moment of time that I'm going to start jumping up this platform?" (Birks)

According to Birks, for the players who approach the timing task in this way, with a complete attunement of dance-like bodily rhythm and action, the puzzle is very easy. For players who approach the task in a different way, they wonder, "Oh, why is that puzzle in there?" For these players the puzzle is messy, hard to time and verges on the impossible.

Through Birks's game we can begin to better understand the process of intersomatic awareness. First, Birks sensorially intensifies the notion of distance. In one sense, distance is literal physical distance. Because players are connected via a server, they can be located anywhere in the world. Then, there is the physical distance within the gameworld. Because each player sees something different, each player's point of reference—his or her "index"—is in a different place. This is "indexical distance."

The controller mapping of mouse buttons to gesture disrupts habitual bodily communication practices and causes moments of dys-appearance. Dys-appearance shifts

to disappearance as players' understanding of each other increases through the practiced use of in-game gestures and players become attuned to each other, kinaesthetically. When each player communicates with the other player, drawing on a collective memory of shared somatic experience and with rhythm, duration, and timing, and the puzzle is solved, there is attunement and "clearing." Throughout the game there is a continual process of calibration and re-calibration, as the player's body disappears and dys-appears. Each moment of dys-appearance, becomes an anchor, a somatic marker.

Equally so, for Birks as designer, there are somatic markers in the design process. As designer he has made careful decisions about sensory input and body mapping; he has attended to how the body is measured, monitored, and manipulated through a process of sensory intensification and subsequent somatic imprinting. Birks suggests that "One of the big things we can do with games is give people a problem and then kind of hold up a mirror… In a game like *Way* how you play is who you are." The same can be said of the design for the designer.

## Journey

> *"I'm sure I'm not alone in thinking Journey… was quite a phenomenal experience and the great achievement of it was to create an environment in which people would feel a closeness, a genuine affection for each other."*
>
> *--Sylvester Wolfe*

There were games which the designers I interviewed referenced repeatedly, games that were considered exemplars of the game design craft. Jason Chao's game *Journey*, was one of them. "*Journey* connects nicely with physicality and the body," said Wolfe. "It's very rare for a game which involves two people interacting with each other to not

involve them attacking each other in some way. Or attacking something in some way. So one thing *Journey* did that was amazing, was just throw that whole rulebook away." What makes players' interactions in *Journey*'s game world radically different from other games is its reliance on intersomatic communication. There are some obvious similarities between *Way* and *Journey*. *Journey*, like *Way*, is two-player (though the game does offer a single player option), and like *Way*, features players who do not know each other, playing remotely. Both games focus on shared communicative exchanges between players, and between players and the environment, and neither game allows players the use of language. However, where *Way* featured gestural input in a constrained platform environment, *Journey* focuses on whole body movement and vast open world exploration. What is remarkable about the similarities between the two games is that during development neither Chao nor Birks were aware of each other's games. "So, I joined *Journey* for the last two years, but the game started… at the same time that I was starting working on *Way*," said Birks, commenting on how he got involved in the development of *Journey*. "We were both working on this thing that we both wanted to see exist in the world of games that wasn't out there that we wanted to play…"

*Journey* begins with the player, a robed figure, standing alone in a desert. As the player traverses the vast desert expanse in an attempt to reach a monolithic mountain illuminated in the distance, she becomes habituated to the desert environment. The designers have conceptualised the game as an ecological whole. Controls are presented pictorially at the beginning of the game and with the exception of the credits and title screen no written or spoken word features in the game. The player learns she cannot speak but, instead, only "chirp," a paralinguistic utterance whose length and volume

depends on how long she presses the "X" button on the controller. She learns she can link chirps together into a song if she presses the button repeatedly, and, further, her chirps are attuned to the game's background music. She learns to jump, then surf down sand dunes, and then, after meeting "cloth" creatures that attach themselves to her body to form a scarf which trails behind her, she realises that they give her the energy she requires to fly: the longer the scarf is the more power she has. The energy the scarf provides, however, is limited. As the player expends energy the cloth loses energy: a bodily information exchange between the player and the cloth creatures.

**Figure 7. *Journey*'s Cloth Creatures**

At moments during her journey, the player has the opportunity to encounter other players temporarily connected to the game.[25] Players can choose to ignore each other,

[25] To see the entirety of *Journey*'s gameplay encapsulated in a 20-minute video see https://www.youtube.com/watch?v=KH5pnb_uotY

but if they meet there is a standard greeting process to be enacted, and this greeting process illustrates well how the game's designers attended to intersomatic considerations.

At first there is distance between the players, who are located at different indexes. They see each other—and this visual recognition initiates an intersomatic mode of attention—but the players share no common space. This indexical distance is reduced as players become closer in proximity, orienting themselves towards each other and calling out to each other using bird-like chirps. Then they make a connection—literally. When both players are close enough their characters light up, and then they "charge up" each other's scarves—a shared "power up." This mutually beneficial power exchange is a moment of attunement and forms a somatic imprint. Each player realises that she has something of value to the other; the game has signalled to them that together they are stronger than they are apart. There is a kinaesthetic joining. In this one moment of player intercoordination, Chao has exploited myriad intersomatic channels to construct the ritual of greeting. The end goal of these intersomatic communications is empathy—and, in particular, kinaesthetic empathy—feeling another's viewpoint through bodily resonances.

Chao argues that physiological movements, how the player interacts with the controls is important to attend to because it generates emotions. "When I think about the players' body and input, I'm more thinking about not to tire them, not to stress them. Letting them forget they have a body because… we want the player to think their body is inside the virtual world rather than in reality. It's not really that I have a body; it's more like I have nerves. So, I attach to my nerves different things and then treat that thing as my extension." According to Chao, the less time players are disrupted by their

bodies, the better. Designing gameplay so that the player does not obviously attend to her body requires thinking about the physiological and physical requirements of the game's control system. There are certain controls that stress the player's muscles out "after just a little bit," said Chao. "You know, with touch control these days, certain games make me feel my skin is wearing off." Because game controls require the player to repeat a given action many times, the designer must consider control input from an ergonomic perspective. A player, said Chao, must be able to push a button with the least amount of effort. For him a control system should not "stress" nor "tire" the player, otherwise the body gets in the way of the play experience. Furthermore, it is not only physical exertion that the designer must attend to but the precision of the controls. Overly precise controls can induce stress in the player, and create a feeling of anxiety.

"If you play *Angry Birds*, you pull the bird but… there's only one solution that can actually beat the game in a perfect score, and most of the solutions are a complete failure," explained Chao. "When you pull down the bird, you get stressed out because you are like 'Oh, is this the right angle? I don't know if maybe it should be a little bit higher or a little bit lower.' Then there's some kind of anxiety, right?" Chao argues that when a game has precise controls like this, or is "very, very difficult," it doesn't feel "safe" to play because there are a multitude of errors a player can make. "So, what do I mean by making it safe?" asked Chao. "A snowboarding game tends to [feel] safe... because all you have to do is to lean left or lean right, and regardless of how many mistakes you make, you eventually end up at the bottom of the hill." A game with a control system that gives a player a "safe feeling" is crucial for flow (Csikszentmihalyi, 1990). Players cannot enter a flow state if they do not feel they are in control.

Ensuring players feel "safe" and "in control" and that they won't be able to "screw up" is not just something Chao applies to the design of a game's control scheme, but constitutes his overall design ethos. He employs a habitual way of thinking about design that has a somatic basis Chao refers to as "smoothness." Chao's preference is for a pattern of order that involves "no hard corners in change":

> Every change needs to be a smooth curve. So, I'm talking about acceleration and deceleration, things coming to stop, starting to spin. They all need to have a little bit of inertia and smoothness. Somehow I think that's beautiful and elegant. Of course, in nature, not everything moves perfectly, but in a game, I like to have these movements be smooth. I think, the better words to describe this smoothness are organic analog… [It's not] digital… If you see a digital sound wave, it's a square wave. It's either a one or a zero. And when I say curves, I say smoothness; I'm saying we shouldn't see square waves. The waves should always be smooth…. Smoothness is everywhere. The smoothness of the camera movements, the smoothness of the camera zoom, the smoothness of the players' momentum, the smoothness of the turning, the way they jump, they land. Everything has to be organic. Smooth.

**Figure 8. Running on Cloth in *Journey***

This concept of smoothness is exemplified by Chao's use of textiles and fabric throughout the game. One of the primary interactable objects in the game is cloth. Chao

wanted players to be able to interact with the cloth "creatures" intimately. "I wanted it to feel erotic or romantic," said Chao. "Being able to run on cloth, to me, is a very soft and smooth behaviour rather than running on a very hard place. So, I like that softness and smoothness."

Chao uses cloth to emphasise key intersomatic exchanges in the game. Important game moments are linked to cloth. Typically, the first moment in the game that players meet each other features the game goal of reconstructing a cloth bridge (see Figure 8). Repairing and traversing the cloth bridge is a sensuous expression, according to Chao. The cloth is not hard or solid like the ground, nor is it spatially fixed. Instead it moves and morphs with the players' movements, functioning as a transitive object that permits the player an intimate means for the exploration of space. Synaesthesial transformation creates somatic imprints. The player feels the smoothness of the cloth through enacting it. Considering the barren landscape and ecological design of the game, the inclusion of the cloth fabric imbues the play experience with a sensuous mysticism: playing along a carpet bridge conjures up mnemonic associations of magic carpets. By evoking this somatic mythology and giving the player the ability to dance sensuously along the cloths, Chao has created a fluid relationship with space, creating, like the surfing aspects of the game, a whole-body perspective, a felt path. This subtle use of temporality and proxemics epitomises Chao's view of organic analog, and suggests mutability and impermanence. The sand is moving, the cloth is moving and the players are moving in coordination with a game space in constant motion. Sand and cloth become somatic markers, not fixed in place but oriented to the player's body in an intimate, sensuous way. Interacting with moving objects also suggests a particular type of energy relationship: fluid, and fleeting.

**Figure 9. The Cloth Bridge**

Smoothness, for Chao, is created by attending to rhythm and, thus, is dependent on the interplay between spatiality and temporality. “Rhythm is the frequency of change, in my opinion. So if you track the player’s input, and base it on an input intensity, you draw a curve over time…. if you draw a curve for the player’s input, there should also be a curve for the world’s system output—whether it’s songs, it’s visuals, it’s movements, they can all be joined to a curve. And the curve needs to be smooth.” Considering rhythm allows the designer to map out how the player will move through space and create, through the use of carefully considered feedback, somatic markers. Chao makes a distinction between low frequency and moment-to-moment feedback and describes how an ecological approach to design—where the relationship between the game environment and the avatar/ character is considered harmoniously—facilitated the development of the game’s “surfing” mechanic.

One of the key challenges *Journey*'s design team faced was designing a core mechanic that allowed the player to navigate the game's immense desert expanse while still maintaining a reasonable game pace. Chao's explanation of the process the design team went through to choreograph temporality and spatiality illustrates how they created the structure for the player's felt path. "Initially, there's no surfing…. There's walking and flying and jumping. But then we realised that when the player is walking towards somewhere really far, on the road, it's extremely tedious," explained Chao. "You know, you'll be walking towards the mountain and the horizon, and after you've walked for five minutes nothing seems to change at all and so it's really, really boring." The first parameter the team tried changing to combat player boredom was speed. They gave the player the capability of running fast. However, this binary—running fast or slow—led to another design dilemma; namely, "when [players] run really fast, what happens if later on, we don't want them to go this fast?" Eventually the team decided speed wasn't a viable design solution, and what was more relevant was the amount of feedback they offered the player and how they used this feedback to balance anticipation and reward. Chao explained: "If you walk on flat ground, to something that's a mile away, or a kilometre away, and… you have no reward until you reach the end, it's really low frequency in terms of feedback." Chao instead emphasised the importance of moment-to moment feedback. "We have the player leaving a footprint trail. So, every second you walk forward, you're drawing a line behind you and that makes the walking a little bit more interesting." The footprint trail is a body technique, a somatic indicator. For the designer, the trail is a corporeal imprint of a design decision: a form of visual notation. For the player the trail is a visual indicator of felt proximity. It shows that they have affected the environment they are navigating and the locality in turn becomes a "centre

of felt value" (Tuan, 1977). Each movement of the player is memorialised as the sand retains a resonance of where the player's body has been.

As meaningful as the trail is, however, it, in and of itself, does not offer the player enough reward. So the design team further considered the rhythmic relationship of space and time to create an oscillating wave pattern of energy expenditure and reward. Chao explained: "So, we said, alright, let's try creating these little mountains, little hills, and mounds. When you're behind the hill, you can't see what's in front of you, and when you climb up, not only do you get to see farther but also you can get a speed boost [as you surf] downhill." In this way the game breaks up the rhythm of "just walking forwards" to "up-down, up-down, up-down." In order to make the surfing feel more satisfying, the designers make the climbing feel harder or, as Chao puts it, "more stressed out": there is a continual rhythm of investment and reward. And, importantly, this rhythm forms a smooth organic analog path.

The process of tuning a game for this "smoothness" is imprecise. According to Chao, determining how long a surfing segment should be was a subjective measure. "There's definitely an official test and also an unofficial test. The unofficial test is just you're playing again, and again, and again, and again at the same section, you know, yourself," said Chao. At first, smoothness is based in the designer's own somatic response to the game. "And, eventually, you will reach some kind of rhythm. It just felt like it's right for this part of the surf to be slightly longer. It's too long for me to walk up this dune. You kind of try to tune it for a rhythm that you find comfortable." The "official test" comes when the player plays the game, and the designer ascertains whether or not his designed rhythm is "in tune" with that of the player. "And if people

give up or they find the game boring, that means this part needs more feedback," said Chao.

Rhythm is also evident in the technique the player uses to accumulate energy. The player has to fill up his scarf to generate the energy required to fly and this energy is used up over time. In order to fly long distances, the player needs to be conscious of the rhythm of each of the "flaps" of his robe. The optimum rhythm involves flapping and then gliding as long as possible to get the most out of that flap before he flaps again. If the player has a frenetic "flapping" rhythm and uses all of his scarf energy at once, he cannot travel as far.

This rhythm becomes even more important with the addition of another player. Energy can be generated between players in two ways: calling out to each other and flapping. It is possible to fly infinitely through the world with another player by "leapfrogging" back and forth between the two intersomatic channels. "If I shout to you, then you flap. Then you need to shout to me, so I can flap again. And so that becomes a very rhythmic thing where you're constantly tossing the baton between each other," explained Birks. "If you think of *Journey* as being about forming a connection with a stranger… if you are communicating well and you… have built up an understanding… you can basically almost play through the entire game without ever touching the ground." Using only intersomatic exchanges, players' cooperative, intercoordinated dance-like efforts allow them to travel infinitely. "We often thought of *Journey* as a ballet and as a dance in that way," said Birks. "Trying to build within a system… where if one player did try to do too much themselves they would never get as far or move as gracefully as if they danced together and took turns."

### *Markers*

There are explicit markers in *Journey*, integral design moments that are placed by the designers in an attempt to create a player's felt path. There is the marker on the player's robe, a symbol characteristic to that specific player, and this same symbol floats in the air when the player chirps. The sand trail discussed previously is also a marker. Another marker in the game is the cloth "creatures" that the player not only collects to fuel flight, but which also serve as sign posts/ way-finding aids. "Those are… explicit markers… we use them to pull the player along," said Birks.

In *Journey*, Birks argues "we do a lot with objects in space… how you're relating to them and how we switch this up over time." Objects create correspondences that form somatic imprints and, in turn, act as somatic markers. "In *Journey*… we have the monster, that sort of the guardian or the dragon, whatever you call it. Early on, without even knowing it, you're walking on the monsters' [body] parts that are broken down in the sand," explained Birks. "We haven't… introduced you to the monsters yet, so you're stepping on their heads and walking over their backs and there's no threat there. You're just sort of climbing all over them. They're old and they're broken. They're not alive." For the player these objects are simply markers in space, and players are primed (Kahneman, 2011) by the designers to think of them as nothing more than archaeological remnants sunken into the sand. However, mid-way through the game, one of the guardians emerges from the sand and frightens the player, completely disrupting the player's expectations of that body in space. "Most players don't even realise that they had seen the [guardians' bodies] way back," said Birks, "because we don't call much attention to it." It is not until the guardians move that the player associates them with being alive. And then later on in the game the designers reuse the

guardian body as a monster figure. In this way, the designers have repurposed the same object (the guardian's body) multiple times, forcing the player to recalibrate his spatial experience to accommodate each new interpretation of the object, and creating a design marker, a somatic imprint, that they have brought to life.

Light can be a marker, where its function is to illuminate for players a critical game path. The player sees something shining and knows she must travel that way, or, conversely, sees an object or area which hasn't been lit up and thereby knows that she hasn't interacted with it or been in that place before. "So that's almost the most lizard-brain, lowest level, speaking to the player as a designer and saying 'this is unmarked,' 'this is un-passed territory,' or 'come this way,'" said Bell. Markers help the designer create a sense of intimacy. "We actually want the player to have some… to be able to sort of go off that path and return to those things and use them as anchors to understand where they are in space and where they need to go without ever getting terribly lost." Markers, then, create a player's framework or rule-set for how the world works. "So much about playing *Journey*," said Birks, "is a conversation between you and the environment."

One of the key characteristics of markers in game design is that they are repeated and exaggerated. This repetition can be used by designers to create meaning. Chao explained that colour, shapes, contrasts, and hues are useful tools through which a designer can assign meaning. For instance, *Journey* is a game largely devoid of the colour blue. There is no water, there are no plants and the environment the player traverses is largely comprised of sand. The game environment is predominantly sand coloured. This lack of blue primes the player and creates a somatic imprint. "When you want to express something," said Chao, "you want it to be extremely simple and

minimal so that there's no way that the audience can be distracted." According to Chao, exaggeration and repetition are the basic techniques to capture an impression. "We kept the blue away from the player until the very end, and we also kept away the water until the very end, so that you feel a sense of relief, you know?" explained Chao. "We kind of suppressed the player by not giving them what they were missing until the very end to create a cathartic ending."

The most significant marker in the game, for Birks, is the other player; she or he is a literal somatic marker. "We make big landscapes open and barren so that you see [the other player] when they're just a small dot on the horizon.… We make sure that when they call out to you that you really know physically where they are," said Birks. "And we even have… this subtle HUD, with white light that glows on the edge of the screen and shines when someone shouts to another." According to Birks, *Journey* is basically a game about moving through space with another person. Designing for intersomatic communication requires providing opportunities for players to navigate space together and understanding the particular intersomatic needs of this type of communication. Players must be able to orient themselves to each other. "When I'm with another player, I'm constantly thinking about where they are." Proximity is not just important for communication. From a technical standpoint it is essential for maintaining a connection: if players' paths diverge dramatically they will disconnect from each other. "You just don't want them to get lost or lose sight of them. No one ever wants to make too drastic of a move," said Birks. "If I want to go right, I start to cheat right a little bit and make sure that you're following or else if you haven't responded quick enough then I might come back left again to make sure that we're still together." Intersomatically aware design, then, requires considering proxemics in relation to connection. Birks pointed out

that as designers they exploited the possibility of loss of connection to allow for emergence. “So much about the game is just the playfulness of putting an object between me and you so that we can play hide and seek together… this constant hide and reveal of this other…. And… so… when it came down to design a huge thing that we were constantly thinking about even though we didn’t necessarily frame it that way, was always… what is the connection that the players have to each other.”

### *Felt Proximity*

For Chao, the most rewarding feedback mechanism in the game is touch. “Secretly, I wanted to give the player a subconscious feeling that ‘life is likeable and everything alive is just like me.’ So, that’s the message, but the system is very simple.” Anytime the player touches anything alive, she is rewarded.

However, Chao was careful to point out that touch must be accompanied by appropriate feedback. “What you want people doing in your world, it’s completely at your control as a designer. I feel like a god because I can control what people value and what people enjoy and do.” Chao pointed out that although the goal of *Journey* was to foster empathy through the use of touch, it became evident early on that it wasn’t just attending to proximity that was important. By allowing players to physically touch each other, Chao thought they would help each other by pulling each other up onto stairs or use physics to push objects together to work collaboratively. Instead, players pushed each other off of cliffs or into attacking monsters. In short, ill-attuned collision physics caused players to make the most of deadly environments by “sacrificing” each other. Chao said, “Initially I was like, ‘Wow, people are so mean here! Isn’t this game supposed to be about helping each other out in a tough environment?’”

Chao pointed out that in order to foster "positive," pro-social behaviours, the designers needed to fine-tune the types of actions for which they provided feedback. As a result, Chao removed the collision, replacing it with a "growing" mechanic, so players felt rewarded for staying close to each other and charging each other up. "Designing in a virtual world is, you know, the sky is the limit," said Chao. "You can design any behaviour, you can make the player do anything, but it has a lot to do with what you want to say at the end. Based on what you want to say, you can determine whether you want to reward or eliminate… behaviour."

### *Kinaesthetic role play—Body Techniques*

By no means do all players of *Journey* play the game in the same way. It has long been evident that players respond to multiplayer games in different ways (Bartle, 1997; Canossa, 2009) and *Journey* is no different. To get a sense of how people were going to play *Journey*, the design team would run play tests with the 10 or so people in the studio. One of the game's other designers, Robin Hunicke, developed the idea of role-playing as different player styles: lover, teacher, loner, griefer, explorer. Lovers, for instance, would always want to stay with the other person, and acted enthusiastically; teachers always wanted to show their fellow players things in the world, and loners wanted to be alone. At the beginning of the play test Hunicke would hand out cards, each one with a different player style written on it—and Birks and nine other team members would play the game in the style written on the card to get a sense for how the game would be for that particular player style. "So we had these five roles and then we would all jump into the game and play. And depending on which two roles came together… *Journey* would feel very different," said Birks. Some play styles immediately

engendered a connection. A lover and explorer would be "constantly chat chirping with each other and discovering things together." Two loners might play in parallel, connecting but maintaining distance. "If you are a lover and the other person's a loner," said Birks, "you're trying to be with this other person and they constantly are trying to get away from you. That might go on for two hours, that might go on for ten minutes. But if that happens multiple times it's kind of a lonely place." The point is that each play experience is a valid response to the play environment. According to Birks, people who haven't read *Journey* well enough will think that *Journey* is "about gagging you and making you feel something good or throwing all this goodness at you." But, he said, *Journey* can be really tragic for a lot of people, and really sad.

