

I Am More Than My Thumb

A body-based interface experiment seeking to engage the entire body, using the game 'Cloud'.

Kellee Santiago
B.F.A. Theatre
New York University,
Tisch School of the Arts
May 2001

Submitted to the Interactive Media Division,
School of Cinema-Television,
in partial fulfillment of the requirements for the degree of
Masters of Fine Arts in Interactive Media at the
University of Southern California
May 2006

© University of Southern California, 2006
All rights reserved

Author: **Kellee Santiago**
USC CNTV, Interactive Media Division
May 10, 2006

Thesis Advisory Board:
Scott Fisher
Chair of the Interactive Media Division,
USC CNTV
Mark Bolas
Visiting Associate Professor in
Interactive Design
Stephen Olsen
Senior Technical Animator,
Sony Pictures Imageworks

Thesis Supervisor:
Michael Naimark

I Am More Than My Thumb: A Gestural Body Interface

Kellee Santiago

Submitted to the Interactive Media Division,
School of Cinema-Television, on May 10, 2006,
in partial fulfillment of the requirements for the degree of
Masters of Fine Arts in Interactive Media at the
University of Southern California

Abstract

This thesis proposes an investigation into game interface and play possibilities when natural human gesture is the guide. By assuming that technology is going to develop to a point where we will no longer need a physical device to interface with gaming consoles and computers, I have developed an experience that examines how body-based interfaces will expand the experience of play, as well as increase the communicative possibilities of the game medium. The current controller/keyboard interface options for digital games often restrict players from fully engaging in the interactive experience because they are physically awkward for many body types, can be damaging to the physical well-being of the player, often require previous knowledge of the controller in order to engage in the game, or are so complicated that it detracts the player from being immersed in the world of the game.

The game, "Cloud," developed by students at USC, is a game designed for newer players, with easier to understand controls. The game utilizes an intuitive keyboard and mouse control schema, making it a good candidate for my own experimentation, because of the stark contrast and comparison between a popular game interface and a gestural body-based one. By using the natural movements of the human body, I experimented with interface for "Cloud" that explores what it means to use the body to interface into virtual gaming worlds.

Keywords

game interface, human gesture guide, immersive, motion capture
technology, player body (interface), biomechanics, RSI

Thesis Supervisor: Michael Naimark
Title: Visiting Associate Professor,
Interactive Media Division

This work was supported by House of Moves,
Vicon*Peak*, and PhaseSpace corporations.

Acknowledgements

I am deeply indebted to the following individuals for their support. Without them, this project simply would not have happened.

Kan Anant	Andrew Sacher
Mark Bolas	Janet Santiago
Michael Brazil	Jose Santiago
Jenova Chen	Sean Santiago
Julie Dillon	Michael Steffen
Stephen Dinehart	Mike Stein
Scott Fisher	Nicholas Turner
Tracy Fullerton	Jeff Wang
Bing Gordon	Peggy Weil
Justin Hall	Ashley York
Mike Jantz	
Tracy McSheery	
Bradley Newman	
Stephen Olsen	
Jonas Oppenheim	
Susana