One play testing session offered an interesting insight into how the game's exploitation of isolation and loneliness in a multiplayer setting can generate empathy. "One of my favourite moments in *Journey*, thinking about bodily awareness and characters in space and roles and all sorts of things [was]… I drafted the loner and the other… Nick—I didn't know it was Nick at that time—we're playing the game at our computers. He's another designer. He's the lead level designer, drafted the griefer." Playing as the loner, said Birks, it becomes very clear to the griefer that you are avoiding them, and the griefer makes it his mission to exploit that. "He would just haunt me… Anywhere I went he would come after me. You know, show me things before I got to discover them for myself. Every chance I could, I tried to get away, and it just wasn't happening." Nick followed Birks to a tower in the desert, which they ascended together. When they reached the top, Birks started "duping," implying to Nick, through body language, that he was going to jump off the tower to get away from him. Birks said he was communicating, "Look, I'm gonna jump off this tower. I don't care. I don't

need to go to the mountain right now. I will go back the fifteen minutes it took us or ten minutes it took us to climb this tower and fall all the way back down to the bottom just to get away from you. And so I'm going to do it. I'm going to jump." Nick continued to chirp and taunt Birks. And then Birks did what he threatened to do: he jumped.

> And this is where I have my sort of Dr. J behind the backboard moment… I jump off and … he darts after me. But when I jump off, I flap right after I go over the… edge… And I jump back up on to the tower and he ends up falling all the way to the bottom. So I basically duped him out… because that was the only way I could get a lot of distance on him. And so he falls all the way to the bottom and he's chirping the whole way down like, "You, asshole," or whatever he's trying to say.

And, then, Nick is gone, because, in *Journey*, when players are too far apart, they disconnect from each other. "But the moment that we disconnected was the moment I wish I could have shared with him," related Birks. "And this was the moment that I realised, really realised that we had made a good game, or felt, I personally felt, proud of the game we had made." The evasive manoeuvre Birks had performed "was so interesting and good and playful," the only person he wanted to share it with was the person he had just removed from his life. "I was desperately trying to get away from him but after that happened, I just wished he was there. And that's when I was like 'oh, cool. Even when *Journey* is at its worst it still orients you towards this positive feeling of connection and longing for this other,' or at least in this instance." A key outcome of intersomatic awareness is shared understanding. In Birks's example, bodies sharing physical space, timing, and a distinct somatic choreography made possible by rules, were fundamental to creating an empathetic moment.

## Diploplia

Exploiting intersomatic channels in game design allows designers to play with normative expectations of games. It challenges players to see the art form they are engaging with differently, because it involves a synaesthetic transformation. In the case of Jonny Bewley's *Diploplia* this seeing involves a literal transformation of visual perception. *Diploplia* is a virtual reality game designed to combat Amblyopia and Strabismus. Through manipulating information sent to the player's eyes, Bewley changes the way players visually perceive the world and, further, allows them to experience the way other people also see the world. In this way the game exploits the visual, but in a way that is unique from all of the other games discussed thus far.

The challenge for people who have Amblyopia and Strabismus is that one eye is stronger than the other, and dominates perception. When the "good eye" is open, the brain suppresses the information coming from the "bad eye." The typical method used to treat Amblyopia and Strabismus involves covering the "good eye" with a patch to force the "bad eye" to strengthen. Previously, doctors largely considered the condition to be treatable only in children, and then only before the age of 12, and rectifying lazy or crossed eyes in adults was thought to be unfeasible. In the last four years, however research has shown, said Bewley, that the brain is "more plastic than people thought and you can retrain the brain to use the bad eye again."

The inspiration for *Diploplia* came from Bewley's realisation that games are a fast track to the body's response system. "I think that games have been designed basically to take advantage of the brain's reward system…. And so [I thought] if I can basically take advantage of that reward system and make the goal being able to see better, then that can be the fastest way we can convince someone's brain to rewire itself to see better."

First-person shooter videogames have been shown to improve eyesight (Jeon, Maurer, & Lewis, 2012) and the iPad app *Ultimeyes* uses simple puzzles to exercise the visual cortex. However, Bewley pointed out that the limitation of these methods is that they require a tremendous amount of commitment before there is measurable improvement in eyesight.

In the case of *Diploplia*, a head-mounted virtual reality display called the Oculus Rift displays game components as separate images, with varying contrast ratios, to each eye. Crucially, *Diploplia* "only displays some of the relevant game information to each eye, forcing the player's brain to incorporate data from both eyes to win. Unlike a typical game, where the player is restricted to a forward-facing view (as in looking at a TV), which is displayed on a flat screen, and which creates the feeling of a 3D world by altering camera angles, the Oculus Rift tracks the player's head movement so that the player can look around the game world naturally. As the player looks up, the Rift shows an upward view of the gameworld; equally so for left, right, and behind.

Because the Oculus Rift does not have hand-operated tracking, *Diploplia* uses the Leap Motion, a commercially available 3D gesture control device, to track players' hand and finger movements. "Using Leap Motion interaction, the game lets the player control the paddle in a natural fluid way," said Bewley. "The Leap Motion allows people to see where their hands are in the game, and makes it easier for players to engage with UI in virtual reality."

Bewley, who has Amblyopia, had been thinking about making *Diploplia* for four or five years before he began development with the Oculus Rift. He had toyed with the idea of developing a game that used two projectors and polarised glasses, but because of the cost and lack of flexibility of the development environment he did not feel it was

"worth the risk." "But once the Oculus VR came out and a bunch of new studies had been coming out about how to fix the lazy eye, the problem I have, I decided it was cheap enough that I should try it out and so I got the development kit and started working on it," said Bewley. One of the attractions of using the Oculus Rift for development was that because it delivers a separate image to each eye, Bewley had full control over what he could transmit to each eye by simply writing software. "And right after I coded one of the first parts was the first time I had ever seen in 3D." Bewley explained:

> The idea is if you send something in really high contrast to your bad eye and not your good eye then the brain will basically send you that information, and if you do it with the same object, which never happens in real life, right, like you don't see, say, a ball in front of you really bright to your bad eye and really dark to your good eye, but I can make all of the objects in the game like that, and there's a certain point where I can move the contrast ratio in the game to make the stuff brighter and brighter to the left eye and for me the first time I did this, at one point it just clicked in, and I saw it in 3D.

Bewley now always sees 3D in virtual reality using the special game mode, and he can also see 3D in the real world, although not all of the time (e.g. he can see things close to him in 3D). "It takes time to strengthen the muscle and to get your brain to integrate the two [images] and to relearn how to integrate the two, or in my case to learn for the first time, how to integrate the two images," explained Bewley.

One of the strengths of Bewley's software is that it not only allows people with Amblyopia to see how everyone else sees the world, but it also lets people with normal vision see the world in the way that someone with Amblyopia does. "I've had people with normal vision use the Amblyopia mode and asked them what it looks like and they always say it looks weird."

One core facet of body-oriented knowledge Bewley has gained from his project is that it has underscored how technology can help share somatic knowledge that would be impossible to understand otherwise. “It allows people with Amblyopia to see how everyone else sees the world,” said Bewley, and, in doing so, it demonstrates how inadequate everyone else’s explanations of experiencing 3D are. There isn’t a good way to understand 3D aside from experiencing it, according to Bewley. This type of intersomatic knowledge is almost impossible to explain in words, because there is no point of shared somatic understanding: there is no useful point of comparison that can be relied on. Conveying to someone else how it is that you see the world in a way that will allow the other person to see the world in the way that you do, said Bewley, isn’t like explaining to someone how it feels to, say, throw a baseball. “With throwing a baseball, people have thrown other things and so you could imagine what it would be like to throw that. But there’s no analogy. There’s nothing close enough for 3D vision. If you’ve never had it then there’s nothing close to say ‘it’s like that.’”

The display of *Diploplia* is the Oculus Rift. The game, however, is controlled by gesturing using the Leap Motion, and this too increased Bewley’s intersomatic awareness. For Bewley, the decision to integrate the Oculus Rift and Leap Motion was an obvious one. In virtual reality everything is in 3D; the virtual world is essentially wrapped around your head, and the head-mounted display prevents the player from seeing the mouse or the keyboard. According to Bewley, the Leap Motion makes sense inside virtual reality. Players intuitively understand how to use natural gestures to make 3D rotations in 3D space, so it makes more sense to control those rotations using the Leap Motion rather than trying to map them to a mouse, or keys on a keyboard. The game, then, leverages the player’s natural hand movements.

However, one of the challenges of designing for the Leap controller is that while players intuitively know how to move their hands, it is much harder for the designer to pick the right gestures to use for control. Unlike the mouse, or the game controller, which have long histories of ingrained bodily usage and sedimented body memory, there are no gestural standards for the Leap Motion. The Leap Motion requires an entirely new lexicon of design (literally, a new form of sign language). Bewley acknowledges that one of the difficulties of body-oriented design work is a lack of knowledge about the body itself: "I don't know as much about the body, which is part of the problem."

"I think as a community of developers… we need to agree of certain kinds of gestures for certain kinds of tasks. There should be one gesture for bringing up a menu for instance," explained Bewley. "I think what will happen is that over time people will realise that certain people's implementations are the best and we'll kind of get a consensus from that."

Coding a gesture provides a useful example of how intersomatic awareness manifests itself in the design process. In order to initiate an in-game action, one must make a spatial movement that can be translated into a reciprocal event on-screen. It necessitates, by this means, the generation of kinaesthetic empathy. The designer can code the gesture for himself and it will work for him, but it's not necessarily a perfect match for someone else. Bewley explained:

> In my experience you can never tell if something is working until you let other people try it and tell you it's not working. Because one thing I've learned is I'll code a gesture for so long and what happens is I become really good at it and I understand what the code is doing so I can make the gesture to fit the code. But no one else can. So there's always something that I think is working great and then everyone will be like, "This doesn't work or you have just got to do it like this." But really good design is me not having to tell them exactly how to do it.

### *Body Techniques*

All of the designers I interviewed pointed out that body-oriented design requires some sort of physicality in the design process, and designing a gesture was no exception. Gestural design involves considerable kinaesthetic roleplay. Bewley said that he "gestures a lot." He often walks around as he gestures, so that he can bounce ideas off of the people around him. He'll make a gesture and ask whether or not they think it would work for the input he is considering. He said that most of the time they have no idea. He pointed out that while he is able merely to think about the gestures, he must "do the gestures to think about it well."

Designers in this research emphasised that the body-oriented effects in their games affected not only the players of their games, but also the designers themselves. For Bewley this was underscored in the moment he first saw 3D. "It's not every day that you get, that you understand… it's hard to describe what its like to get a whole other quality of your vision," said Bewley. "Things look more real now to me than before. But, before, I would have said things were as real as they could be… It's changed my perception of the world."

## Recessiveness, or Games that Emphasise Interoception

Technology can help expose the interoceptive, the hidden somatic states that are normally recessed. By doing so, it allows the designer to integrate these states into design. These next cases feature a discussion of senses that are more inwardly-directed. As Paterson (2007) remarks, it is "relatively easy to recognize and quantify patterns of

cutaneous senses," more complicated is "invoking other receptors and the somatic (or bodily) senses that constitute the background of everyday embodied perception" (M. Paterson, 2007, p. 7). In the cases presented here, the designer disrupts the player's habitual bodily relationship with these receded senses. The specific games that comprise this section are *Flowy* (Sylvester Wolfe), *Nevermind* (Emma Ryan), *The Extraordinary Adventures of Baron Munchausen* (John Wellbrook), *The Betrayer's Banquet* (Evan Smith), and *Matching Pennies* (Curtis Murphy).

## Flowy

Games such as jet.ro's *Racing Pitch*[26] and Sleeping Beast Game's *Space Team*[27], exploit the exteroceptive vocal channel by leveraging paralanguage articulations and spoken word. In *Racing Pitch* players "hum" to emulate the sound of race cars and, in doing so, navigate a race car around a track. *Space Team* is a cooperative party game where players flying in a decrepit spaceship shout technobabble at each other while attempting to outrun an exploding star.

Wolfe's game *Flowy*, in contrast, focuses on the specific qualities of breath. *Flowy* was in development at the time of the interviews, and though it has since been released, Wolfe's design insights are revealing. Not only was *Flowy* designed to be therapeutic—to have a specific and measurable positive effect on a group of people—but the impetus for the project was deeply personal. "I have had panic disorder as a result of post traumatic stress, and my sister has had panic disorder and generalised anxiety as a result of obsessive compulsive disorder," said Wolfe. "So we were talking about a mobile app that taught people breathing retraining exercises, actually for some time... probably

[26] http://jet.ro/games/racing-pitch
[27] http://www.sleepingbeastgames.com/presskit/sheet.php?p=spaceteam

around five or six years ago, this was when we first had that conversation." The catalyst for development was a chance encounter Wolfe had with a game called *Asphyx*. At times the game asks players to hold their breath. "I was really struck by the idea of self report and trusting the user," said Wolfe. "Because I'd done a bunch of projects which were about connecting a virtual interaction with a physical interaction. And people would always say how does the game know, and you'd always come up with some complex way of measuring reality with your game. Which is a big challenge. So I was really struck by the elegance of the answer to 'How do you know?' being 'Well, we just trust you,' and if you don't want to do it that's fine. And that I liked."

*Flowy* is a phone and tablet game that monitors the rate of player breathing through a self-report mechanism. The start of a gameplay session requires players to first calibrate their breathing, so that the game system can determine the number of breaths they take per minute. The player inhales while a circle fills in on screen and exhales while touching the screen (see Figure 10). This haptic breath loop is the main input mechanism for the game.


**Figure 10. Breathing Mechanic in *Flowy***

Mapping in *Flowy* involved considering the core perceptual loop that people would perform when they played the game, explained Wolfe. Player input is touch, the duration of which is based on the exhale, but this does not explain the entirety of the game's mapping system, which also incorporates the player's inhalation through visual timing. For players to understand this mapping, the system had to very clearly communicate when the player had interacted with it and what the effect of that interaction would be. According to Wolfe, this necessitated ensuring the game provided both primary and secondary feedback. Primary ludic feedback centred on the pivotal game marker of exhalation:

> Interestingly, inhaling is an angiative action. It increases your heart rate. Breathing retraining exercises work when the exhale is longer than the inhale, the exhale is emphasized more than the inhale... and so we wanted to make sure that the exhalation is where your reward happens, and you want to sit with that moment…so we do that by having a ludic response, which might be you know, I intentionally wanted to achieve this, I wanted to push this over here, or go over here, or whatever, that was what I wanted. So that's your first reward, "did I successfully achieve what I set out to do?" (Wolfe)

A mantra Wolfe said he had written on the wall in his office was "reward the exhale." In addition to the primary ludic breath exhalation reward, the game also had secondary motion rewards: events triggered when a player performs an action. In the game, the player views a boat from an isometric perspective. "So as you inhale, things are pretty static," said Wolfe, "but when you exhale you move the boat… it throws out a wake, which is an assemblage of different particle effects, so it looks nice and pretty." The player also experiences wind moving in the world, subtle game animations which are pleasant and rewarding, and then, the player gets, what Wolfe calls, extra synaesthetic rewards: "collecting a thing, running over a thing, pushing a thing

somewhere." According to Wolfe, the more second order motions that are triggered by player input the better. "Within a threshold. Before it gets too confusing."

It is obvious that primary feedback and secondary feedback, along with the rhythm generated from the player's breath and the game's response, create the felt path for the player. Less obvious is the impact that these design decisions have on the felt path of the designer. "Inhaling and exhaling is obviously very central to what we're doing, to the extent that on all of our story boards, every frame has noted on it when the player is inhaling or exhaling," said Wolfe. "That's the level of connection we're looking to achieve. With that there is an inherent rhythm." Each storyboard has a literal somatic marker on it, an emblematic notation for moments of attunement between the player, designer, and game world/ system. The storyboard itself represents a literal path. Further, focusing on the exhale is a bodily-oriented marker in the design process as it permeates all design decisions. Wolfe points out "focusing on the exhaling" is a somatic marker, in particular, for him. "I get this when I play *Flowy* because I'm quite attuned to exhaling as a relaxing activity. I do it everyday when I meditate." Wolfe's somatic training creates a particular experience unique to him, and this, in combination with his status as designer-player gives him a unique perception of the game. "So when I play *Flowy* it has quite a visceral effect on me when I go through the exhales, which I imagine I sort of trained myself to experience, more than someone coming completely new to it would do."

One of the core issues Wolfe faced in designing *Flowy* was the tension between what *Flowy* was trying to do and what games "generally try to do." According to Wolfe, most games work by trying to "stress you out," or arouse you. Players become increasingly tense until the moment of victory, which produces a "pleasant release" of

tension, and, Wolfe argues, that this is where much of the visceral pleasure of skill-based games comes from. “Whereas with *Flowy*, we’re trying to calm you down,” said Wolfe. “And the breathing exercises that you do calm you down, but then we also have to make sure that the setting calms you down, and that the interaction calms you down as well, which is an interesting challenge because it’s quite hard to build a meaningful decision that is calming.” In this way, *Flowy* disrupts players’ habitual responses to the game, placing a particular in-game premium on calmness rather than stress.

Like Chao, who pointed to the necessity of “organic analogue” as a guiding design ethos in *Journey*, Wolfe discovered that spatial and temporal agency were essential to not “stressing the player.” The spatial design of the game was as important as the temporal: chronemics and proxemics were essential channels to keep in balance. “The game started off as a side-on boat game. The reason it turned into an isometric boat game was that people really loved the scene and setting and they found it to be…what’s the word I'm looking for…semiotically calming. Just having two axes of movement, or one axis of movement was limiting, like you were trapped. So these two things were working against each other.” When the game was side on players were restricted to movement along the x axis. “When we picked it up to completely free 360 degree control over your movement, then suddenly it was more relaxing for people, more calming.” Greater freedom of movement offered increased agency and had a calming effect on player.

During prototyping Wolfe relied on a core body technique I call kinaesthetic roleplay. “We’ll prototype on paper or with whatever’s to hand, basically. Which is a tough process, like it’s always an extension. You feel silly doing it, but then it’s helpful.” With *Flowy*, to test the breathing mechanic, Wolfe made physical prototypes

before coding the game. “You had a cardboard stick with a piece of paper attached to the end of it with two eyes drawn on it, that was your avatar, a metronome, and a piece of paper with some platforms drawn on it.” As with any kinaesthetic process rhythm and timing was important. Equally so was the position of the character. “And yeah, we just played with the interaction. That when you inhaled your character floated upwards and when you exhaled it floated downwards so were we playing around with how that felt. Whether it was at all compelling.”

Even in a simple prototype, intuitive intersomatic elements such as temporality, spatiality, and proxemics were important to consider and be deconstructed through testing. Breath, and the tempo of breath, in coordination with the spatial position of the platforms and the player’s body on screen were all judged to be inter-related and needed to be considered in an ecological environmental whole to test the integrity of the design idea.

## Nevermind

> "*A digital game is a very abstract concept. Rarely is the physical component part of this; especially the designer’s physical component. Because when you say body engagement it’s motion control, Kinect, that kind of stuff. But designer and body is a – it’s an interesting pairing*."
>
> *---Emma Ryan*

Like Wolfe, Ryan is interested in games that have a positive impact on the player. Unsurprisingly, considering her long-term experience with yoga and meditation, and the resulting body awareness and body control she has gained from these somatic practices, Ryan turned to biofeedback games to explore how she could create a game to help players cope with post-traumatic stress disorder.

*Nevermind* is a biofeedback-enhanced adventure horror game. The important consideration for our discussion of intersomatic awareness is the unique way that biofeedback generates awareness between bodies through physiological body responses. Ryan's game *Nevermind* exposes habitual somatic patterns/ responses and asks the player to attend to them. Equally so the game reveals designer's habitual somatic responses.

*Nevermind* is a single-player game with gameplay "not too dissimilar from *Myst*." Players use environmental clues to solve puzzles. The game measures players' physiological reactions using a biofeedback sensor—a heart rate monitor—to deliver gameplay that responds to physiology: the more scared, anxious, or stressed the player is, the harder the game becomes. "You have to learn how to face your fears," explained Ryan. "You're going to get scared and you're going to get stressed. But you practice techniques to calm yourself down in the face of that and to manage those reactions."

In Ryan's game you play as a "neuroprober," a scientist who enters the subconscious of extreme psychological trauma patients suffering from post-traumatic stress disorder. "These are people who experienced something really terrible at some point in their life and it was so awful their conscious mind couldn't process it and so they forgot about it completely," said Ryan. The game explicitly explores concepts of memory. As the neuroprober scientist, the player enters the patient's mind to attempt to piece together the fragmented memories in order to decipher the trauma. As in real life, once the patient can remember and come to terms with what has happened, Ryan said, he or she can "gain ownership" over it, start to work through it, and begin to heal.

While Ryan knew that she wanted to make a biofeedback game, identifying an appropriate biofeedback technology was challenging.[28] There were several biofeedback devices that seemed viable, such as Neurosky, Mind Reader and mSense, but they were prohibitively expensive, and getting the sensor to talk to the game engine she was using—Unity—was "almost impossible." It wasn't until she came across an app for the iPhone called *Stress Doctor*, by Azumio, that she realised measuring heart rate was a viable possibility. "What it does is quite ingenious," said Ryan. "You put your finger over the LED light and the camera, and it illuminates your finger and the camera can detect subtle changes in your heart rate." Each time blood pumps through the hand, oxygen saturation in the finger increases, and this increased blood volume causes the finger to become redder. The system uses this colour change to detect heart rate and by calculating the time between each heartbeat, it can determine heart rate variability (HRV). "So that's where I really started to play around with HRV and I realised, 'Oh my God, that's brilliant and simple and easy and we should use that.'" While the iPhone would have been "a brilliant way of integrating the sensor in the game," as an input device for a PC game the iPhone was too cumbersome and the screen would have created an obstacle to immersion. Instead she opted to use the PulseOx monitor, a pulse sensor which clips onto the index finger. But, after spending four months trying to "hack" into it and attempting to get it to "talk" to Unity, she abandoned the PulseOx: "Getting it to communicate with the game was not going to happen." These challenges highlight a key tension in making games that focus on interoception: the hardware is still "catching up" to a designer's somatic design wishes.

[28] Since the time of the interview Intel® RealSense™ Camera has been released

In the end, Ryan used a technology produced by Garmin, the Ant+ protocol. This, combined with a heart rate monitor strap worn around the chest, measured and then wirelessly transmitted heart rate data from the player to the system. “We got back from winter break,” said Ryan, “and the programmer was demonstrating it. He had the Garmin cardio strapped on and the whole set up going, and he’s like ‘I think I got it working.’” As the programmer navigated the level, Ryan said she could see subtle variations in the gameplay as the game detected his biofeedback. “It wasn’t until someone snuck up on him and shouted ‘Boo!’ and we saw a huge spike that we knew,” said Ryan. “It was a magical moment.”

There are some specific considerations designers of biofeedback games must address, and by attending to these a designer increases her intersomatic awareness. One of the core considerations is player difference. While heart rate variability calibrates to the individual player—it is based on the delta of the heart rate, not the specific heart rate—not all biofeedback metrics align so smoothly. “Basically everyone’s a little different,” said Ryan. “So that’s something that you definitely have to take into account, which you don’t have to do as much with traditional game development.”

Heart rate variability measures the intervals between heart beats. “It doesn’t matter if you have a fast heart rate or a slow heart rate,” said Ryan. “It’s just what that distance looks like. So someone—and this is totally counterintuitive—who’s calm but happy and alert and feeling good will have an inconsistent heart rate. So it will look like, fast-fast, slow-slow, fast-fast, slow-slow between beats.”

According to Ryan, the sympathetic and parasympathetic systems engage back and forth. When the sympathetic system—the “amped up” system—is in control the heart rate is a little faster. When the parasympathetic system, the “mellow” system, is in

control, the heart rate is marginally slower. “So you want to be going back and forth rapidly,” said Ryan. “That’s why you feel calm, but alert.”

Temporality in *Nevermind*, then, is a bodily-based rhythm directed by the player’s own parasympathetic and sympathetic systems. Further, it is the players’ bodily input that choreographs play and determines their felt path. The game essentially measures physiological arousal. When a player becomes stressed or scared or nervous then their sympathetic (fight-or-flight) system engages and her heart rate becomes consistent. “It’s just fast-fast-fast-fast-fast-fast-fast,” said Ryan. “And that’s how we can determine if the player is getting scared or stressed because it only takes a few seconds for that system to kick in and for your heart rate to become consistent.”

This interplay between the two systems, and Ryan’s application of her understanding of how a player’s physiological arousal can be applied within the game’s design, gives her enough intersomatic awareness to understand player difference. Essentially each design choice she has made has involved identifying how she expects a player will somatically respond to the mechanic or puzzle she has created, and tuning that challenge to the possible parameters of physiological response. Without technological amplification and interpretation a designer might rely on visual cues (seeing the heart rate through watching the pulse in someone’s neck) or tangible mechanisms (taking a pulse by holding the wrist). What makes a biofeedback game interesting from an intersomatic awareness perspective is that through the system, by interpreting a player’s heart rate and delivering tailored gameplay, the designer is, attuned to the player.

Being able to see players’ differing physiological reactions to the same events through biofeedback validated an important design principle for Ryan: that the

experience of play is not "one size fits all." "You can't take for granted that everyone's going to feel that same way about the same things in the game. I think with traditional games, you can just chalk it up to 'oh, well, this person communicated this better than this other person.' You're not really sure if everyone is excited about this one moment or not, but the biofeedback can see that." In a sense, biofeedback games bring to the surface an issue that designers of traditional games can often get away with ignoring: each player is different.

Ryan highlighted two key edge cases that underscore her comments about how biofeedback makes player differences that typical videogames hide more apparent. "We had one guy who was an executive of a large company, and so I guess he's managed to really kind of perfect his 'stay cool under pressure' reflexes, and so the game just never responded to him at all. I had to keep assuring him that it was working, it just – it was him, not the game, which was an awkward conversation." In contrast was the "perma-anxious" player: "he just couldn't make it through because he was just super-nervous for whatever reason the whole time. I think part of that too is the act of putting on the biofeedback stuff. It sort of primes the player to be a little bit more anxious and self-conscious than they would normally be. I think some people deal with that better than others."

Another somatic design consideration Ryan identified as easily underestimated is the user experience challenges that result from new types of input like biofeedback. *Nevermind* continually recalibrates itself in response to the player's physiological data and one of things Ryan said she struggled with was how she could let players know whether the game was reading the player's biofeedback or reacting to it. "If you don't really give players direction in terms of 'the game is doing this because you're getting

stressed out,' then they might assume that things that aren't related are related and so they may not think that the game is working correctly." The possibility of an illusory correlation is based on the strength of an associative bond and, like accounting for player difference, is something game designers need to account for and mitigate. "Did the wind blow because I'm getting stressed or is that just a coincidence because I felt a little stressed? And then, we had it triggered in an event where the wind just happens to blow at that point in time so, you need to kind of correlate it so they can make the most of it."

Another consideration is that biofeedback adds complexity to game testing. Because gameplay relies on internal bodily responses, designers have considerably less control over testing than they do in "normal" games where game input is a standardised controller or keyboard.

> We would find ourselves testing the game before a big deadline and it would be two in the morning, we just fixed a bug and think "Okay, let's make sure the game all runs as expected" and put on the Biofeedback sensor. And I'd be so stressed out and end up for the deadline like "Oh my God, we need to get this done, like now, and I need to go to bed," that I kept dying because I was too stressed out, which was probably a good thing. I had to learn how to calm down even in that scenario, just to play through the game and so it's – yeah, that's a challenge I never experienced before in traditional game development. (Ryan)

This knowledge raises an interesting consideration for conventional game development. When a designer plays through her game, she is not always clear that it is her own real-world body that might be contributing to the difficulty of the game, whether her physiological behaviour manifests itself in, say, speeds of reaction times, or sequencing, or rhythm. For Ryan to test and design her game, she had to really be attending to her physical awareness, her somatic awareness of her body. "One common challenge for game designers," said Ryan, "is that you get used to playing your own

game and so what seems easy to you may be very hard for someone else." According to Ryan, designer familiarity with controls and mastery of gameplay creates a habitual patterning that can impede the creation of a "good" user experience. Biofeedback, in contrast, presents an objective measure of the game through internal response. "I guess it keeps you honest, in a way, because even if you've played it a million times, you can still get stressed-out and you will still react just the same way."

Biofeedback provides the designer with a different perspective into the player that they might not otherwise be able to access. "With play testing, you can tell when people are getting really frustrated, especially players who aren't really gamers. So like just, when they're trying to do basic navigation and their stress levels are going way up in places where they shouldn't and so, "Okay well, our navigation might be a little bit too challenging for new players" and that's an insight you just wouldn't really – wouldn't be as obvious if it were a non-biofeedback game…. With the biofeedback, you can't really lie with it, which is great."

"But one thing that was really interesting and kind of fiendishly fun but a little uncomfortable," continued Ryan, "was when talking to players—if they had the sensor on or were hooked up to the game and they played the game, or even before they played the game or after they played the game, they just happened to be hooked up to it—and having conversations with them and watching the game react to them as you're asking them questions about what they thought about it, it was kind of like a lie detector test. You could always tell, [when you asked] 'Well, what did you think about this puzzle?' and there's a spike and you're like 'Okay, they certainly have strong feelings towards that puzzle, interesting.'"

And neither was Ryan, herself, as designer-player, immune to the "lie detector" effect, and this phenomenon added a further degree of transparency to team discussions. When she was testing a new feature of the game or testing for bugs in front of the team while wearing the sensor, the team would ask her, "Well, what do you think of this new thing we put in?'" "They could always tell like when I was just trying to be polite," said Ryan. "Well, [I'd say], I think maybe it needs a little bit more tuning," and like there's a spike there, they're like, "Okay, you hate it." It's like "Well, I don't hate it but yeah, we need to work on that more." It keeps you honest. So, just as biofeedback provides the player with an alternate means of expression, so too does biofeedback for the designer. It truly is a somatic way of communicating, and this is a very clear intersomatic exchange within the design process. Biofeedback offers a somatic mode of attention, exposing the designer's own internal responses.

### *Body Techniques: Play Narration*

One technique Ryan used to assess player understanding of the game was play testing and observation, with a key emphasis on player narration. Testing was undertaken in a usability room with one-way glass. Participants would play the game, narrating their experiences out loud. They might say, "Hah, did the door lock behind me because I'm stressed?" Ryan explains, and "we'd be like 'Oh, whoops, no okay.'" Or a player might say, "Why is the screen getting blurry. Is that a bug?" Well, that's a stress reaction but they don't recognise that. So then, we try to do what we can to make to make it more obvious."

> An example of that is, there's one room where – you're in a kitchen and when you start to get more stressed, the kitchen starts to flood with milk and

> as you become more calm, the milk will subside: it kind of drains out of the kitchen. And you can't leave the room until the milk is gone so, so you can't open the door while the whole room is flooded with milk. But a lot of people weren't understanding because they thought the door was locked because they were stressed so we put a sign on the door that just says "Leave your troubles outside the door" or something that worked narratively in the game but also sort of gave them reinforcement that you need to calm down to make the milk drain out before you can open the door. (Ryan)

Another technique Ryan uses is a form of kinaesthetic roleplay. Ryan communicates design ideas, what the player is feeling, etc. by acting them out: "I tend to gesticulate a lot… and I do it subconsciously." If she's imagining a player in a maze, with cars around him, she might make a "claustrophobic kind of mime gesture" as she navigates the path the player might take. Ryan said kinaesthetic actions help her communicate feeling. "It's just something that naturally happens but I also wonder if it helps build sort of this empathetic relationship with the player too. Like, I am miming this situation and kind of creating, setting up a scenario and this is how I want the player to feel as well even though they will be making those actions but hopefully feeling that on the inside."

For Ryan intuition is an important part of game design, and she makes many design decisions based on intuitive feelings—"like we have to do this or we really shouldn't do this and I'm not exactly sure why but it just doesn't feel right"—suggesting that "they usually serve me well." She does express a tension she feels, between intuition and exact proof, wishing that she were able to make "those decisions with less of a gut feeling and more of, a "this is exactly why." Ryan points out that it takes a lot of trust for a team to move forward based on a designer just having a "good or a bad feeling." Consequently, "I think listening to that inner voice is super important in game design, because it will rarely lead you astray, but you have to do it with caution."

According to Ryan, a good game designer is able to listen to her inner voice analytically, to ask herself in a critical way "Why do I have a good feeling about this?" and then be able to build off of that and communicate her ideas with the rest of the team.

With biofeedback, says Ryan, you get a more honest reflection and accurate depiction of the game through the body. In a sense the game exposes a player's somatic markers and allows, in turn, the designer to interpret/ use/ exploit these markers in the design. The game's exploitation of intersomatic exchanges between the player and the game offers body-oriented insights to both the designer and the player. "It's an awesome example of getting information from your player you wouldn't otherwise be getting as a game designer," said Ryan. The game makes the interoceptive visible "Not only do you get access into a world you would never see, you get access into the world the player is very rarely aware of themselves." Because people are often unaware of their somatic triggers and responses, they are often unaccustomed to attending to their physiological reactions. The habitual response, to ignore the body, is due to bodily "desensitisation," and it is this desensitisation that the game exposes through its measurement and revealing of intimate physiological responses. The designer and player see, through the game, "a part of a person that has been forgotten, in many cases," and Ryan says as a designer it is rewarding to see the moments when players notice this themselves.

"Sometimes it takes them a little while to experiment with it to – I think most of the time, people go into it thinking it doesn't really work. But then, once they start realising there is a correlation, they're like, 'Oh, I guess I was getting a little nervous" or "I guess I was a little startled there.' Then they become more aware of that, and they're like, 'Oh man, this area totally wigged me out." When players make a correlation between the effect the game environment has on their physiological responses—and

consequently the effect their physiological responses have on the game environment—they engage in a deep intersomatic relationship with the game: an affective feedback loop. The "coolest moment" for Ryan is when players "make that connection between that tiny tinge of tightness in their stomach and the game responding because then, they realise that… that sense, that really small voice of 'Oh no,' has an impact on their body."

Unlike mapping in a console game, mapping in *Nevermind*, says Ryan, involves addressing this inner "Oh no" voice. While the core input is derived from analogue data taken from heart rate, the mapping necessitates thinking in a deeper way about what internal or external body parts a player tenses up, when they start to feel "the heebie-jeebies." "Some people, they feel a knot in the pit of the stomach," said Ryan, "some people feel tension in their shoulders. Everyone is different, kind of how you respond to that, those moments of anxiety starting to build up." The aim of *Nevermind* is for players to leave the game with a better appreciation of which of their body areas signal stress or fear, and therefore which body areas to pay greater attention to.

The goal of the game, said Ryan is to generate enough body memories of "I felt this way in the pit of my stomach or my shoulders or wherever and the game became harder, so I needed to pay attention to when that happens so I can kind of nip it in the bud and calm down before the game kicks my ass, basically." Ryan's game relies on memory as a structural narrative device (the neuroprober piecing together memories) and, also, within the design process she understands the importance of somatic memories in order to affect real-world change. It is Ryan's hope that players build body memories of cause and effect, recognising that when they were stressed or agitated the game became harder and punished them, and conversely, when they started to calm

down, that the game became easier. In this way, "the memory then can become sort of active body memory in the real world," said Ryan. "So I'm in traffic, I'm starting to feel that same feeling, I'm going to calm down and start to feel that feeling of calmness and apply it in everyday situations. That's really what our ultimate goal of *Nevermind* is."

*Nevermind*'s core biofeedback goals revolve around leveraging what Shusterman (2011) refers to as "somatic imprints." Ryan's intention as designer is to develop a system that will allow the player to generate enough somatic awareness that this state of body control can be employed whenever a situation evokes that sense of stress. "That's really the idea with *Nevermind*," said Ryan, "to become aware, so that when you have that tiny, tiny "oh, no" voice in the real world, you can realise you're starting to get stressed and tense and you can calm down and hopefully, that kind of cascades into better health skills."

*Nevermind* is a horror game, and this fact, indicates Ryan, further exploits the game's development of somatic imprints. Ultimately the game relies on a player's past body memories (versus those memories created in the game) of kinaesthetic and physiological experiences to generate a sense of kinaesthetic empathy:

> There's also… a sense of empathy because the horror game is totally ineffective if the player doesn't feel, in some way, shape, or form, that they themselves are also threatened, especially when we're relying on that physiological reaction as well. So I think you have to rely on the player's body-memory to subconsciously react to these really uncomfortable, visceral situations as well, so that they can feel that sense of fear and that sense of threat in the context of the game.

Further, these bodily memories are collective, in that they are shared in the consciousness of the wider gaming collective playing Ryan's game. "There are a few moments in *Nevermind* that almost always get everyone," said Ryan. "These moments in many cases were really hard to implement; they're hard to design; they're hard to

create the art for; they're hard to program." For Ryan, these empathetic moments are not just shared in an intersomatic relationship between the player and the game, but between the player, game, and designer. It is through witnessing the player's response to these moments that Ryan got a sense of kinaesthetic attunement. By observing the player, feeling the anticipation of a player about to interact with these moments, watching the player interact, and watching the player respond, by "both watching their body movement, if they gasp or say anything, and also seeing the physiological response, was such an amazing moment because we put so much thought into creating that exact experience." Ryan expanded further: "we crafted an experience and [to] watch it pay off and see it happening and see [the player] understand what we are trying to communicate is… powerful."

One of the current limitations of *Nevermind*'s biofeedback system is that while it measures heart rate variability, which is essentially a measure of arousal, it does not measure valence. Valence is "how you feel," said Ryan. "Are you happy? Are you sad? Are you angry?" According to Ryan, emotions line up on a scale of arousal and valence. If someone is highly aroused and has a negative valence, then they are angry and upset. In contrast, if someone is highly aroused and has a positive valence then they are excited and happy. Because *Nevermind* can only detect arousal, it cannot tell the difference between types of emotion: whether the player is excited or upset, the game sees it as the same thing. Currently there aren't many sensors that measure valence. Even galvanic skin response, which one might assume would offer a useful means of measurement, only measures arousal, because it is essentially measuring sweat. Ryan raised the possibility of MRI scanning being used to measure emotion, but underscored that any application of that technology within games remains a distant prospect.

Nevertheless what is key for Ryan about *Nevermind* is the connection she feels as a designer with the player. "When you watch… a player struggle with things that you've spent hours trying to design or enjoy things that you've put a lot of thought into, there's this connection you feel. It's like a sense of validation… they're communicating with a part of you. They're connecting with a part of you. They understand you, in a way."

## The Extraordinary Adventures of Baron Munchausen

Though Wellbrook designs all types of games, the most visceral full-body game experience he has designed is *The Extraordinary Adventures of Baron Munchausen*, a local multiplayer story-telling game that is non-digital. What makes the game an unusual body-oriented experience is that the central mechanic is entirely focused around gustatory processes. The game is played in the pub or in a bar. "Drinking is integral to the game," said Wellbrook. "It's not something you just sit at home and play…. You need to toast people. You need to take drinks at certain places in the game. You have to buy other people drinks." As the game proceeds, players become progressively drunker, and the game mechanics are geared for this. The mechanics of the game are simple. "It's a game of interrupting and arguing within a particular fixed framework, but it's also a game of imagination." Players tell "wildly inventive" and "eccentric" stories, in the style of Baron Munchausen. "This is, of course," said Wellbrook, "greatly aided when you are drunk. The game gets better the drunker you are."

*The Extraordinary Adventures of Baron Munchausen* has a particular sensory order that arises from a disruption of the haptic-occular centrism that typifies videogames. Wellbrook employs a core design technique of sensory intensification,

embedding gustatory practices at the game's pivotal junctures to draw players' attention to significant game moments. Tasting and smelling are mapped to the gameplay, opening up "actional fields" (Leder, 1990, p. 18). Important game moments are marked as things to be ingested.

The game is contained in the pages of a bound manuscript, the content of which is narrated by Baron Munchausen himself. Wellbrook uses the Baron's narration to initiate an affective call, to alert the player to the decidedly physical requirements of the game. To play *The Extraordinary Adventures of Baron Munchhausen*, the player must be prepared to attend to the game somatically. The player requires "three or more stout friends, preferably of noble or at least gentle birth; a table; several chairs; a copious supply of drinks, preferably with a charming wench to serve them; and some coins to serve as stakes and to pay the reckoning when all is done" (The Extraordinary Adventures, p.4). Players gather around a table, "with a bottle of decent wine or an interesting liquor to moisten their throats, and each takes a turn to tell a story of an astonishing exploit" (The Extraordinary Adventures, p. 2).

Players assume the role of drunken eighteenth-century noble men or women, and challenge each other to tell far-fetched adventure stories. "So, I would turn to you and go 'Oh, my dear Countess, I haven't seen you in so long, but I gather that in the meanwhile, you have an extraordinary tale of how you once accidentally impregnated the Pope!" Wellbrook explained. "And you just have to start telling this story." The conceit of Wellbrook's gustatorially led design is that it operates using more than one actional gestalt. Drinking and issuing challenges are actional fields that are not isolated actions, but are intertwined "corporeal foci." It is a simple mechanic that creates powerful resonance. A player challenges another player to tell a story, and in doing so

issues an affective call. Wellbrook designed this moment of player-issued challenge to be "provoking." First-time players can find it intensely uncomfortable and daunting. These situations place a telic demand on the storytelling player. His or her body dys-appears through a moment of affective disruption (excitement, anxiety, or fear, depending on how comfortable the player is in telling stories). Simultaneously, there is a spatiotemporal constriction, time and space close in on the storyteller as the other players focus on him or her: the storyteller must suddenly physically *perform*. According to Wellbrook that "initial leap off the narrative cliff…, if you're sober, is terrifying, particularly if you've not played the game before. But if you've had a drink or two, and this is why alcohol is integral to the game, it feels just, you know, 'Oh, I have no idea what I'm going to say, but I'm just going to start talking! And that's enough.'" Alcohol cushions the player's landing.

According to the game's rulebook, stories should "be told at a good pace without hesitation or undue pausings for thought. Inflections, gestures, mimes, props and strange voices may all be used, although the narrator is warned not to go too far" (The Extraordinary Adventures, p. 10). In practice, the player will generally only be able to relate a few sentences of her story before another player interrupts with a proposal—what Wellbrook refers to as a "handhold"—which the player can choose either to build into her story, or else to reject. "Other players may interrupt the story-teller with objections" that are amusing and challenging obstacles. "This is done by… draining one's glass, [and issuing a challenge]. Direct insults to the storyteller's "truthfulness, parentage, or claim to noble rank" are "answered by a challenge to a duel, three rounds of rock-scissors-paper" (The Extraordinary Adventures, p.55). This essentially

comprises the game's combat system and the loser either turns over his entire "purse" to the challenger or drops out of the game.

Said Wellbrook, "You want players to interrupt your story, and you want to integrate the bizarre and illogical ideas into your own stories. These interruptions force you, the storyteller, to think about your own story in a totally different way, and greatly help you add drama and unexpected twists to lead you to the logical end to your story." As much as the storytelling is fuelled by alcohol, so too are the interruptions. *The Extraordinary Adventures of Baron Munchausen*, underscored Wellbrook, is not a story game that merely happens to have drinking elements added to it to because "drinking is fun." Wellbrook emphasised, "The drinking is integral to playing the game better."

The player-created handholds—gustatorily driven narrative markers—work in tandem, with the narrative structure Wellbrook has created. Even though the story is constantly evolving and unfolding, Wellbrook pointed out that as the game's designer he needed to attend to temporality, to pace the game to ensure that its system of mechanics accommodated the opening, mid game, and end game while allowing players to interact strategically with each other. The designer attends to the temporal flow, introducing changes and contingencies, pace and beats, which the players must absorb into an overall gameplay/ narrative rhythm. The rhythm and pacing of the game is dictated by drinking and rounds of storytelling, each one representing a moment of discomfort or intensification, these moments imprint on the player and create somatic markers, which together comprise the player's felt path, an intercoordination of moments that the player remembers as being pivotal about the game. Getting drunk as part of the game fundamentally changes the way people are in their bodies in the game world.

### *Body Techniques*

To understand intersomatic awareness in gustatorial design practice, it is important first to frame design itself as a somatic mode of attention. In other words, to attend to the fact that design is a bodily oriented process, conducted by a designer who has a very real body. The orientational centre of game design is the designer. As with the body in gameplay, there is an absenting of the body during the act of design: the designer's body disappears in focal, background, or depth disappearance as the designer conducts his work. However, gustatory design provokes bodily dys-appearance. In order to engage with another's body, the designer often has to make his body a foreign thing. Gustatorial design involves a self-oriented disruption, a self-imposed distancing, that contributes to the development of an embodied gustatorial competence, which continually develops during the design process. Important somatic design moments identified by designers can be conceived of as body techniques. The designer attends to a bodily-oriented game using his lived body.

There are two key body techniques that Wellbrook uses in design, and that factored into the gustatorial design of this game: kinaesthetic roleplay and kinaesthetic emplacement, a kind of psychogeographical *derivé*. Wellbrook uses kinaesthetic roleplay to help understand the basis of a character. Kinaesthetic roleplay is a type of focused method acting, which involves "walking around, thinking about how characters are going to move, how are they going to stand, or position themselves in relation to each other." For Wellbrook, the importance of this kinaesthetic roleplay is that it facilitates the development of a physical vocabulary for a character or a game mechanic. "Acting out how the character is… using yourself as the model for it, is a very good place to start. I recommend also drawing the curtains first, or your neighbours will think

you're weird." Through this roleplay the designer develops an intersomatic relationship with the character he is creating, grounded in a process of bodily interbeing—involving kinaesthetic mimesis and attunement—which facilitates kinaesthetic empathy. The designer begins to feel the character's physical repertoire, their set of actions, abilities, and special abilities that he can then apply in the game. To design a game based on the character of Baron Munchausen, Wellbrook needed to become Munchausen, at least in a quasi-kinaesthetic way.

Wellbrook also employed an impromptu psychogeographical body technique: a type of spatially-confined dérive. As Debord (1958) conceptualised it, a *dérive* is a "mode of experimental behaviour" in which a drifter journeys through an urban landscape. A *dérive* is typified by a "playful-constructive" approach in which the drifter drops "during a certain period, [his] relations, [his] work and leisure activities, and all [his] other usual motives for movement and action" and lets himself "be drawn by the attractions of the terrain and the encounters" he finds there. While a dérive is most often completed in urban environments, it can be a means to understand the psychogeographical articulations of a spatial field, and it is this aspect of the technique that I wish to draw out in my discussion of Wellbrook's body technique. Namely, it is the communication between body and the self-contained space while the body is in locomotion that is important, and the value that "letting-go" provides the designer. Wellbrook said it wasn't his intention to create an "alcohol-fuelled" game, but the game's genesis fostered this gustatory approach. Wellbrook related how he had been working on the design of a game based on the centuries-old stories of the adventures of Baron Munchausen for approximately a year and a half, but had been struggling with the game's structure because the game wasn't working. His design breakthrough occurred

via a bodily oriented experience in the unlikeliest of places. One morning while in the shower Wellbrook was considering the meta-structure for the game and remembering that the defining characteristic of the Baron Munchausen's adventures was that they never happened. And, further, that the Baron's stories were only ever told over a drink. Wellbrook asked himself if it was possible to construct a game that centred around drinking and storytelling. "And, then, I had the whole thing," said Wellbrook. "Suddenly, it was just like it appeared in my mind, and the rules that I came up with in that instant are pretty much the rules that were published."

Wellbrook attributed his epiphany to the unique kinaesthetic qualities of the space he was in: the shower allowed him to focus in a way not possible in other everyday spaces. There is a particular spatiotemporal corporeal quality to this design genesis. On the one hand, the shower created a neutral, closed space, that provided a confined gestalt, an almost meditative space in which Wellbrook could think; on the other hand the shower offered a measure of novelty that differentiated the act of design thinking from habitual work practice. Together these aspects created a sensory intensification that, in turn, caused bodily dys-appearance. The shower fostered a "corporeal hermeneutics": it didn't force continued self-reflection as intense moments of gaming discomfort might, such as where the player might be attempting to master a new control scheme; instead, it disrupted the body's habitual way of being in space just enough to foster inspirational thought.

> I find being able to be in a neutral space, and it doesn't have to be a completely new space, but a space where I'm doing something I don't do all of the time…. The shower, anything that puts you, I don't want to say meditative, but somewhere where you don't have to think about anything else. Swimming. I've come up with good ideas walking as well. I think it has to involve being active. There has to be a degree of activity so that you almost—you set the body running and then that ceases to be a distraction,

> where it's just kind of humming away in the background. Very few good ideas have come when I'm just lying in bed.

Through this kinaesthetic design practice, Wellbrook's design memory is irrevocably marked and there is the development of a body technique. This technique is incorporated as part of the larger domain of Wellbrook's design practice.

There is one further consideration the shower encourages remarking upon; namely, the importance of the mnemonic function of water. A mnenomic sensation is "a response to stimulus as it has been identified in one's memory with a particular time and place." Mnemonic sensations have mnemonic potency. The flow of water has a mnemonic function in that it produces a particular type of "sensory data" that is "central to deliberation at the inception of the design project" (Malnar & Vodvarka, 2004, p. 41). Finally, there are the associative qualities of water, and water flow, with the act of drinking, and the idea of the drinking game. Wellbrook's body was literally incorporated into the shower. Through the shower gestalt (namely the space of being in the shower), the game design is somaticised. Wellbrook's discussion points to a generalised awareness of his body and the sensory cues provided by the shower and his bodily sensory responses.

## The Betrayer's Banquet

*The Betrayer's Banquet* is a physical game focused around players' relationships with food. The game is Smith's attempt to explore the classical game theory and economics game the *Prisoner's Dilemma*, through the activation of taste and smell. The game features an embedded implementation of an iteration of the *Prisoner's Dilemma*

and is played by 48 people sitting at a banquet table (24 per side) who have been positioned at random.

The player's position along the table dictates his or her gustatory experience: The menu becomes increasingly less palatable as the players move down the table. Players seated towards the top end of the table receive food they might expect to be served at a banquet (e.g. steak, salmon, and fruit crumble). At the bottom end of the table the food served is marginally edible (chicken's foot soup, spam, edible insects, and bread and butter for dessert). The middle of the table is served a spectrum in between (meatballs, cabbage, and dry cake).

The game features 32 courses, served every 15 minutes for the period of the dinner. At intervals, each player is invited to play the *Prisoner's Dilemma* with the person sitting opposite her. Players have a small wooden token (see Figure 11). On one side of the token is a mark of betrayal (a knife); the other a sign of trust (a goblet). Players are tasked with secretly selecting one of the two sides, and then revealing their choice. Depending on the outcome, the players either move up or down the table. If both players cooperate, they both move up five spaces towards the top end of the table. If one player betrays the other, the betrayer moves up ten places and the betrayed player moves down ten. If both players betray each other they both move down five places. When the players move they displace the other diners, so if someone moves up five places, four people move down one.

**Figure 11. Game Tokens**
Source: http://boingboing.net/2013/11/21/betrayers-banquet-gourmet-d.html

Gustation is the organising structure for the game, proxemically, temporally, thematically, and strategically. It provides the overarching game gestalt. Like in Wellbrook's game, it bookends the game rounds and provides handholds for the players. The game does not feature a points system, but because it involves a physically observable change of status (position wise and food wise) based on outcome, players innately understand the reward mapping of the game. However, it is important to realise that gustation is not the only sensory relationship Smith has attended to in his design. Gustation, though, is the organising structure through which all of the other perceptual systems in the game are framed.

The aspect of design Smith is most interested in is multiplayer interaction, particularly the dynamics of strategic decision-making between strangers in a group. A central consideration for Smith's work, therefore, is how players relate together in the game space. Fundamentally, Smith's design interests are intersomatic. A particular challenge Smith faced in the design of *The Betrayer's Banquet* arose from the extreme

local multiplayer nature of the game. Smith needed to account not only for one body in his design, but 48 co-located players, most of whom did not know each other. As with Wellbrook, the inspiration for Smith's design came from an "aha" moment in a neutral space. "It just came in a flash. I was just sitting on a train and I had some graph paper… the next thing I remember doing was drawing out the table and then figuring out how people would move…. " Smith began exploring the mechanics of how a banquet involving the canonical game theory game example *Prisoner's Dilemma* might actually work. "Initially it was just very, in terms of the mechanics it would be, okay, how would people move, what happens when people get to the top, what should the food be like and you know a big thing we're still iterating on is, how do you choose who should get to play next? Because obviously there's only one pair at a time so you can't have multiple groups moving around because that would be really confusing." Smith explained that the key to the game is putting players in a highly structured, but novel environment, and setting them a clearly bounded task: this allows them to not only interact, but to interact more easily with strangers. "You force people to play a game together with high stakes and the game is a negotiation, kind of bluffing game, right." If people are in habitual environments, explained Smith, they will always interact in the same way. "Whereas if you set them up in an unusual environment, it changes the way that they interact and this can break through barriers," said Smith. "And the other thing is, if you give people a very, very restricted [task] they can often build rapport more easily." In intersomatically aware design the designer structures the environment in a way that fosters bodily expression between people. The design goal of *The Betrayer's Banquet*, then, revolved around fostering relationships between strangers using taste and smell as the primary modes of attention. In the game, the taste-smell system is intensified by linking

gustation and olfaction to a physical manifestation of trust (cooperation) and betrayal: the playing of *Prisoner's Dilemma*. Thus, intersomatic design knowledge/ awareness in this case involved not just understanding players' bodily engagement with other material objects (the table, the food) but, also, the intercorporeal relationships—the kinaesthetic dialogues—between players that transpire within the game's gustatory practices.

In designing the game, Smith intensified and disrupted players' habitual attitudes towards food and dining. Players perceive, evaluate, and react to the sensory cues Smith provides. There are two key ways Smith disrupts habitus: the disruption of spatial expectation (setting) and the disruption of proxemic and chronemic expectations related to dining. First of all, Smith plays with spatial expectation by creating a novel performative space that is out of the ordinary, but provides the player with a perfectly balanced and acceptable trope for the game: in this case a "Freemason kind of theme." Smith related the importance of a degree of mystery and intrigue in setting up the players' bodily expectations of the game. When players first locate the venue—a seemingly abandoned warehouse at the end of a *cul-de -sac* on Rosina Street in London—they are summoned one-by-one by a robed figure and directed to enter through a door opened only a crack, asked to give a prearranged password, and ushered inside. This is an important moment because it places an affective demand on the player. It is a literal call to action, an initiation, which the player must respond to in a very physical way. Players feel, said Smith, "Okay, wow, this IS a secret thing." Players give themselves over to the gameplay and become part of the game dynamic.

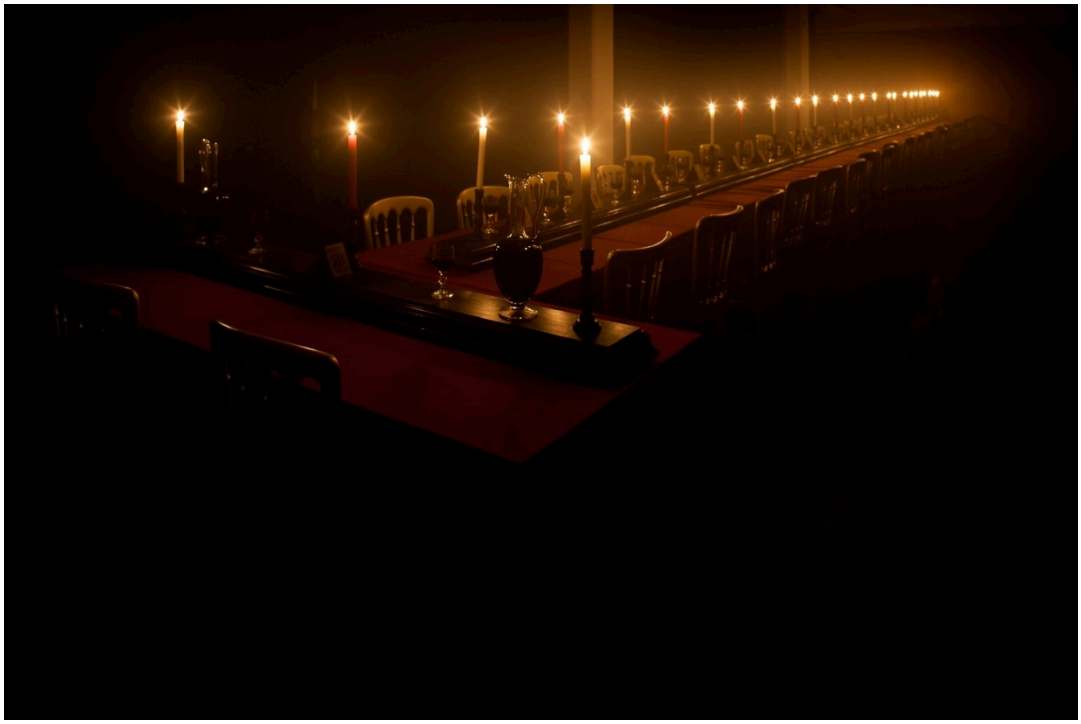

**Figure 12.** ***Betrayer's Banquet*** **Table.**
Source: Will Edgecombe.

In addition to the secret-society call to action, there are other moments in the design that Smith indicated are sensorially imprinted in his design memory and that he feels are equally marked for the players and their feelings towards the game. For Smith, the moment the dining chamber is revealed to the player is a pivotal marker in the game's design. "The whole thing is set dressed. It's really quite striking. And it… sets the scene" (see Figure 12). Another important design moment is when players realise the game is not just about table manners, but treachery. When players enter the dining hall they are told to stand behind their chairs and to look into the eyes of the person standing opposite them and to consider whether they will betray that person or not. "That's a great moment," said Smith, "because people are like, 'Oh wow, I'm going to have to engage.'" Through eye contact there is a shared intersubjective moment, a bodily exchange, a connection where the distance between bodies is "closed," as players realise

the choices that they make will not only affect the other players, but will, fundamentally, affect themselves. Smith said he designed this empathetic moment to compel players to care about the outcome: "If players care," said Smith, "they'll engage."

Olfaction played a key role in creating a sense of place. "An unremarkable space can be transformed into a place of significance by the introduction of an odor" (Malnar & Vodvarka, 2004, p. 130). An odour has the power "to endow spaces with a special character" (p.129). Experience design, for Smith, necessitates attending to olfaction. The designer must "design the smell." The smell of a place, for Smith, is of fundamental importance. "And nobody, I mean this is the funny thing, because it doesn't come across on paper, right, no one believes you, but then if you actually do something to make the smell of a place good, people really like it. But they don't know why," said Smith. "And it's the kind of thing that if you write in your event description it makes you sound like a crackpot, but you know…." Smell is a dramatic memory sense, and when carefully employed in design, through a process of sensory intensification, it is capable of evoking multiple associated memories. "We do not in the first instance rationalize and verbalize what we smell, but we have an immediate reaction to a smell and a tendency to act in accordance with it," write Malnar & Vodvarka (2004). "In other words smelling something generally leads to emotionally colored and sometimes instinctive actions" (Malnar & Vodvarka, 2004, p. 132).

In *Betrayer's Banquet*, Smith *designed* the smell by attending to candles. "The whole thing is candle lit, and candles actually have a very strong smell. It's like when you put out a match… And it gives a really strong sense of the sacred." Designing smell in this case is a body technique that creates a feeling in the player by the very nature of its ambiguity. It primes the player to feel a particular way. "The funny thing about a

candle smell is it's not a smell that people identify. But it makes you feel like, it's like a church smell, it makes you naturally more, at least I believe in our cultural associations in the West, it makes you feel like you should be solemn. It sort of goes with the smell of books and things." The candles' mnemonic quality not only invokes memories of smells, but other sensations. These mnemonic sensations create sensory imprints. An olfactory memory can evoke strong sensory experiences and emotional dimensions, such as belonging and sacredness.

As might be expected in a game about gustation, another important moment is when the food is first served. Up until this point players are not sure what end of the table is the "top." They have been told that at one end of the table the food will be good and at the other end of the table the food will be bad, but they are unclear which end is which. Smith explained, "When the food comes out, and people can see what's on one end and what's on the other end, there's a cheer from the top end and a groan from the bottom and that's really a nice moment."

Another key marker in the games design is when players actually play the *Prisoner's Dilemma*. "When they are looking into each other's eyes and making – they're holding this wooden token under the table and deciding which side to place," described Smith. "That's a really great moment because you've been talking to this person for the last 20 minutes about whether you're going to betray them or not and then it actually comes to the moment where you have to make the decision and everyone gets this little smile on their face…." Treachery is, suddenly, acknowledged as a viable option.

Betrayal (or cooperation, for that fact) leads to the second way Smith disrupts player's habitual expectations of being in the space. In typical real world dining

situations, when a diner sits at a long table to eat he or she remains in *in situ* for the entirety of the meal. By forcing players to move multiple times over the course of the dinner, Smith challenged their habitual sense of order. He disrupted spatial relationships by not only placing status on position, but necessitating that players change position. As one player of the game related, "I had read that the best strategy was a simple tit for tat – start by cooperating, and then match your opponent's previous behaviour. This could mean punishing betrayers on the next round, but forgiving them in the subsequent round." The mention of rounds reflects the repetitive, epystrophic nature of the gameplay. Betrayal and trust are not one-time occurrences, but decisions, and gaming moments, repeated again and again over the course of the evening. The player continued:

> My chosen card, the 10 of clubs, meant that I started just a few seats from the top and received the best food. As my partner and I tucked in to the first course— an artichoke and parmesan salad— we agreed to cooperate, as there was little to be gained by trying to reach the number 1 slot. Unfortunately, we hadn't realised that as others moved up from the lower half of the table we would gradually slip down. As betrayers worked their way up the table on their own, realigning the two sides of the table, we would be forced to negotiate with new partners. (Aron, 2013)

In this way, Smith places a repeated telic demand on the player: disrupting habitual response, which in turn creates an affective call, which imprints on the players body and then repeats itself when the player interacts with the next player. "It's a very "high intensity event," said Smith. "You know, at this event, people don't check their phones because they've got 15 minutes to decide if the person sitting opposite them is trustworthy and the outcome is actually really important. The stakes are high. So you find that people really get into it quite intensely." The high stakes Smith refers to in regards to this game is the prospect of literally having to consume failure, bodily.

The measures of success in this game are the types of food players eat. Ingestion brings us full circle to the interoceptive nature of gustation. The incorporation of food into the body—it is not just that the food is there as an indication of reward or failure, but that the player ingests this food—reminds us that the game is a juxtaposition of the "sensorimotor surface of the body" and its visceral depths. The game allows us to see the complemental series Leder identifies in *The Absent Body* in action. Smith's design intensifies and problematises the player's relationship with food and in doing so ecstasis and recessiveness emerge.

### *Gustatorial Mapping*

Designing a game so centred around the body means that there are some fairly unique intersomatic design concerns, the most pressing of which is gustatorial mapping. Each aspect of gustation needs to be mapped to the game and considered in the development of the game mechanics: gustation and gameplay are inextricably linked. Thus, Smith must consider hunger, portion size, timing and delivery of the food, duration of each course, as well as practical considerations of how the food will be prepared. The game involves the creation of 200 plates of food over the two hours the dinner is typically served within, and because the venue does not have a built-in kitchen, Smith has to ship in a kitchen, including four chefs and two kitchen porters. Unlike game design in established genres,[29] where there are established conventions and design practices that a designer can rely on to help guide design, gustatorial game design is bereft of exemplars. According to Smith, one of the most interesting and challenging aspects of the game design, was how to create a good experience for people who were

[29] An example of an established genre is a first person shooter (FPS). As discussed earlier there are accepted conventions that can guide the designer in terms of mapping decisions (e.g. shooting being mapped to the right trigger on a game controller).

losing "gustatorily," particularly when habitual expectations for a banquet is for the food to be "good": "We have to have losers, we have to have people who if they play badly they end up at the bottom and they get crappy food and, you know, people aren't very happy about that and people are really not used to that idea… it's very rare you lose at a restaurant."

The banquet table is covered in glasses and plates and food and, as much as the game involves food, it also hinges upon the consumption of alcohol. When players are not actively playing *Prisoner's Dilemma*, they are negotiating and drinking. The game has two choices of wine—white or red—and a central dilemma Smith faced in incorporating alcohol into the game was how he could avoid mapping intoxication. In the first two iterations of the game, Smith used an embedded drinking game to determine when a pair group would play *Prisoner's Dilemma*. When a set of players finished their drinks they could play. "You had a ritual cup of cut crystal and it was filled with port and when you finished it you got to play…," explained Smith. "But we found that no matter how big a glass we gave people, they would just down it." Smith could not run the game fast enough to match the rate at which people could drink. At other events he used smaller glasses of wine, but with equal problems. "I remember at one event we went through 75 bottles of wine," related Smith. "Everyone was getting really, really drunk…. The thing is, no one was unhappy about it. It wasn't like they were unhappy about the fact that they were drinking, but it sort of got to the point where I think it was undesirable…. You can give people too much of something that they want."

A player's inability to regulate his or her own alcohol consumption leads to a process of excorporation. Interoceptive processes surface unexpectedly in moments of

gustatory excess. Betrayal leaves a bad taste in people's mouths, literally, and Smith pointed out that this can result in quite visceral—and body-oriented player responses. "When people get betrayed, there's quite amazing engagement there." When players are drunk, the engagement intensifies. "We've had people throwing drinks at each other and… screaming." And, infrequently, a player becomes so drunk he vomits. Throwing drinks and vomiting signify *excorporation*—the body expels rather than ingests—and this represents the mostly intensely ecstatic physical responses to the sensory cues Smith has embedded into the game. Bodily dys-appearance in this case signifies the functional limits of the design.

Gustatorial design skill is a "bodily transformation that is not via an intellectual flash of understanding" (Leder, 1990, p. 32). The pivotal design moments that Smith recounted in our design conversation can be conceived of as design gestalts that become slowly imprinted into the designer's body. Via incorporation, a gustatorial design vocabulary is developed and "abilities sediment" into gustatorial design practice. To frame it another way, the designer's body masters its skill "by incorporating its own corporeal history of hours and days" (Leder, 1990, p. 32) and this in turn becomes a somatically marked bodily past that guides sensory design and tacitly structures future design practice.

### Matching Pennies

Like Smith, Murphy explores a key game theory concept through gustatorial design. His local multiplayer game, *Matching Pennies*, like the other games discussed, features food as a reward. However, his game differs from the other two games in that it features a touch screen which two players share. Another notable difference between

Murphy's game and Smith's and Wellbrook's games is that the bodies Murphy designs for are very different: they are primates. Murphy's work raises important questions, then, not just about gustatorial design practices but about the wider auspices of intersomatic design practice: How do we design for a body that is significantly different from our own? What is a viable body to be considering in game design? How do we design when language is not a possible design factor?

Murphy's design work fits within a larger research framework called the Ai Project, a research endeavour that explores chimpanzee perceptual and cognitive capabilities. Run by Tetsuro Matsuzawa, the Ai Project, began in 1978 with a one-year old chimpanzee from the Guinean Forest.[30] While initially the focus of the Ai project was on understanding the acquisition process of language-like skills in chimpanzees through the research use of a computer-controlled lexigram[31] system, over its more than 35-year period the work has expanded considerably. "The Ai project's aim since 2000 has been to clarify aspects of the chimpanzee mind within social contexts, focusing specifically on the emergence, modification, and cross-generational transfer of cultural traditions in chimpanzee communities" (Matsuzawa, 2003, p. 199). Thus, focus has shifted from attempting to understand a single chimpanzee's cognition to that of the understanding social dynamics in a community as a whole.

Murphy's work takes the computer paradigm, fundamental to the Ai project, and extends it into a social setting: two chimpanzees play a local multiplayer game on a shared touch screen. The game is a simple two-choice game theory zero-sum game

[30] The Guinean Forest spans Guinea, Sierra Leone, Liberia, and Cote d'Ivoire. Ai is a *verus* chimpanzee. She was purchased as an infant through an animal dealer in 1977 (Japan did not enter into the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) until 1980). Ai was destined for a bio-medical facility. Instead, she was sent to the Kyoto University Primate Research Institute (KUPRI) where she became the centre of Japan's first ape-language research project (Matsuzawa, 2003).

[31] Lexigrams are geometric shapes that have been used in primate language research to describe words.

called *Matching Pennies*: essentially the two-choice version of *Rock-Paper-Scissors*. Like Smith, Murphy was attracted to the use of game theory because it offered a systematic way of generating insights about chimpanzee social interaction and featured a simply payoff structure (the zero-sum aspect): each round has a loser and a winner.

Murphy's game has been played by six chimpanzees.[32] The chimpanzees voluntarily play the game—when Murphy has set up the game he goes out into their enclosure and calls the chimpanzees and asks them if they want to play the game; however, most often they are waiting by the door of the building where Murphy's game is set up because the game is generally played at the same time each day. Murphy's aim is to assess the chimp's capabilities for strategic thinking using interactive game theory games and he focuses in particular on the Nash Equilibrium. Murphy explained, "In game theory, a lot of these tasks are choice tasks, where each player makes one of two choices, and depending on the combination of choices that the two players make, they're rewarded with different amounts of – well, for humans, it's different amounts of money, and then for animals, it's typically different amounts of food. We chose to focus on the most simple game imaginable, a matching game where the one player wants to match the choice of the other and the other player wants the choices to mismatch, and then if they do match, then the matcher gets a piece of apple, and if the mismatcher wins, then he gets a piece of apple and the loser gets nothing." The gustatorial aspect of Murphy's game design, therefore, functions as both motivator and reward. Any food that the chimpanzees win during the game is taken out of their dinner in order to regulate the overall daily quantity of food chimpanzees receive.

[32] The chimpanzees live in a social group of 15 chimpanzees, in a community that spans three generations, in an outdoor enclosure.

As a zero-sum game, *Matching Pennies*, can be "solved" using a Nash Equilibrium. The premise is that the game can be played in such way that neither player will ever lose. Murphy explained that he usually describes the Nash Equilibrium using the three-choice game *Rock-Paper-Scissors* because it is more familiar to most people. Applying the Nash Equilibrium to a game of *Rock-Paper-Scissors* means that players play each choice (either rock, paper, or scissors) 33% of the time, and make the distribution of their choices entirely random. When a player plays at random there is no pattern for the opposing player to exploit. Even if players can discern that the opposing player is choosing the strategy of playing at random there is nothing that the player can do strategically to win. The best scenario is for the player to ensure that her play is equally random so that she can avoid losing. In this situation, it can be said that there is an equilibria.[33] "If you imagine that I play, say rock, paper, and scissors, 33% of the time, but I'd always play rock, then paper, then scissors, repeatedly," explained Murphy, "you can still beat me because you can detect my pattern. But if I play them randomly, in a random order, then you can't detect my pattern. So, there's no way that you can beat me. In fact, no matter what you do, we'll end up splitting 50/50 the number of times that we win."

According to Murphy, humans don't apply the Nash Equilibrium successfully in games because it is exceedingly difficult for humans to be random. "If I gave you a piece of paper and asked you to write 0's and 1's in a random order, it would be really hard for you to do it. There would be some kind of pattern that an algorithm could detect quite easily." In contrast, chimpanzees are capable of applying the Nash Equilibrium in optimal play, even when they switch roles (matcher or mismatcher) or

[33] A real life example of the equilibria is the Cold War.

when payoffs are adjusted. There are two explanations for the reason that chimpanzees are able to apply the Nash Equilibrium successfully. The first is that humans tend to be prosocial and cooperative, whereas chimpanzees are more competitive. From a young age, chimpanzees develop their competitive skills through playfighting, wrestling, or playing hide and seek and, in doing so, they "create and continuously update a strong status and dominance hierarchy" (Martin, Bhui, Bossaerts, Matsuzawa, & Camerer, 2014). Humans, in contrast, shift their focus from competition to cooperation, a process facilitated by the use of language. The second explanation is based on the evolutionary implications of language development, what Matsuzawa (2014) calls the "cognitive tradeoff hypothesis." According to this hypothesis, "the brain growth and specialization that led to distinctly human cognitive capacities such as language and categorization" also results in humans processing some simple competitive tasks—such as the *Matching Pennies* game—"more abstractly and less automatically than our chimpanzee cousins" (Matsuzawa). Chimpanzees working memory is also more advanced than humans.[34] This disparity between human processing and chimpanzee processing offers an interesting implication for intersomatic awareness design. As Murphy pointed out "There's no way to imagine what it is like to be a chimp in this situation.

### *The Arena System*

The Arena System, what Murphy calls his game setup, (see Figure 13) has specific features which work well for chimpanzee bodies. Chimps stand or sit on the ground, facing a multi-touch screen at a 45-degree angle and, at the same time, they face the other chimp who is using the system. The chimps do not see each other's bodies in

[34] A video demonstrating chimpanzee working memory capacity can be viewed here: https://www.youtube.com/watch?v=qyJomdyjyvM

entirety but can see each other's arms. In this way, their attention is directed both at the monitor and at what the other chimp is touching on the screen.

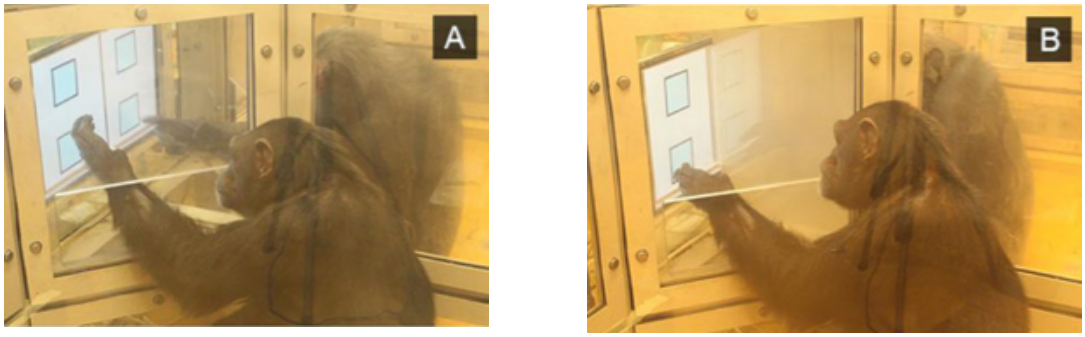


**Figure 13. Arena Set Up with Transparent Film (A) and Opaque Film (B). Source: Martin, Biro, & Matsuzawa, 2013.**

The screen is one touch panel, so the chimpanzees can "intuitively comprehend the joint nature of the task;" however, it is divided in the middle by a transparent polycarbonate barrier, covered in a layer of smart film. In this way Murphy can use software to control whether or not the chimps can see the other side of the screen (see Figure 13). As with Smith's game, the reward is food, which brings with it specific gustatorial design considerations. Chimps receive 8-mm apple cubes for correct responses. Underneath the touch screen in front of each player is a tray to which apples are delivered to the winning player via a universal feeder machine. "The feeders, like the smart-film barrier, are connected via a circuit to a digital input/ output module, which is connected to the master PC," explained Smith.

Like Smith, Murphy needed to consider both the amount of food provided and the pacing of the delivery of the food. Smith, organised the delivery of 32 food dishes, paced in 15-minute intervals. In contrast, the delivery of food in Murphy's system is triggered by the PC software recognising a win state. The feeders can dispense food that is roughly 8 mm in diameter, at a rate of one rotation every 1,500 ms. Thus, Murphy's

gustatorial design has both a proxemic and chronemic element. Inherent in the chronemic aspect of the game's reward system are visual and auditory indicators of success. A key factor in the game's design is the intersomatic connotations of winning. The win-state is reinforced by the visual and auditory channels. The screen of the winning chimp turns green. If the chimp on the left side of the screen wins he or she is rewarded with a high-sounding beep and if the chimp on the right side wins, she or he is rewarded with a low-sounding beep. But even more so, Murphy's game is designed to issue a very specific affective call. "If the other chimp wins," said Murphy, the losing chimp can see the other chimp pick up a piece of food and eat it. Further, because the food is delivered mechanically through the universal feeders, even before the reward is delivered the chimps can hear the machines rotating and the chimps can tell if the feeder is moving or not based on the noise. This increases the sensory anticipation. Murphy, thus, places a telic demand on the players by emphasising inequity. In turn, this demand makes an affective call. Murphy explained:

> Many chimp interactions are agonistic, and they live in a dominant hierarchy, so if the subdominant chimp approaches a dominant chimp, there's kind of a ritual exchange where the subdominant has to assume a certain posture, make certain vocalizations, so that the dominant won't get upset and attack them. You see that a lot in naturalistic circumstances, like in the wild or even watching the chimps in the outdoor enclosure here, but it does occasionally happen in the lab. I've had some times where the chimps will kind of get upset with each other. I haven't really collected good data on it, kind of more anecdotal, but there's a lot of times where chimps will kind of – well, there are some tasks that I have that are kind of inequity tasks, where one chimps gets a bunch of rewards and the other doesn't get any, even though they're doing the same thing, and in that case, you can kind of tell that they're frustrated or that they're jealous through their posture, they'll avoid eye contact and that kind of thing.

We have seen with Smith's work, the outcomes of "gustatorial excess." Vomiting and throwing drinks are edge cases that need to be contended with in design. Similarly, there are chimp-specific considerations that Murphy needed to make. The technology

used with chimps needed to be robust and "chimp proof"—the touch screens are securely mounted with acrylic faces to avoid screen damage. In addition, because the chimps are eating cut apples, they get apple juice on their fingers and this has unique implications the designer must consider: "If a touch screen is capacitive, then you have a problem because if the chimp touches with their fingernail, it's not going to register; if it's an optical touch panel, if there's saliva or dirt on the screen, which happens all the time with chimps, then the cameras can't pick it up as well. Actually, I think the best touchscreen for a chimp is the resistive touch panel, which just takes pressure." However, in the case of the Arena System, Murphy could not locate a suitable multitouch resistive screen. "So I went with capacitive. And there was a bit of a learning curve for the chimps, that they learned to not use their fingernails."

As much as Murphy places an affective call on the chimpanzee player through the sensory intensifications in his design, the game design places a reciprocal call on Murphy. Accommodating chimp's bodily factors are disruptions, affective disturbances, which signify the differences between his own body and the chimps. For Murphy the key difference in designing for an animal versus designing for a human is language: interspecific communication is predominantly non-verbal. "When you design stuff for chimps, you don't have language… you can't tell them anything about how to play it or what they'll be testing; it's more of like a show than tell. You have to show them in a way that they can understand how this system works. That was kind of the goal I had from the beginning, which was to create a very simple system that didn't require any previous explanation to be able to use."

Part of the reason the Arena System is able to be used without explanation is because it built upon the collective memory of chimp-oriented design. All of the work in

the AI project is based on the use of food as a reward. As a result, gustation has been the foundation of their game design for more than three decades. This forms a shared collective memory both for the designer and for the chimpanzees. The chimpanzees also expect—and have a learned behaviour—that food will be an integral part of the games they play. Murphy, thus, inherited the gustatorial emphasis of the design, but, equally, so he inherited other aspects of systems design based on a long period of cultural memory. For instance, chimp user interface design has specific usability considerations that have developed in parallel to human game user interfaces over the past 35 years. On a basic level, Murphy explains, that for chimps "when there's something on the computer screen, it is something they can touch and something that they can interact with, so, as a result it is hard to show them passive information." Chimps have learned through a 35-year cultural memory that "if there's anything on the screen it should be touchable."

In addition, the chimps will always start a game by pushing a start key. "If you watch the Ayumu video[35], you'll see that there's a little circle in the corner for every trial. So I use start key in my tasks." (See Figure 14).

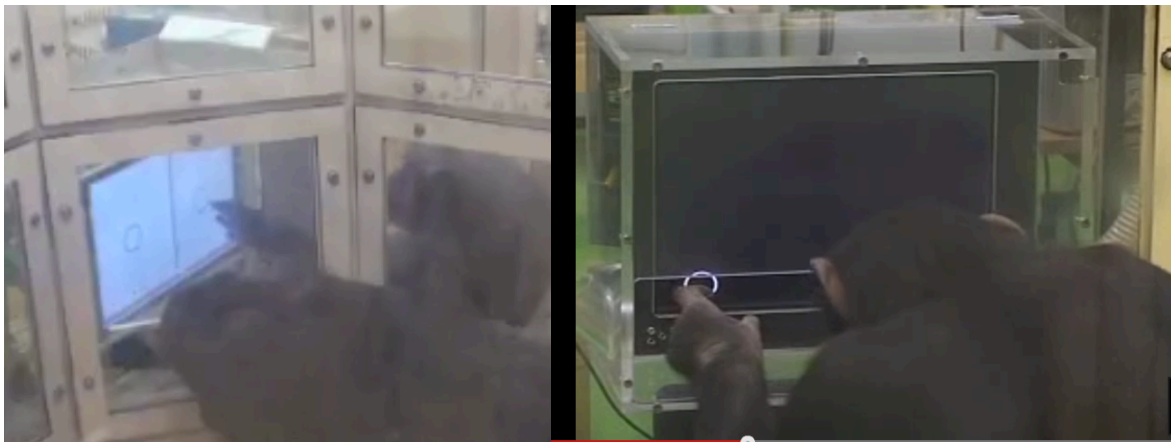

**Figure 14. Start Key in Chimpanzee User Interface**

[35] https://www.youtube.com/watch?v=JkNV0rSndJ0

The start key is a bodily marker that signifies an actional field. Pushing the start button not only starts the game, but initiates the intensification of the taste-smell system. Further, each consecutively designed game system which employs the start key contributes to a sedimentary process of player and design(er) memory. The chimpanzees involved with the Ai Project have played games containing these start keys thousands of times (Murphy's *Matching Pennies* game, alone, was played in four sessions by two chimpanzees, 200 times, totalling 800 plays). Through repetition, long-trained patterns of movement have developed. This bodily knowledge goes beyond mere reflex response, reflecting a type of procedural memory that integrates discrete elements into holistic temporal patterns and forms a gameplay habitus. The chimpanzees incorporate the start key in a bodily action that sets off a chain of events in which the body then recedes into background disappearance. This process of sedimentation produces a somatic marker that signifies a pivotal bodily moment. Interestingly these pivotal markers can point to a process of incorporation based on incorrect patterning and in these cases bodily disappearance becomes dys-appearance, a signification of a problematic or disruptive state for the designer. "I think the chimps might use something like a pivotal marker sometimes. I've witnessed situations where a chimp will be really bad at something; they'll keep getting wrong answers. I have a Matching-Pennies task which is – it's an individual task that they're playing against the computer algorithm, and the computer algorithm I wrote is very good at detecting any kind of pattern they're using, so if they're not being random, the computer algorithm will beat them almost every time," explained Murphy. "A lot of these chimps are very bad at this task, and some of them will try different things, like they'll do a somersault and then try it again,

or they'll flip upside down and touch the panel. I do think – I mean, I can just tell you this anecdotally, let's say that they go upside down and touch the panel and they get a right answer, that they'll be more likely to do that again just through reinforcement learning. Insofar as a somatic or a vestibular effect of getting rewarded as attached to some kind of reinforcement learning, then I think they're more likely to do it again, sure."

For most of the game—because of his attention to examining social interaction between chimpanzees rather than between chimpanzees and humans—Murphy is an outside observer. And watching the chimpanzees creates a similar kinaesthetic imagery and empathy that one might feel watching a dance performance. But, there are times, when the experience features a more pointed corporeal blending into shared experience, particularly in cases when the chimpanzees want Murphy to do something for them. In this way the game gestalt creates a somatic mode of attention for both Murphy and the chimpanzees. So, as much as Murphy creates a telic demand/ affective call for the chimpanzees, chimpanzees issue demands of their own. Murphy explained, "If they want to get my attention, they'll just knock on the glass, the acrylic. And usually if something is wrong with the feeder, like an apple that's stuck in the tube or an apple missing from the slab, they'll let me know." The tap on the glass is a literal somatic mode of attention. The chimpanzee uses gesture and sound to create a sensory intensification and make an affective call to Murphy. This in turn demands action on the part of Murphy. On the surface it appears that this is complex social behaviour, but Murphy cautions that it isn't possible to determine the precise nature of what the chimpanzee is doing. "It's tough to tell if – it's hard to say if they're doing it because they're anxious, if they're not getting fed, or if they're doing it to get my attention. I

think it's easy for me to imagine they're doing it to get my attention, but it's not something that I can prove without, you know, a whole experiment." Regardless, the memory of this incident creates a sensory imprint and becomes a notable mode of attention in Murphy's design work.

Murphy's work with chimpanzees increases his somatic, and simultaneously, his intersomatic awareness because it highlights the difference between his body and chimpanzees. "When you can watch what chimps are capable of in terms of navigating a three-dimensional arboreal environment, the way they can climb and navigate between trees. They have no fear at all of heights; they can jump between branches when they're a hundred feet in the air. That kind of thing I think about sometimes like how different it is from humans and myself."

The designers I interviewed, Wellbrook and Murphy included, used a type of kinaesthetic roleplay as part of the design process. In Murphy's case this offered him a mechanism for effectively communicating with his primate players. "I have kind of casually learned how to move my body like a chimp, and that helps sometimes when I'm trying to negotiate with chimps to do things or if I want to make a proper greeting to a dominant chimp or if I want to really greet any chimp, I know how to move my body in such a way that will get them to react in a favourable manner." Through kinaesthetic mimesis Murphy develops somatic idioms, somatic resonances—durable bodily dispositions and bodily memories—that provide a way of understanding and interlinking bodily experience. "A greeting for an alpha male is avoidance of eye contact, I'll put my head down, I'll reach my arm out and present by wrist and make grunting noises. That's a subdominant display."

# Chapter 6: Discussion

## Game Design as an Intersomatic Mode of Attention

In the previous chapter, the analysis of the reflective interviews with game designers was described and organised into exteroceptive-focused design practices and interoceptive-focused design practices. The chapter showed how designers address the fundamental tension of the absent body in their design practices and revealed the highly intuitive and experiential qualities of their intersomatic knowledge. The chapter addressed those things that signalled attention to the body, when and how designers attended to the body, and how designers measured and monitored bodily processes. I showed that designers place different corporeal loads on players, depending on the bodily/ affective response that the designer wishes to create in players. The chapter related the challenges and considerations designers faced when addressing somatic concerns in their practice. Designers gain considerable awareness through mapping and employing sensory cues. They learn the differences between their bodies and the other bodies in the corporeal field. Often, this points to the need to acquire additional knowledge. I also described how bodily aspects of design were marked in the designer's memory as pivotal design moments. From this empirical analysis it is possible to identify the core dimensions of intersomatic awareness: sensory ordering, sensory intensification, somatic imprinting, and somatic marking.

In this chapter I elaborate upon these core constructs as a means to provide a more direct answer to the main research question posed by this thesis: How can we understand the dimensions of intersomatic awareness through an examination of designers' experiential knowledge and somatic conceptualisations? The discussion first reviews the

two central paradoxes of intersomatic design: the paradox of the absent body and the paradox of the designer as experiential centre. What follows is then organised into discrete sections, each focusing upon a particular aspect of intersomatic design practice and presented through a functional model of intersomatic awareness. However, while suitable for functional and demonstration purposes, it should be recognised that these divisions are artificial: the intersomatic constructs should be understood as interdependent and, thus, not self-contained.

## Paradox One: The Absent Body – Concealment and Alienation

In the introduction to this thesis, I began the discussion of intersomatic awareness in game design by stating a fundamental paradox. Games are unavoidably, inherently, and inescapably corporeal activities, but the somatic aspects of games and game design are rarely the thematic object of discussions by players, designers, researchers, and spectators. Leder (1990), as I noted in Chapter 3, supplies two concepts to help make sense of this paradox: disappearance and dys-appearance.

When the body is functioning unproblematically, it recedes from conscious awareness. It *disappears*. The body is typically absent in discussions of game design because its self-effacing nature allows it to be overlooked. The body is latent to individuals when they are engaged in purposeful action of which they have a practical command. The wonder of a game is "that it promotes its own oblivion" (Merleau-Ponty, 1982): a player performs bodily inputs and, from the moment she is caught up in their telic meaning, she loses sight of them. The controller, the screen, the other players, her hands, her eyes, her body "are there only as the minimum setting of some invisible operation" (Merleau-Ponty, 1982, p. 357). When the controller-mapping and mechanics

of a game allow the player's hands to express intent in such a way that action conforms to expectation, the body functions unproblematically. Gaming habitus is thus represented in the coalescence of a series of unproblematic operations, which is a habitual state of both the player and the designer. "The lived body," writes Leder (1990), "is an ecstatic/ recessive being, engaged both in a leaping out and a falling back" (p.103). The ecstatic-recessive nature of the body results in "two complementary forms of self-concealment" that mark the surface of the body: focal disappearance and background disappearance (Leder, 1990, p. 26).

To continue with the controller example begun above, *focal* disappearance refers to the self-effacement of the hands that occurs during focused attention on a gaming activity. When the hands' actions, and their proprioceptive and touch-sensing capacities, function without disruption—but remain as the player's bodily focus—they instantiate *focal* disappearance. There are other sensory operations and organs that are in operation, but they are instances of background awareness. The legs, for instance, might be stretched out in front of the player and thus forgotten, lost in *background* disappearance. They are a bodily region that disappears "because they are not the focal origin of [sensorimotor engagement] but are backgrounded in the corporeal gestalt; that is, they are for the moment relegated to a supportive role, involved in irrelevant movement or simply out of play" (Leder, 1990, p. 26). In addition to focal and background disappearance, the player's body is also marked by *depth* disappearance as the visceral organs and interoceptive processes such as respiration and circulation continue to function without being noticed. This focal-background-depth disappearance helps us to make sense of Nørgård's (2012) reflection that a "game is concurrently a corporeal experience and an 'un-attention-demanding' experience" (p. 166). Thus, the default

mode of gaming, that is to say its predominant somatic mode, is one where the player habitually forgets the existence of the body. To play a game fluently, it, in fact, appears that the body must disappear.

The analysis of the empirical evidence in Chapter Five, and specifically the hermeneutic dialogues with designers, revealed the fact that the somatic modes of gaming are not solely restricted to disappearance, as there may be more forces in play than bodily disappearance. Another somatic design consideration exists, beyond the disappearing body: As much as there are times when the body is forgotten, there are also times when the body summons attention because it presents itself as an alien presence—uncontrolled, uncomfortable, and in the way (Leder, 1990). In these times, the body is not absent because it *disappears*, but it is absent in the etymological sense of the word, as in "being away" (Leder, 1990); it is a foreign body.

However, the empirical analysis also revealed that rather than being a completely unwanted state, *dys-appearance* is an essential component of intersomatic design. The inherent differentiating quality of a game is that it is a form which involves epystrophic episodes of blockage and enablement: games are systems that present players with obstacles to be overcome and situations to be contended with, challenges that occur in loops and repetition organised in not just cyclical but episodic fashion. A path in a game is not a straightforward bodily journey from start to finish. The player stops and restarts, goes forward and loops back. The designer sets bodily challenges for the player which must be met somatically, and consequently, must become incorporated into the player's habitus so that she can play the game effectively. This thesis illuminates some of the ways that game designers actively play with "bodily phenomena [to] manifest structures of concealment and alienation" (Leder, 1990, p. 220). Intersomatically aware design

practice understands that games demand something corporeal of their players and, equally, the players place demands on the game.

### Paradox Two: The Designer as Experiential Centre

The designer's body is the "orientational center in relation to which everything else takes place" (Leder, 1990, p.22). Further, Johnson (1990) points out that "the fact of our physical embodiment gives a very definite character to our perceptual experience…. Our world radiates out from our bodies as perceptual centers from which we see, hear, touch, taste and smell" (1990, p. 124). The designer occupies the central vantage point in the world she creates and so it is her body that guides and directs the design process. Game design is a self-oriented perceptual activity: the designer must make happen the things she envisions. A game designer's body is, then, at the centre of her game, because she is her own default. It is her own intent she is attempting to realise. She, herself, must forge through preliminary concepts, mappings, mechanics, builds, and initial playthroughs, simply because she is the only one who knows what it is that she is attempting to create. She engages in a type of ameliorative first-person practice, where, by attending to how the game feels—reflecting in action (Schon, 1983)—she can iterate and improve upon the design. In this way, game design can be conceived as a somatic mode of attention.

This then leads to the second paradox. The intersomatic is always understood as some aspect of the somatic. The game designer's understanding of another's body is juxtaposed with her understanding of her own body, since her central frame of reference is herself. From her central vantage point, the designer creates the objects in her design gestalt. She focuses her "attention on one object or perceptual field after another" as she

scans the game environment. What may be "figure" or foreground at one point may become "background" at another as she moves perceptually through her world. Her interpretations of the players' corporeal field—their actions, abilities and capabilities—are within the system she has designed and based upon her perceptions and assumptions of how the player will use the system and how the system is designed to be used. Further, the centre-periphery structure is a recurrent motif in the designer's experiential space. Some aspects of the design are "more important than others . . . [as] they loom larger [in her] experience and are more central to [her] interactions" (Johnson, 1990, p. 124). In the context of a game's design, these more important forces are sensorially-imprinted perceptual activities, which, in turn, become somatically marked. The designer designs not necessarily *for* herself, but *as* herself.

If the orientational centre of a designer's corporeal gestalt is the designer herself, the question then arises as to how possible it is for the designer to understand the somatic intentions of the player. Game design is clearly not a purely solipsistic pursuit, so how then does this intersomatic aspect manifest itself? As Crossley noted (1995a), Merleau-Ponty supplies a way to answer this question, through his explications on intercorporeality (Merleau-Ponty, 1968). This answer involves, at least in part, a challenging of "the classical formulation of the problem of intersubjectivity" predicated on the Cartesian assumption that "mind or subjectivity is a different 'substance' to the body, is located (privately) within the body, and is only directly available from within (that is, by means of introspection)" (Crossley, 1995, p. 142).

Merleau-Ponty's challenge[36] comprised three basic components (Crossley, 1995, 1996, 2006). According to Crossley, the first piece rejects the notion that things exist as different "substances" (i.e., mind and matter, materiality and ideality, sentience and the sensible, or subject and object). While it is useful to make distinctions between these aspects of being, Merleau-Ponty suggests these distinctions are not ontological absolutes, but are only relative to each other. Accordingly, there is no "absolute other"; nothing exists except by its relation to the rest. Thus, "all human subjects belong to and are part of the same world (Being)" (Crossley, 1995, p. 124), pointing to a commonality of experience. Second, Merleau-Ponty suggests that "we should not understand mental predicates as referring to inner (incorporeal) mental states but rather as referring to publicly verifiable aspects of embodied conduct or behaviour" (Johnson, 1990, p. 124). The implication, then, is that behaviours make mental or subjective declarations directly available to both the perceiver and the perceived: "subjectivity is not private and inaccessible, it is worldly and publicly available" (Crossley, 1995, p. 143).

Finally, perception occurs across a common shared space, an "intermundane space." There are not two separate worlds, belonging to the perceiver or the perceived, but one plane of reality. "I must be simultaneously the perceiver and the perceived and so, too, must she," explains Crossley. "This intertwining or 'chiasm', as the later Merleau-Ponty (1968) terms it, is the basic form of intercorporeality which, in turn, is the basic form of human being in the world." Thus, the orientational centre paradox is resolved through the recognition (Ferrari & Sternberg, 1998) that design understanding occurs in a practical-perceptual space (the "intermundane space") that is shared between players and designers, and therefore players' intentions are visible in some way.

[36] This discussion is elaborated throughout Merleau-Ponty's work but receives particular attention in *The Phenomenology of Perception* and *The Visible and the Invisible*.

What the self-orientation, centre paradox points to is that intersomatic awareness is a self-reflective, hermeneutic process. "The events and circumstances that shape it are ... constructed products of self-generated meaning[,] shaped to fit" a growing conception of a bodily-aware design self (Ferrari & Sternberg, 1998, p. 309). Designers create systems that transform the essence of their experiences—in a process of algorithmic mimesis—into a form that can be understood by a player. In this way, the design "self is not only constructed but its mode of construction is 'massively hermeneutical'" (Ferrari & Sternberg, 1998, p. 309). This means that at the heart of intersomatic awareness is an interpretive structure of awareness, one based on a dialogic process between the designer and the player, vis-à-vis the game. Thus, when players use the system there is a "talking back," and the designer reflects on what the player is telling him. In this way the game becomes an intermundane space in which the designer both shares his experience through the game form and perceives the player's experience of that experience. Thus, these two phenomena "meld."

## A Functional Model of Intersomatic Awareness

The two paradoxes discussed above—the absent body and the designer as the orientational centre—underscore the conundrum of design practice. They also offer a bifurcated framework to better understand the core concern of the research question. I turn now to a discussion of the functional model of intersomatic awareness, adapted from Rusch's (1970) model of awareness (see Figure 15). It is composed of four components: sensory ordering, sensory intensification, somatic imprinting, and somatic marking. Within each component are a number of sub-components. The process unfolds in this sequence:

1. Sensory data is arranged through a process of sensory *ordering* or sensotyping.
2. It is then *intensified* by the designer to create affective calls in the player.
3. Sensory data is perceived and reflected upon, through a process of *somatic imprinting.*
4. Finally, it is stored in memory, with key moments of understanding becoming *somatically marked.*

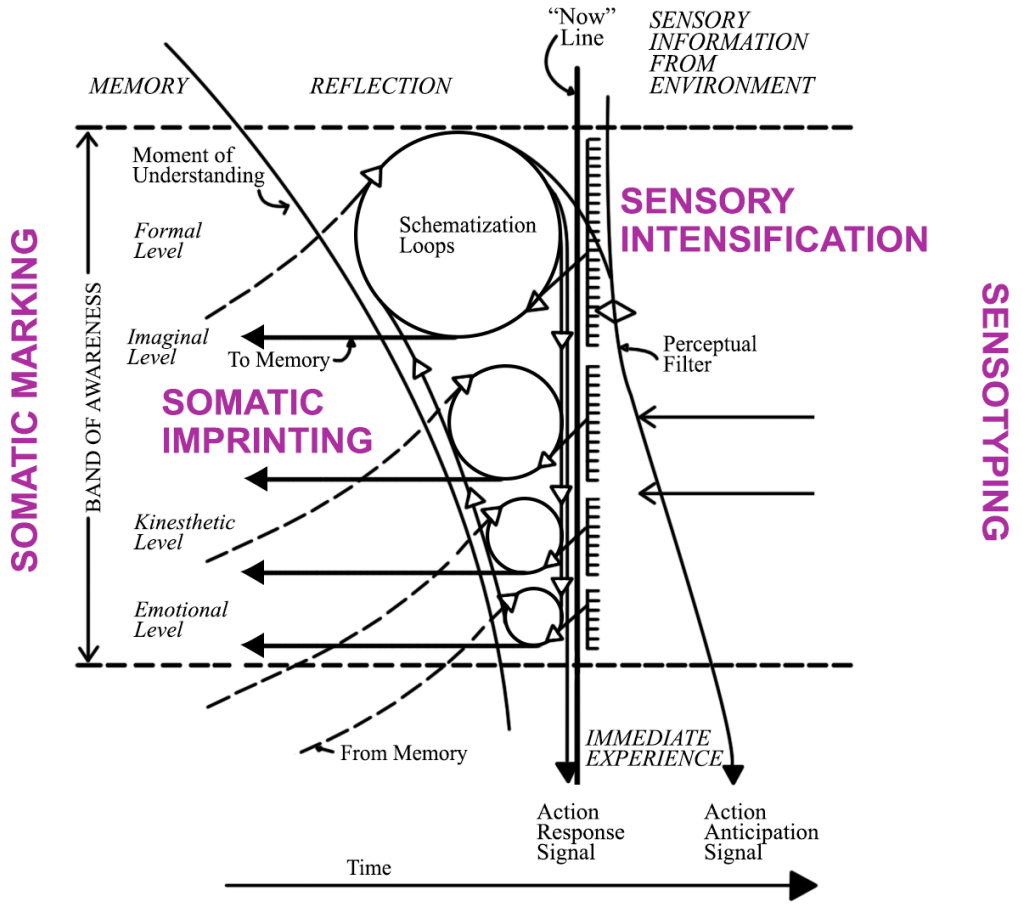


**Figure 15. Functional Model of Intersomatic Awareness.**
Adapted from Rusch (1970).

### *1. The sensorium, the sensory order and sensotyping*

*The most important thing is understanding how people are going to react to your game, not just mentally, not just tactilely, not just cognitively, but*

> *physically… whether they're going to feel involved, whether they're going to feel tense, whether their body is going to react physically to the game play experience and in what way and what types of controls they're going to… Understand that people do play games physically. It's not just sitting on the sofa, moving very little except one's thumbs and index fingers.*
>
> *--John Wellbrook*

Our senses structure the world. "[M]y body," Merleau-Ponty (2014) writes, "is not a sum of juxtaposed organs but a synergetic system, of which all of the functions are taken up and tied together in the general movement of being in the world" (p. 243). Although the senses differ, "they originate in the same body and their objects overlap,… they share an experiential field … [and] [e]ach refers to a more general faculty" (MacDougall & Taylor, 1998, p. 51). As perceptual systems, the senses "not only overlap in their functions, but are also subsumed under a total system of bodily orientation," writes Ingold (2000), drawing upon Gibson's (1966, 1979) conceptualisation of the senses as perceptual systems. "Looking, listening and touching, therefore, are not separate activities, they are just different facets of the same activity: that of the whole organism in its environment" (Ingold, 2000, p. 261). The structural space in which the senses and their perceptual associations combine to become "unitary phenomenal experience" is called the sensorium (Laughlin Jr., McManus, & d'Aquili, 1992, p. 106). According to Ong (1967), the sensorium is the entire sensory apparatus as an operational complex" (p. 6). This is not to say that all of the sensory systems are treated equally. "Man's sensory perceptions are abundant and overwhelming. He cannot attend to them all at once. In great part a given culture teaches him one or another way of productive specialization" (Ong, 1967, p. 6).

Game design tends to be touch- and vision-centric. There is certainly a material causation for this—namely, that technological availability and technological limitations

make it difficult to address other senses (particularly those of interoception and proprioception). Ways of dealing with these limitations and the predilection for haptic and ocular centrism have been learned from, and developed through, years of gameplay practice and participation in the wider culture of the game development community (Lave & Wenger, 2002). "Some sensory experiences"—such as those related to the exteroceptive senses—are "familiar and easily articulable" (M. Paterson, 2007, p. 27). They thus become part of the design communities' broader habitual practice. Over time, a designer acquires bodily knowledge, develops and shares patterns of behaviour, learns particular techniques, and relies on familiar mechanics and conventions to foster certain sensory experiences. This habitual repertoire for organising experience becomes indicative of the designer's sensorium or sensory order.

In turn, each game a designer develops has its own sensorium that is derived from that individual's structuring of sensory experiences. Drawing on Wober's (1966) definition of the sensotype, Geurts (2002) defines a sensory order "as a pattern of relative importance and differential elaboration of the various senses" (p. 24). It is through this patterning and elaboration that the designer learns "to perceive and to experience the world . . . and develop his abilities" (Wober, 1966, p. 182). These sensory orders comprise the basis of design sensibilities (Geurts, 2002), "a lasting mood or disposition patterned within the workings" (Desjarlais, 1992, p. 150) of designers. The designer creates the sensory order in a game "by attending to some types of perception more than others, by making an issue of certain ones while relatively neglecting other ones" (Ong, 1967, p. 6). I will term the development of this structural relationship between different sensory systems within a sensorium or sensory order,

sensotyping[37] or sensory ordering. Sensotyping is the process by which the designer addresses the senses through mapping and the creation of actional fields.

Designers capitalise on bodily ways of knowing. At the heart of the sensory order are the base perceptual mechanisms the designer wants to exploit. For instance, Winchester's starting point for the design of *Joust* was the desire to exploit slow motion, so the resulting design sensotype emphasised the auditory, tactile, and kinaesthetic modes. In contrast, in *Flowy*, Wolfe focused on breath and, thus, sensotyping emphasised respiration, tactility, kinaesthetic, and visual modes. In order to better understand the specific somatic decisions designers made, I conducted a sensory order or sensotype analysis of each of the selected games, using a "sensory slider tool" adapted from Malnar and Vodvarka (2004, p. 247). This visual reference tool was useful for several reasons, as it

- served as a visual encapsulation of each game's sensory order
- helped isolate, in a meaningful way, the individual sensory systems that were used in the game
- assisted in understanding how the designer applied this sensory ordering to her mapping choices

Sensory mapping involves myriad decisions, all of which have as their basis attention to the control of sensory cues and sensory responses. For instance, in *Journey*, Chao relied on an organic analogue approach to mapping player controls.[38] Consequently, the game's control system was specifically designed to give players the feeling they were

[37] Sensotype is a term coined by Wober (1966) to indicate "the pattern of relative importantance of the different senses" (p.182). Sensotyping as I use it is the process by which the designer applies the senses through mapping and the creation of actional fields.
[38] Character movement was mapped to the left analogue stick; the camera was controlled with the right analogue stick

surfing down sand dunes, by giving them considerable freedom of movement. Body mapping for Ryan in *Nevermind* involved creating a system that helped a player understand her somatic response to a particular game mechanic or onscreen event. The aim of *Nevermind* was for players to finish the game with a better appreciation for the bodily signals they should attend to when they are becoming stressed or scared. Therefore, to help players develop an understanding of how these signals work in concert to create a somatic map, it entailed connecting heart rate monitoring to a player's interoceptive responses. This takes the form of the ambiguous inner "oh no" voice, "having the heebie jeebies," "feeling a knot in the pit of the stomach," or "shoulder tension." In *Diploplia*, Bewley overrode players' habitual visual perception by mapping different visual images to each eye.

There are two pragmatic points to be made here in regards to applying the Sensory Order Analysis technique. First, though it serves the valuable purpose of encapsulating, as a "snapshot," the designer's sensory ordering of what might be considered common sensory experience across players. it is important to remember that this snapshot only captures a static moment in time for a "general player." Inevitably, because games are fluid, lived systems in continual flux, an understanding of the game's sensory order as a totality would required multiple re-applications of the sensory order analysis at pivotal junctures throughout the game. Further, it would also require completing this across multiple players. Second, because of the variation in types of games, there was an inherent tension between addressing the "standard" sensory systems and the desire to go deeper into the sensory analysis by breaking each sense down into component parts (for instance, more haptic or body movement categories for physical games like *Joust*). Thus, there seems to be merit in creating multiple sensory sliders suited to the particular

characteristics of a game. However, these future considerations do not detract from the value of the sensotyping, which was aimed at capturing in a meaningful and visually accessible way the overall general sensory ordering of the game. By engaging in this sensotyping of each game's "common sensory responses," it was possible to understand the sensory system the designer was attempting to exploit and to elucidate some of the corporeal assumptions inherent in each game.

### *2. Sensory intensification*

> *As perception becomes habitual, it becomes automatic. Thus, for example, all of our habits retreat into the area of the unconsciously automatic; if one remembers the sensations of holding a pen or of speaking in a foreign language for the first time and compares that with his [sic] feeling at performing the action for the ten thousandth time, he will agree with us… Habitualization devours … And art exists that one may recover the sensation of life; it exists to make one feel things, to make the stone stony. The purpose of art is to impart the sensation of things as they are perceived and not as they are known. The technique of art is to make objects "unfamiliar", to make forms difficult, to increase the difficulty and length of perception...*
> .
>
> --Shlovsky

Game designer habitus is derived from play and design experiences. These experiences develop essential somatic knowledge that the designer can then encourage through the exchange of physical cues, and sentient and sensory information (Zuboff, 1988). The sensotyping elaborated upon in the previous section underscores that designers have a sensory repertoire developed through practice and imprinted in memory that they employ in their design practices.[39] The correlative component of intersomatic awareness involves taking this sensory order and understanding how to

[39] This bodily way of knowing may not be consciously or explicitly considered by the designer.

manipulate it. An overarching term for this process is sensory intensification. Sensory intensification involves four aspects: amplification; disturbance; disruption; and spatiotemporal constriction and telic demand.

**Amplification.** Through sensory intensification, designers amplify particular sensory modes. For instance, at a base level the outcome of controller-mapping decisions results in amplification. In *Way*, for example, Birks's decision to map the mouse to left and right arm gestures, rather than to a switch that set off a preset whole-body animation of the character, intensified the tactile, kinaesthetic, and proprioceptive sensory systems. The result is that focal attention was placed on gesture. Exaggeration and repetition also facilitate amplification. In *Journey*, the creation of a world devoid of organic life—that is, plant matter and water—involved activating the visual sensory system. This was achieved by removing the colour blue from the game's palette, exaggerating the low contrast and overcast lighting, and restricting the world's colour schema to a yellow palette.

**Disturbance.** With sensory amplification, inevitably, comes disturbance. Even the most gentle of touches will create a movement on a body of water, the extent of which depends on the force exerted and the nature of the body being amplified. By presenting the player with a particular sensory cue or set of cues, the designer creates a momentary disturbance in the game player's habitus. When and how the player's body reveals itself depends on the duration and intensity of this somatic disturbance. If the players' responses to the cues are an easy fit within their bodily hexis—that is, their sensory skill, familiar iconography, or indexing processes—the body may not surface or may only present itself for a momentary duration. However, more likely than not, in important game moments, the designer has designed an intentional disruption to the

players' habitual sensory responses. The actional gestalt of the game exerts a pull on the player (Leder, 1990).

**Disruption.** There are also unintentional disturbances, when the system responds in ways that the designer did not intend. These come from an unexpected affective call placed on the player. It issues to the player an *affective call*. The player's "attention is summoned… in a way that would not be by a more neutral stimulus" (Leder, 1990, p. 73). "This affective call has the quality of compulsion" (Leder, 1990, p. 73). The player *must* attend to it. Consequently, these disturbances place a telic demand on the designer. The designer, inevitably, will need to respond to this unexpectedness from a design standpoint. This telic demand can be caused by an inconsistency in the way the system measures a player's input. In *Fable: The Journey,* for instance, because the developers pushed the Kinect to its functional limits by tracking a seated rather than standing form, when the player changed position after initial body calibration, the game struggled to register this change and needed to recalibrate. In other games, the player's performative environment may intrude. Docherty, for instance, spoke of hitting the lights in his bedroom with the Wiimote when he lifted it above his head in *Wii Tennis*. Players themselves might amplify the system in an unintended way, such as in the case of *The Betrayer's Banquet* where the players overdrank, got drunk, and vomited. In these situations, problematic incorporation led to bodily dys-appearance (Leder, 1990).

In this way, by using sensory cues to disrupt the self-effacing nature of the body, designers can intentionally and unintentionally problematise a player's habitual way of being. Sensory intensification is the basic mechanism by which the designer attracts the player's attention (in essence, this is the initiation of sensory response). The designer

embeds particular sensory cues in the game design and an area of the player's body, previously recessed, begins to assert itself.

**Spatiotemporal constriction and telic demand.** The affective call can become, in and of itself, a somatic mode of attention. Through its disruptive quality, sensory intensification "constricts not only the spatial but the temporal sphere" (Leder, 1990, p. 75), creating *spatiotemporal constriction*. Competing focal demands are removed as the player's attention is "narrowed down." Attention is concentrated on only that incoming information which is necessary. Thus, suggests Leder, sensory intensification is a centripetal phenomenon, a force that brings space and time towards the centre. In Figure 15, this process of sensory intensification is encapsulated in the core areas of immediate experience; namely, incoming sensory information, perceptual filtering, and initiation. Sensory intensification places a *telic demand* upon the player in that it inspires a goal; namely, to resolve the discontinuity. This gives rise to a "hermeneutical and pragmatic moment" (Leder, 1990, p. 78). Understanding occurs through a dialectic of experience and reflection encapsulated in somatic imprinting.

### *3. Somatic imprinting*

The intersomatic awareness model, adapted from Rusch's (1970) model of awareness, encapsulates how sensory information from the environment enters human awareness. The overall process of somatic imprinting is straightforwardly expressed but deeply complex: Immediate experience involves the designer taking in information from three sources: sensory data is perceived, reflected upon, and stored in memory (see Figure 15, top labels in diagram, running right to left). Specifically, perceptual information is passed through perceptual filters and coded into manageable "chunks,"

which are then processed through reflection. Reflective activity structures this recoded information into new units of meaning. *This is somatic imprinting*. Reflection is a "constructive activity": it constructs connections between schematic loops occurring at different levels of awareness (Rusch, 1970, p. 15).

As information is reflected upon it is somatically imprinted, or stored, in the designer's body. Understanding is the act of forming linkages between emergent meanings and meanings existing in memory. Meaning units are "stored in memory," but Rusch (1970) points out that "it is not so much a process of placing new units of meaning into established 'storage bins,' as it is the construction (from a continuously regenerated supply of parts) of an elaborate lattice which unfolds with the passage of time" (p. 62). Design memories, then, are not static or rigid, but are part of a memory structure that is dynamic and in a constant state of flux: "just as immediate experience is continuously changing, so also the memory structure is continuously being reconstituted and reconstructed under the impact of the change of experience" (Rusch, 1970, p. 63).

**Bands of Awareness.** There are four different ways of structuring sensory information, each occurring along a band of awareness: the emotional level, the kinaesthetic level, the imaginal level, and the formal level. While all of the bands are "continuously active," working to produce a generalised awareness, one or two of the levels tend to dominate focal awareness. This "focal attention concentrates, or attends somewhat single-mindedly to a narrow part of the band and constructs a sequential trace which is superimposed over the [general] flow of awareness" (Rusch, 1970, p. 62). The levels are distinguished by their degree of conceptual abstraction. For example, the formal level has a high level of abstraction and thus the reflective aspect is predominant.

In contrast, the emotional level is characterised by limited conceptual abstraction, because immediate experience (that which happens in the "now") is emphasised.

The activity is what determines focal attention. Looking at an apple, for instance, would activate the imaginal loop. Thinking about adding the apple to a shopping list would be a highly conceptual activity and would occur at the formal level. Eating an apple would feature an emphasis on the emotional or kinaesthetic levels. Getting hit by an apple would trigger the emotional level. While the entire band of awareness is relevant to understanding, most relevant to a discussion of intersomatic awareness are the emotional and kinaesthetic bands of awareness.

In the emotional band of awareness "our apprehension is almost entire experiential and nonreflective" (Rusch, 1970, p. 66). The innate response to things is feeling; "it is only afterward that we identify and cognize, what it is that we are feeling" (Shaviro, 2012, p. 58) . The reflection that occurs at this level, explains Rusch, is only through empathy—a means to comprehend emotional meaning. Rusch provides a vivid example:

> Pretend for a moment you just witnessed an accident in which a child on a bicycle was struck in front of his home by an automobile. Pretend he is thrown twenty feet or so and lands on his back, stunned, immobile, but relatively uninjured. Hearing the screech of the brakes and tires, his mother rushes out of the house, horror-stricken. Anguish is written all over her, in her facial expressions, her gestures, her posture, her tone of voice, and so forth. Now look at the other witnesses as they watch her bend over her son. Their faces, too, are filled with anguish, and their bodies, too, recoil with shock. Clearly, emotion is being communicated from the mother and son to the people who surround them. No words are spoken between them, but a message has been transmitted nevertheless. (p. 67)

Pertinent to this discussion is how emotional meaning can be communicated between people if emotion is tied to the immediacy of one's experience. First, argues Rusch, it is important to realise that there is some reflective activity taking place, but, it takes place "so directly and automatically," it is difficult to disentangle conceptually

from the immediacy of experience. In the case of the above example, emotional meaning is encapsulated in “sentic modulations” (Clynes, 1977): “the physical means by which an emotional state is expressed”, such as posture, gesture, tone of voice and timbre, and facial expression (Picard, 1997, p. 24). In this way, sentic modulations take a form that makes their meaning perceivable by another. “Affective and emotional states are not simply qualities of subjective experience; rather, they are given in expressive phenomena, i.e., they are expressed in bodily gestures and actions, and they thereby become visible to others” (Gallagher & Zahavi, 2013, p. 203).

The meaning that is shared is the commonality of experience. “You may never have had a son struck by an automobile, but you have experienced other personal tragedies. The overlap between your experience with tragedy and the mother's tragedy of the moment is what is ‘transferred’ to you by perception” (Rusch, 1970, p. 67). The perception of her emotional state brings to the fore emotions derived from the observer’s own experiences. However, this is a process of abstraction. We do not experience the tragedy as the mother does, or have the same feeling. Instead we are experiencing our own emotional state that comes from a past memory laden with emotions we perceive as being similar to those sentically expressed by the woman. According to Rusch (1970), there are two criteria for empathetic transfer of emotional meaning between people: 1) that they have both had experiences which overlap emotionally and 2) that each person can perceive the other, in some form, through sensory/ perceptual channels. Intersomatic design knowledge then involves being able to read the players’ sentic modulations and being able to understand the meaning of their actions expressed in playable game space.

At the kinaesthetic level, the focus is on bodily understanding the world, developing habitual reactions, and structuring or conceptualising experience through

bodily movement. The kinaesthetic band of awareness involves, like the emotional band, a reflective and conceptual element and an element based in immediate experience. Rusch (1970) labels these, respectively, kinaesthetic empathy and kinaesthetic imagery. Watching a tight rope walker cross Niagara Falls, for example, step after step on a single rope, "one can 'experience' by empathy the bodily tension she must be facing" (p.68). Similarly, watching the hands of an elite level *Street Fighter* player creates mimetic patterns of tension and finger effort in one's own body. This experiencing of bodily tension and effort involves activating the sensorimotor body surface and the visceral organs, through the mirror neuron system. It is an immediate experience.

Kinaesthetic imagery, in contrast, involves reflection. To look away seconds later and replay the tightwalker's journey in one's mind is a reflective activity. This reflection then becomes imprinted in memory. As Fuchs points out there is "[o]bviously . . . a memory of the body apart from conscious recollection." This memory, argues Fuchs, is a collection of habits developed through "repetition and exercise." Sheets-Johnson (1999) expands Fuchs's argument, suggesting that memory is based first and foremost in the "qualitative dynamics of movement" (Sheets-Johnstone, 1999). For her, bodily memory can be understood in terms of "kinaesthetic/ kinetic melodies" rather than in terms of "implicit knowing," "procedural memory," "tacit know-how," and so on, because "kinaesthetic/ kinetic melodies hew to the realities of experience as well as to neurology"[40] (Sheets-Johnstone, 2012, p. 44). Thus, in this model, the kinaesthetic level is not only about procedural body memory but an understanding of the subtleties and complexities of movement that are grounded in the "kinetic qualities that structure our movement and constitute its particular dynamics" (Sheets-Johnstone, 2012, p. 44).

[40] Sheets-Johnstone is referring to the work of Luria (1966a, 1966b, 1976a, 1976b).

Kinaesthetic awareness includes such thing as understanding bodily reflexes and response rate, recognising spatial and movement patterns, and anticipating and acting on them. Further, it involves a sensorial perception of position, movement, or tension, and involves an awareness of the players' "orientation in space and the passage of time and rhythm as it occurs in" the phrasing or beats within a scene (Smith, 2002, p. 131). The basis of intersomatic design comes from kinaesthetic awareness. Designers have a movement sensibility which gives them the ability to do several things: sense spatial locatedness, temporality, and energy through bodily movement; incorporate this movement into their design practice (Fraleigh, 1996); and differentiate their experiences from those of their players. Intersomatic intelligence and interkinaesthetic sensitivity (Behnke, 2008) come from understanding how the body appears habitually in design.

**Indexing.** A designer needs to be aware of the bodily benchmarks that dictate player capability. Indexing is the process by which a designer identifies somatic modes to which to attend. The designer creates points of reference that signify current body knowledge, normative somatic design decisions, and future design goals. During this process the designer identifies tensions between her habitual design practice and the knowledge she requires to accomplish it. The designer might acknowledge that a gap exists between her intent—to share an experience—and what is available to help her achieve that intent. Or, she might identify a design problem, such as a smaller scale mechanical aspect that is not working in the way she intended—for instance, the feel of a jump sequence that has not been correctly tuned.

The somatic knowledge focused on the emotional and kinaesthetic bands of awareness is "keyed to the most relevant pragmatic (intentional, goal-oriented) level of action" (Gallagher & Zahavi, 2013, p. 211). However, I do not intend to suggest here

that one can infer what "the other person is intending by starting with bodily movements, and moving thence to the level of mental events (desires and beliefs)" (Gallagher & Zahavi, 2013, p. 211). Instead, my perspective is that actions are made meaningful by the entirety of the reflective and experiential context of the intercorporeal environment. This is to say that for meaning making, affective and kinaesthetic awareness are not isolated constructs but depend upon sensory context and intersomatic entities. What is most important to this discussion of games is that "we interpret the actions of others in terms of their goals and intentions set in contextualized situations, rather than abstractly in terms of either their" kinaesthetic or emotional performances (Gallagher & Zahavi, 2013, p. 212).

### *4. Somatic marking*

*"We try to make that act of interacting with that world, something that you also feel in your body."*

*--Tale of Tales*

In the game design process there are bodily markers that act as anchors in space. Space, time, and expressive potential are somatically bound. What happens in space creates a somatic imprint, a resonance of a place that is, in turn, marked in the design journey. This imprint has the capacity to influence behaviour and decision making. A useful term to describe these bodily anchors is "somatic marker" (Damasio, 1996). Somatic markers are created by somatic state changes that occur when somatic imprints provoke a moment of understanding. A somatic marker can be created by a literal body imprint: a bodily response to a game mechanic, or the haptic feel of game hardware. As Tomkins pointed out, he prefers using a controller where he can "feel" the groove of the

d-pad on his thumb. This haptic feeling becomes a somatic state, a preference for his kinaesthetic engagement with a game.

Similarly, Hargrave talked about how a key feels when it is pressed on the Das Keyboard[41]—how there is a rewarding click halfway through the button press as the system receives the press signal and then a rewarding "cushion" as the his finger completes the pressing motion. Such sensations represent a somatic ideal for the kinaesthetic and affective feeling associated with a game mechanic. Each of these bodily responses is a somatic marker for the designer and influences the design decisions he makes. Another somatic marker might be the coalescence of a sequence of muscle memories. For instance, in *Street Fighter* each movement in the sequence of moves a player must perform to complete a Shoryuken[42] becomes somatically marked in aggregate when the player successfully learns the sequence. It is further embedded into her gameplay habitus when the complex motor pattern is repeated again and again. Through these repetitions, the player develops her own style, identifiable in much the same way as a morse coder's "fist" (Gladwell, 2005).

Sites of bodily difference are also marked in game design. Murphy's somersaulting chimpanzee is a pivotal somatic marker for both Murphy and the chimpanzee, but for very different reasons. Equally so, was the somatically marked moment when Chao realised he needed to transpose the touching mechanic in *Journey,* because it fostered agonistic gameplay, with a growing mechanic in order to develop feelings of connection amongst players. A somatic marker can also be a habitual bodily response to game space. Shusterman (2011) writes that "certain places leave such strong

[41] http://www.daskeyboard.com/

[42] "Executed by moving the stick forward, down, and then down-forward. . . . The move is a jumping uppercut in which the user spins upwards with some horizontal movement as well, knocking the opponent to the ground and inflicting damage" (http://streetfighter.wikia.com/wiki/Shoryuken).

somatic imprints of feeling that [this feeling] is involuntarily evoked whenever we enter them" (p. 6). Inherent in Shusterman's comment is the fact that these somatic imprints are the result of a dialectic relationship with space.

During our conversations, designers discussed key design moments, and because the focus of the conversations was the body, they elaborated on how these moments were somatically marked by the somatic feedback involved in the situation.

**Somatic being.** Another type of somatic marking can be encapsulated in a body technique[43] I will call "somatic being." Games often transform experiences into a playable form. In doing so, moments, events, feelings, and senses need to be documented by the designer for future reference. In order to capture the essence of the experience, an approach of "being" can be employed. Being emphasises documenting the experiential aspect as a whole, what Hammersmith likened to a zen-like approach. Being is essentially a practice of bodily notation, but is fundamentally different from taking a photograph or recording a video. The designer observes with her whole body, placing herself in the situation which she wishes to capture and attempting to absorb as much of it as possible into her body. When she is out of the situation, back at her design work, she accesses that bodily memory to recreate the experience in the game. It is a process of sensual bodily presence that aims to avoid reductiveness.

The foundational principle of the being technique is that some experiences can only be recorded in the body. Hammersmith compared it to a process of taking snapshots with her body, which she can then "flash back" on. She used several techniques for this purpose: standing somewhere for three minutes with her eyes closed; performing a physical activity such as running or swimming; or generating tactile

[43] See Parisi (Parisi, 2009) for a discussion of Mauss's concept of body technique applied to games.

sensations like taking sand in her hand or collecting objects which she can sensorially refer to later on. “It’s about concentration, really making yourself be there in that situation, at that moment, and being very aware of being there. Not just passing through.” This affective and kinaesthetic basis of “being” also exists in another body design technique: kinaesthetic emplacement. Emplacement suggests the sensuous inter-relationship of body-mind-environment (Pink, 2009). This manifested itself in the unintentional design practices of Wellbrook and Smith, where, because they were in a neutral yet novel design space— Wellbrook in the shower and Smith on a train—they were inspired to think in different ways.

**Kinaesthetic visualisations.** Somatic marking also occurs through several types of kinaesthetic visualisations. In a sensory walkthrough practice the designer actively imagines how the parameters of the game will play out. Hargrave explained: “I close my eyes, hold the controller in my hand or whatever it is, mouse, keyboard. I move it around. I see how it feels with my eyes closed and I try to image what comes out.” An extension of this type of performative visualisation is a technique which involves the designer *becoming* the game object, whether that object is the primary game character, a non-playable character (NPC), or a static object that the designer wants to understand. In this way the designer “inhabits” the object, feeling what it is to be that body in the game world, considering the experiential qualities of that design artefact in the wider ecological whole of the game.

**Kinaesthetic roleplay.** Finally, a more active way to imagine game scenarios is kinaesthetic roleplay. Kinaesthetic roleplay can entail the designer physically trying out virtual game designs in the physical world—as in the case of Wolfe’s breathing prototype walkthrough for *Flowy*, a physical prototype which featured a popsicle stick

avatar, a metronome for measuring breathing rhythms, and a piece of paper with platforms drawn on it. As Wolfe breathed in, he moved the avatar popsicle stick upwards. When he breathed out he moved the avatar downwards. In this way, the design ethos of "rewarding the exhale" became somatically marked through the practice of kinaesthetic roleplay. The importance of this type of low-fi experience prototyping (Buchenau & Suri, 2000) is allowing the designer to identify important somatic considerations before committing to full-scale design. The basic tenet of this technique is derived from the belief "that experience is, by its nature, subjective, and that the best way to understand the experiential qualities of an interaction is to experience it subjectively" (Buchenau & Suri, 2000, p. 425) The body engages in the tasks that the body can do.

It is important to recognise that the markers discussed here are not the only markers that appear in game design, but they are important ones: they act as anchors for important aspects of game design. Markers can either be components of the path or the path itself, "for often form is the *communiqué entier*: it is simply about itself" (Blom & Chaplin, 1988, p. 5).

**Articulatory amplitude**. Sites of articulatory amplitude create forms, called markers. Designers use several terms to refer to the markers in games: set pieces, anchor points, moments, encounters, building blocks, eddies, peaks, and troughs. A marker represents the coalescence of "physiological filters and developed sensorimotor routines . . . through which each individual sustains such physical interaction with the world" (Thompson & Walsham, 2004, p. 737). The creation of markers involves "kinetic articulations" (Poyatos, 2002, p. 52). These moments "will naturally tend to collect around an impulse, a breath, an intention, with relevant material forming a self-

contained unit or phrase. A movement starts, goes somewhere and ends; another idea starts, thereby invoking new set of movements" (Blom & Chaplin, 1988, p. 19). Put more simply, a marker is an important bodily moment that becomes ingrained in memory. Designers and players have different markers—as they are very individual things—but at times the markers aggregate, become attuned, and signify a deep moment of intersomatic understanding.

**Design Paths**

When designers talk about the games they make they talk about paths. Paths can be a literal interpretation of the concept of a path: designers create a path that the player can follow through the game space. Sometimes these paths are linear (as in the case of *Way*). Others are more freeform (as in the case of *Journey*). Still others, such as *Betrayer's Banquet* are paths in the sense that they involve movement patterns in spaces, with permeable boundaries constructed by the configuration of players in the real world.

The term path connotes a spatiotemporal relationship. A path is tied to spatial ability, and spatial ability necessitates attending to visual cues and "kinaesthetic patterns": players "learn a succession of movements rather than a spatial configuration or map" (Tuan, 1977, p. 70). The way a designer configures spatial objects influences the way players move through the game space, which consequently has the potential to affect how they "feel" about their experience of gameplay.

Path, then, can also be used in a wider sense to refer to a *felt path*, which represents the ingrained bodily memory generated from an internalised sequence of actions required in gameplay. A felt path is a reconstruction of transactional space. In a felt path, memory and action are inseparable; what the player (and designer) remembers

is the coordination over time and space of her action and perception (Clancey, 1999). The term was introduced to me by Rosberg during our interview and it originates from Bamberger's (1991) decade-long research work studying children's representations of simple melodies using Montessori Bells. "It's a combination of the spatial path that your body moves across the table as you tap different bells to play a melody and your experience of that," explained Rosberg, "so the feeling of the direction of it in space or of the way of looping back, for example, or of repeating. That's the felt path." According to Bamberger (1991), "once a practised sequence of actions associated with playing a tune is internalized, becoming what I have called a felt path, it becomes a powerful representation of the tune itself" (1991, p. 213). "Felt" in this context does not represent a specific affect or emotional feeling but the "felt sense" indicative of Gendlin's (1978) experiential focusing: "a bodily awareness that . . . encompasses everything you feel and know about a given subject at a given time.... It is felt in the body, yet it has meanings. It is body and mind before they are split apart" (pp. 35, 165). Hendricks explains further:

> The bodily felt sense is a direct sense of this interaction. We experience our situations bodily and so our bodies "know" our situations. This knowing is not just an "inner" feeling, but is a sense of a whole complex situation that includes more than could ever be specified completely. This "sense of" any situation is bodily felt but is not yet articulated in words or images. (Hendricks, 2007, p. 43)

A felt path is a form of direct experience which accumulates and forms the foundation for other experiences. "We call this strategy of construction a felt path strategy by analogy with the familiar experience of marking the chronological occurrence of chosen landmarks as one walks, through time, along a path from here to there-next-next-next. The temporally experienced landmarks then become a description of the path-the way one remembers it" (Bamberger, 1991, p. 25). The felt path is a

useful overarching term to consider the experiential body of knowledge that comes through game design, and to think about intersomatic awareness in videogame design in particular.

But felt paths are not experienced in isolation. A designer begins to understand the importance of another's body within the game design process through a process of relating. Relating involves some form of being attuned. Attunement can be conceived as an external force which creates a connection between bodies and objects. It is the point at which the game designer's state is confluent and concordant with that of the players. Ash relates "attunement" to an "atmosphere" that works outside and between individual human bodies. This is in congruence with Heidegger's "likening of attunement to a musical melody resonating through a space" (Ash, 2013, p. 35). Attunement, in this way, is a "melody that does not merely hover over the so-called proper being at hand of man, but that sets the tone for such being, i.e., attunes and determines the manner and way of his being" (Heidegger, 1995, p. 67). Thus, our sensibility cannot be reduced to one dimension: "sounds, odours, and colours certainly come to us, press upon us, and resonate in us, but, just as we like to approach flowers and smell their pleasant perfumes, so, in the same manner, we like to focus actively on some impressions, and reinforce their effect" (Csepregi, 2006, p. 46). Attunement clearly involves more than setting the tone or "resonating." Intersomatic attunement extends beyond mutual reciprocation to a shared state of bodily being. Single indexes are transformed into an iconic *one*, a moment of *iconicity* of shared understanding.

To understand attunement in a concrete way, we need only look to the common medical practice of "taking a pulse." A comparison can be drawn between this common medical practice and the comparable process of measuring heart rate in biofeedback

games. When a physician takes the pulse of a patient to identify health issues, Daniel (1984) writes that this pulse diagnosis is a moment of attunement, the point at which the two pulses transform into one: “The physician may be said to have experienced in some sense the suffering as well as the humoral imbalance of the patient” (Daniel, 1984, p. 120). We can make an easy parallel between Daniel’s description of the diagnostic practice of pulse measurement and the measurement process of biofeedback in Ryan’s game *Nevermind*. The game offered Ryan a technological substrate through which she was able to experience attunement. In Ryan’s game, the player’s body is attuned with her design body as she watched the game interpret and react to the player’s heart rate variability. The intimacy inherent in these experiences is echoed by Lammer's discussion of “how radiological personnel perceive and define ‘contact’ as it relates to their interactions with patients”: “bodies are mutually interpenetrated, leaving deep though invisible somatic traces; filling perception with multisensual flesh” (Lammer, 2013, p. 103).

# Chapter 7: Conclusion

The end goal of intersomatic awareness is to generate experiential design forms that foster deep understanding about the creation of pleasurable gaming systems. This brings us full circle to the intersomatic paradoxes previously expressed: the disconnect between the insistent focus on thematic elements even in the face of the very somatic nature of game experiences (the absent body), and the essential fact that designers must use their own bodily experiences to create experiences for other bodies (the experiential centre). The action of game design is "other-oriented." "It cannot be understood in isolation from an alterity it acknowledges, informs and with which it thereby forms a system," suggests Crossley. "[I]t derives its sense or meaning from its dialogical participation in shared situations" (Crossley, 1995, p. 141). When we think of empathy in the context of intersomatic awareness in game design it is a somatic empathy, a bodily empathy that is derived from shared somatic knowledge. Leder calls this phenomenon "mutual incorporation": mutual incorporation means "each person's capacities and interpretations find extension through the lived body of the Other" (Leder, 1990, p. 94). Intersomatic "relations are articulated at the site of the body through somatic modes of attention that index bodily ways of knowing learned through socialization, bodily memories, and the ability to relate to how another is likely to be feeling in a particular context" (Nichter, 2008, p. 163). Bodily empathy in design can be conceived of as "intersomatic empathy." Intersomatic empathy design is an enacted process that is not focused on cognitively identifying with or understanding another "person's situation, feelings and motives" through cognitive means, but on the capacity

to access shared somatic understanding by participating with another through intersomatic sensory channels.

This study has been motivated by the desire to understand game designers body-oriented design practices and, in a wider sense, to make a case for examining the concept of intersomatic awareness, not just in games but in domains outside of games. This examination was driven by the research question:

How can we understand the dimensions of intersomatic awareness through an examination of designers' experiential knowledge and somatic conceptualisations?

In an attempt to answer this question, this thesis first situated the concept of intersomatic awareness within its knowledge domain—game development and the body. Then it presented an overview of sensation and perception, highlighting that perception as related to game design is whole-body perception, which is enacted. The underlying philosophy of the thesis is situated within the notion of ecological design—every part of a design is inextricably linked to the whole and vice versa. At the basis of the ecological approach, then, is the epistemology of dialectics.

The importance of a phenomenological approach to the examination of the subject of somatics was underscored by the practical utility of both Csordas's and Leder's work. In particular, throughout this thesis Leder's notion of the interplay between disappearance and dys-appearance has proved to be an especially useful phenomenological invariant. The application of Damasio's concept of the somatic marker also proved particularly effective. Further, it has become the pivotal marker, in and of itself, in the functional intersomatic model.

The hermeneutic conversations with designers formed the basis of the data presented in this thesis. However, equally important to the understandings generated in this research about the somatic perspectives of the designers, was that at times I needed to experience the games somatically myself: to play the games or watch other's gameplay to know and contextualise what designers were sharing with me about their experiences. The feel of a mechanic that a game designer talks about is understood through the listener's own experiential knowledge. In this way, even after the interviews with the designers were finished, my "conversations" with the designers— in the sense of interpreting and deepening my understanding of their remarks—continued long afterwards through my engagement with the game forms they had created. This research then points to the reciprocal and ongoing relationships between the researcher and the designer through the vehicle of play. Games are systems that go beyond asking us to attend to the corporeal aspects of our existence. They challenge players to go engage in "active interpretation" by intensifying, disrupting, and disquieting habitual bodily actions, reactions, and reflections. Giddings (2009) uses the word collusion to address the particularly challenging relationships that exist between the bodies in games and it seems an apt term to evoke in the context of this research dynamic. The ludic etymology of the word—from the Latin "-col" meaning together and "ludere" meaning "to play"—suggests that to "collude is not only 'to work with another' or 'act in concert with', but also 'to act in play', to come together in, and as, play" (Seth Giddings, 2009, p. 156). Collusion has a further powerful connotation. To collude also means "to come to a secret understanding; conspire" (OED). An intersomatic collusion then underscores the inherently telic nature of games; highlights the disruptive activities designers ask of their players, and forces the lived body to the forefront. A game asks much of its player and a

player, in return, asks much of the game. The consequence of this dialectic is an intentional change in the way both of these bodies experience and make meaning in the world.

The core research contribution of this thesis is the functional model of intersomatic awareness. Used here as a tool to think about design, it could equally be employed as a tool for somatic analysis in a number of other domains related to games, notably those concerned with experiential and affective computing.

Looking back across the entirety of this thesis, it can be seen that the hermeneutic circle played a significant role in this research. All of its component parts did indeed contribute to the whole and the whole in turn influenced the parts. The research presented here is part of a circular process of which there is no definitive end. My intent is to "keep the discussion open and alive, to keep inquiry underway" (Packer & Addison, 1989, p. 35).

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# Appendices

## Appendix A. List of Games Discussed During Interviews

| *Game Name* | *Official Game URL* | *Developer* |
|---|---|---|
| A Tale in the Desert | http://www.atitd.com/ | eGenesis |
| AaaaaAAaaaAAAaaAAAAaAAAAA!!! — A Reckless Disregard for Gravity | http://dejobaan.com/aaaaa | Dejobaan Games |
| Ace of Spies | http://www.albinodragon.com/product/ace-of-spies/ | Albino Dragon |
| Activate the Three Artefacts and then Leave | http://www.increpare.com/2010/11/activate-the-three-artefacts-and-then-leave/ | Increpare Games |
| Agents of SMERSH: Swagman's Hope | http://www.8thsummit.net/product/agents-of-smersh-swagmans-hope | Jason Maxwell |
| Alien Breed 3D | N/A | Team 17 |
| Alien: Isolation | http://www.alienisolation.com/ | Creative Assembly |
| Alone in the Rift | https://share.oculus.com/app/alone-in-the-rift | Enno Gottschalk |
| Amnesia: The Dark Descent | http://www.amnesiagame.com/ | Frictional Games |
| Angry Birds | https://www.angrybirds.com/ | Rovio Entertainment |
| Area 51 (2005) | N/A | Midway Studios Austin |
| Arkham Horror | https://www.fantasyflightgames.com/en/products/arkham-horror/ | Richard Launius |
| Asphyx | http://dl.droqbox.com/asphyx/ USE FOR TANGIBLE PLAY | Droqen |
| B.U.T.T.O.N. (Brutally Unfair Tactics Totally OK Now) | http://www.brutallyunfairtactics.com/ | Copenhagen Game Collective |
| Badland | http://www.badlandgame.com/ | Frogmind, Frogmind Games |
| Baldur's Gate | http://www.baldursgate.com/ | BioWare |
| Battlefield 1942 | http://www.battlefield.com/battlefield-1942 | EA DICE |
| Battlefield: Bad Company 2 | http://www.battlefield.com/battlefield-2 | EA DICE |
| BattleToads | N/A | Rare |
| Beacons of Hope | http://www.gutefabrik.com/blog/?p=1100 | Die Gute Fabrik |
| Beatmania | http://www.konami.jp/am/bm | Konami G.M.D. |
| Bejeweled | http://www.popcap.com/bejeweled | PopCap |

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|---|---|---|
| Betrayer's Banquet | http://www.betrayersbanquet.com/ | Original Content London |
| Beyond: Two Souls | http://www.quanticdream.com/fr/#!/fr/category/beyond-two-souls | Quantic Dream |
| Bientôt l'été | http://www.tale-of-tales.com/bientotlete | Tale of Tales |
| BlazBlue: Calamity Trigger | http://www.blazblue.jp | Arc System Works |
| Bloodforge | http://www.bloodforgethegame.com | Climax Studios and Microsoft Studios |
| Boktai: The Sun is in Your Hand | http://www.konami.jp/gs/game/boktai/ | Konami |
| Braid | http://www.braid-game.com | Number None, Inc. |
| Brink | http://www.brinkthegame.com/ | Splash Damage |
| Brothers: A Tale of Two Sons | http://www.brothersthegame.com/ | Starbreeze Studios |
| Bumpy Road | http://www.simogo.com/work/bumpy-road/ | Simogo |
| Call of Duty | http://www.callofduty.com/ | Infinity Ward |
| Candy Crush Saga | http://www.king.com/ | King |
| Cannon Fodder | N/A | Sensible Software |
| Carnival Games: In Action! | N/A | Cat Daddy Games |
| Cart Life | http://www.richardhofmeier.com/cartlife/ | Richard Hofmeier |
| Cat On Yer Head | http://www.playniac.com/games/cat-on-yer-head/ | Playniac |
| Chime | http://www.chimegame.com/ | Zoë Mode |
| Clash of Clans | http://www.supercell.com/ | Supercell |
| Clock Tower 3 | N/A | Capon and Sunsoft |
| CLOP | http://www.foddy.net/Athletics.html | Bennett Foddy |
| Company of Heroes | http://www.companyofheroesgame.com/ (DEFUNCT) | Relic Entertainment |
| Competitive Meditation | N/A | Jane McGonigal |
| Corrypt | http://www.mightyvision.blogspot.co.uk/2012/12/corrypt.html/ | Mighty Vision |
| Counter-Strike | http://www.counter-strike.net/ | Valve Corporation |
| Crashland | https://share.oculus.com/app/crashland | Llyr ap Cenydd |
| Cryptofloricon | http://www.cryptofloricon.com/ | Original Content London |
| Cyber Troopers Virtual-On: Oratorio Tangram | N/A | Sega-AM3 |
| Daikatana | N/A | Ion Storm |
| Dance Dance Revolution | http://www.konami.jp/bemani/ddr/jp/am/ddr/ | Konami |
| Dark Room Sex Game | http://www.copenhagengamecollective.org/projects/dark-room-sex-game-2/ | Copenhagen Game Collective |

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|---|---|---|
| Dark Souls | http://www.darksouls.fromsoftware.jp/contents/index_en.html | FromSoftware |
| Darwin's Monster (Science Museum) | http://www.playlablondon.co.uk/ | Playlab London |
| Dead Space | http://www.ea.com/dead-space | Visceral Games |
| Dear Esther | http://www.dear-esther.com/ | The Chinese Room |
| Devil May Cry | N/A | Capcom |
| Diablo III | http://www.us.battle.net/d3/en/ | Blizzard Entertainment |
| DJ Hero | http://www.freestylegames/com/games/ | FreeStyleGames |
| Donkey Kong | http://donkeykong.nintendo.com/ | Nintendo |
| DOOM | http://www.doom.com/en-gb/ | id Software |
| Dota 2 | http://www.valvesoftware.com/games/dota2.html | Valve Corporation |
| Dragonology | N/A | N/A |
| Ecco the Dolphin | N/A | Novotrade International |
| Fable II | http://www.lionhead.com/games/fable-ii/ | Lionhead Studios |
| Fable: The Journey | http://www.lionhead.com/games/fable-the-journey/ | Lionhead Studios |
| Fantastic Contraption | http://www.fantasticcontraption.net/ | Colin Northway |
| Far Cry 2 | N/A | Ubisoft Montreal |
| Fighting Street (Street Fighter) | http://www.streetfighter.com/us/sfv | Capcom |
| Final Fantasy II | http://www.playonline.com/ff11us/ | Square Enix |
| Final Fantasy VII | http://www.finalfantasyviipc.com/ | Square Enix |
| Fingle | http://www.fingle.gameovenstudios.com/ | Game Oven Studios |
| Fireflies | N/A | Polly Bardon |
| Flight Control | http://www.firemonkeys.com.au/ | Firemint |
| Flow | http://thatgamecompany.com/games/flow | ThatGameCompany |
| Flower | http://thatgamecompany.com/games/flower | ThatGameCompany |
| Forbidden Island | http://www.gamewright.com/gamewright/index.php?section=games&page=game&show=245/ | Matt Leacock |
| Fruit Ninja | http://www.halfbrick.com/our-games/fruit-ninja/ | Halfback Studios |
| Gargoyles | http://www.jamiewoo.com/gargoyles | Jamie Woo |
| GIRP | http://www.foddy.net/Athletics.html | Bennett Foddy |
| Glow Tag | http://www.greenflystudios.com/glowtag/ | Greenfly Studios |
| Glowdoodle | scripts.mit.edu/~eric_r/glowdoodle/ | Eric Rosenbaum |
| God of War | http://gow.godofwargame.com/ | SCE Santa Monica Studio |

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|---|---|---|
| Gone Home | http://www.fullbright.company/gonehome/ | The Fullbright Company |
| Grand Theft Auto IV | http://www.rockstargames.com/IV/ | Rockstar North |
| Grand Theft Auto V | http://www.rockstargames.com/V/ | Rockstar North |
| Greedy Bankers | http://www.greedy-bankers.com/ | Alistair Aitcheson |
| Guilty Gear | N/A | Arc System Works |
| Guitar Hero | N/A | Harmonix |
| Gunstar Heroes | N/A | Treasure |
| Half-Life | http://www.store.steampowered.com/app/70 | Valve L.L.C. |
| Half-Life 2 | http://www.orange.half-life2.com/ | Valve Corporation |
| Halo: Combat Evolved | http://www.halo.bungie.net/projects/Halo/ | Bungie |
| Hanabi | N/A | Antoine Bauza |
| HarmoKnight | http://www.harmoknight.nintendo.com/ | Game Freak |
| Harry Potter and the Deathly Hallows - Part 2 | N/A | EA Bright Light |
| Heartbroken Uruguayans | http://www.ludomancy.com/blog/?s=uruguayans | Daniel Benmergui |
| Heavenly Sword | http://www.ninjatheory.com/wp/?page_id=14 | Ninja Theory |
| Heavy Rain | http://www.quanticdream.com/fr/#!/fr/category/heavy-rain/ | Quantic Dream |
| Heredox | http://www.heredox.com/ | The Clockwork Quartet |
| Hotline Miami | http://www.hotlinemiami.com/ | Dennaton Games |
| I Wanna Be the Guy: The Movie: The Game | http://www.kayin.moe/iwbtg/ | Michael "Kayin" O'Reilly |
| Ibb and Obb | http://ibbandobb.com/ | Sparpweed Games |
| Icefishing V | https://nategallardo.itch.io/icefishing-v | Nathan Gallardo |
| Ico | http://www.icothegame.com/ | Team Ico |
| Insane Robots | http://www.insanerobots.com/ | Playniac |
| Jellyfish | http://www.copenhagengamecollective.org/2013/05/03/were-going-to-the-maldives-the-games/ | Copenhagen Game Collective |
| Jimmy Lost his Toilet Paper | http://www.kloonigames.com/blog/games/tp | Kloonigames |
| Journey | http://thatgamecompany.com/games/journey | ThatGameCompany |
| Johann Sebastien Joust | http://www.jsjoust.com/ | Die Gute Fabrik |
| Katarmari Damacy | http://www.katamaridamacy.jp/ | Now Production |
| King of Fighters | http://www.kofaniv.snkplaymore.co.jp/english/index.html | SNK Playmore |
| King of Toyko | http://www.iellogames.com/KingOfTokyo.html | Richard Garfield |
| Knight's Apprentice: Memorick's | N/A | Microids |

Adventures

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|---|---|---|
| Left 4 Dead | http://www.l4d.com/blog/ | Turtle Rock Studios |
| Legacy of Kain: Soul Reaver | N/A | Crystal Dynamics |
| Lemmings | N/A | DMA Design |
| Lemon Jousting | N/A | George Buckenham |
| LittleBigPlanet | http://www.littlebigplanet.playstation.com/ | MediaMolecule |
| LocoRoco | http://www.jp.playstation.com/scej/title/locoroco/ | SCE Japan Studio |
| Lords of Waterdeep | N/A | Peter Lee and Rodney Thompson |
| Luchador! Mexican Wrestling Dice | http://www.backspindlegames.com/luchador-mexican-wrestling-dice/ | Mark Rivera |
| Luxeria Superbia | http://www.luxuria-superbia.com/ | Tale of Tales |
| Magnetize Me | http://www.copenhagengamecollective.org/2013/01/09/playing-with-magnets-magnetize-me/ | Copenhagen Game Collective |
| Maken X | N/A | Atlus |
| Maquette | http://maquettegame.com/ | Hanford Lemoore |
| Mega GIRP | http://www.foddy.net/Athletics.html | Bennett Foddy |
| Mega Man | http://www. | Capcom |
| Melody Morph | http://web.media.mit.edu/~ericr/melodymorph.php | Eric Rosenbaum |
| Metal Gear Rising: Revengeance | http://www.konami.jp/mgr | Platinum Games |
| Metal Gear Solid 2: Sons of Liberty | http://www.konami.jp/gs/game/mgs2/english | KCEJ |
| Metal Gear Solid 3: Snake Eater | http://www.konami.jp/gs/game/mgs3/ | KCEJ |
| Metal Gear Solid: Tactical Espionage Action | N/A | KCEJ |
| Metroid | http://www.metroid.com/ | Nintendo R&D1 |
| Metroid Prime | N/A | Retro Studios |
| Milo and Kate (CANCELLED) | N/A | Peter Molyneux |
| Minecraft | https://minecraft.net/ | Mojang |
| Mirror's Edge | http://www.mirrorsedge.com/ | EA DICE |
| MmmTsss: Playful Looper | http://web.mit.edu/~eric_r/Public/mmmtsss/ | Eric Rosenbaum |
| Munchkin | http://www.worldofmunchkin.com/ | Steve Jackson Games |
| Myriad | http://www.bitfrostent.com | Bitfrost Entertainment |
| Myst | http://www.cyan.com/games/myst/ | Cyan Inc. |
| Need for Speed: The Run | http://www.needforspeed.com/the-run | EA Black Box |

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|---|---|---|
| Net runner (card game) | N/A | Richard Garfield |
| Nevermind | http://www.nevermindgame.com/ | Psyclapse |
| Ninja | http://en.wikipedia.org/wiki/Ninja_(playground_game) | N/A |
| Okami | http://www.okami-game.com/ | Clover Studio |
| Once Upon a Time | N/A | James Wallis |
| Once Upon a Time in Space | N/A | James Wallis |
| Outcast | N/A | Appeal |
| Pac-Man | http://www.pacman.com/en/ | Namco |
| Pandemic | N/A | Matt Leacock |
| Passage | http://www.hcsoftware.sourceforge.net/passage/ | Jason Rohrer |
| Pipe Mania | N/A | The Assembly Line |
| Portal | http://www.orange.half-life2.com/portal.html/ | Valve Corporation |
| Prince of Persia: The Sands of Time | N/A | Ubisoft Montreal |
| Progear | http://www.capcom.co.jp/newproducts/arcade/progia/ | CAVE |
| Proteus | http://www.visitproteus.com/ | Ed Kay and David Kanaga |
| Puyo Pop Fever | http://www.puyofever.sega.jp/ | Sonic Team |
| Puzzle Fighter | N/A | Capcom |
| Quick Draw | http://www.greenflystudios.com/quickdraw/ | Greenfly Studios |
| QWOP | http://www.foddy.net/Athletics.html | Bennett Foddy |
| Racing Pitch | http://www./jet.ro/games/racing-pitch/ | jet.ro |
| Rainwalkers/ Composition 47 | http://www.ludumdare.com/compo/ludum-dare-26/?action=preview&uid=2280/ | Nuprahtor |
| Rayman Legends | http://www.rayman.ubi.com/legends/en-GB/home/index.aspx/ | Ubisoft Montpellier |
| Rayman Origins | http://www.rayman.ubi.com/legends/en-GB/home/index.aspx/ | Ubisoft Montpellier |
| Renga | http://www.wallfour.co.uk/ | wallFour |
| Resident Evil | N/A | Capcom |
| Rez | N/A | United Game Artists |
| Rhythm Heaven | http://www.nintendo.co.jp/ds/ylzj/ | Nintendo SPD |
| Ridiculous Fishing | http://www.ridiculousfishing.com/ | Vlambeer |
| Samba de Amigo | http://www.sega.com/sambadeamigo/ | Sonic Team |
| Save the minifigs | http://scratch.mit.edu/projects/10118726/ | Eric Rosenbaum |
| Scott Pilgrim vs. The World: The Game | http://shop.ubi.com/scottpilgrim | Ubisoft Montreal |
| Shadow of the Collosus | http://www.playstation.com/en-us/ | Team Ico |
| Shadow Physics (CANCELLED) | N/A | Scott Anderson |

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|---|---|---|
| Shifty Trains | http://www.warwickgamedesign.co.uk/games/shiftytrains/ | Warwick Game Design |
| Silent Hill | http://www.konami.jp/gs/game/vx131/ | KCET |
| Singing Fingers | http://www.singingfingers.com/ | Eric Rosenbaum |
| Slamjet Stadium | http://www.slamjetstadium.com/ | Alistair Aitcheson |
| Socialite | http://www. | Simon Fox |
| Sonic the Hedgehog | http://www.sonicthehedgehog.com/ | Sonic Team |
| soundodger+ | http://www.soundodger.com/ | Adult Swim Games |
| Space Invaders | http://www.spaceinvaders.net/ | Taito |
| Space Team | http://www.sleepingbeastgames.com/spaceteam/ | Sleeping Beast Games |
| Spelunky | http://www.spelunkyworld.com/ | Derek Yu |
| Spy Party | http://www.spyparty.com/ | Chris Hecker |
| Star Fox | http://www.nintendo.co.jp/n02/shvc/fo/index.html | Nintendo EAD |
| Starcraft | http://www.blizzard.com/us/starcraft/ (DEFUNCT) | Blizzard Entertainment |
| Storyteller | http://www.storyteller-game.com/ | Daniel Benmergui |
| Streets of Rage 2 | N/A | Ancient |
| Streets of Rage 3 | N/A | Sega |
| StreetWars | http://www.streetwars.net/#/ | Franz Aliquo and Liao Yutai |
| SU-27 Flanker | N/A | Eagle Dynamics |
| Super Mario 64 | http://www.nintendo.co.jp/n01/n64/software/nus_p_nsmj/index.html | Nintendo EAD |
| Super Mario Bros. | http://mario.nintendo.com | Nintendo R&D4 |
| Super Mario Kart | http://www.nintendo.co.jp/n02/shvc/mk/index.html | Nintendo EAD |
| Super Meat Boy | http://www.supermeatboy.com/ | Team Meat |
| Super Metroid | http://www.nintendo.co.jp/n02/shvc/ri/index.html | Intelligent Systems |
| Super Street Fighter 2 Turbo HD Remix | http://www.games.capcomdigital.com/streetfighteriihdr/ (DEFUNCT) | Backbone Entertainment |
| Swordfight | http://www.nas.sr/swordfight/ | Kurt Beig, Ramsey Nasser |
| Tap Happy Sabotage | http://www.taphappysabotage.com/ | Alistair Aitcheson |
| Team Fortress | http://www.teamfortress.com/ | Valve Corporation |
| Tekken | http://www.bandainamcoent.co.jp/cs/list/tekken/ | Namco |
| Tempest 2000 | N/A | Llamasoft |
| Tetris | http://www.tetris.com/ | Alexey Pajitnov |
| The Darkness | http://www.2kgames.com/thedarkness/ | Starbreeze Studios |
| The Endless Forest | http://www.tale-of-tales.com/TheEndlessForest/ | Tale of Tales |

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|---|---|---|
| The Extraordinary Adventures of Baron Munchausen | N/A | James Wallis |
| The Last of Us | http://www.naughtydog.com/games/the_last_of_us/ | Naughty Dog |
| The Last Word | https://lastwordgame.com | Mark Backler |
| The Legend of Zelda the Ocarina of Time | http://www.zelda.com/universe/game/ocarinatime/ | Nintendo EAD |
| The LEGO Movie Videogame | http://www.lego.com/en-us/movie/videogame/game | TT Fusion |
| The Path | http://www.tale-of-tales.com/ThePath/ | Tale of Tales |
| The Stanley Parable | http://www.stanleyparable.com/ | Galactic Café |
| The Unfinished Swan | http://www.giantsparrow.com/games/swan/ | Giant Sparrow |
| The Witness | http://www.the-witness.net/ | Thekla, Inc. |
| Thomas Was Alone | http://www.mikebithellgames.com/thomaswasalone/ | Mike Bithell |
| Tiny Games | http://www.hideandseek.net/projects/tiny-games-app/ | Hide&Seek |
| Tomb Raider: The Prophecy | N/A | Core Design, Ubisoft Milan |
| Tony Hawk's Underground | N/A | Neversoft |
| Trials HD | http://www.redlynx.com/ | RedLynx |
| Twister | http://www.hasbro.com/twister/en_GB | Milton Bradley Company |
| Type Connection | http://www.typeconnection.com/ | Aura Seltzer |
| Type:Rider | http://www.typerider.arte.tv/ | Blulkypix |
| Typing of the Dead | N/A | WOW Entertainment, Smilebit |
| Uncharted 2: Among Thieves | http://www.naughtydog.com/games/uncharted2_among_thieves/ | Naughty Dog |
| Uncharted 3: Drake's Deception | http://www.naughtydog.com/games/uncharted3_drakes_deception/ | Naughty Dog |
| Viewtiful Joe | http://www.capcom.com/vj/index2.html/ | Capcom Production Studio 4 |
| Virtua Fighter | N/A | Sega-AM2 |
| VVVVVV | http://www.thelettervsixtim.es | Terry Cavanagh |
| Warcraft III: Reign of Chaos | http://us.blizzard.com/en-us/games/war3/ | Blizzard Entertainment |
| WarioWare, Inc.: Mega Microgame$! | http://ms.nintendo-europe.com/warioware/enGB/ | Intelligent Systems |
| Way | http://www.makeourway.com/ | Coco & Co |
| Werewolf | http://www.brenbarn.net/werewolf/rules.html | Brenbarn |
| Wii Sports | http://wiisports.nintendo.com/ | Nintendo EAD Group No. 2 |
| Windosill | http://www.windosill.com/ | Vectorpark |
| World of Warcraft | http://eu.battle.net/wow/en/ | Blizzard Entertainment |

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| Written World | http://www.thewrittenworld.co/ | Playlab London |
| X3: Reunion | http://www.egosoft.com/games/x3/info_en.php/ | Egosoft |
| Zombies, Run! | http://www.sixtostart.com/ | Six to Start |
| Zumba Fitness | http://www.zumbafitnessgame.com/ | Pipeworks Software |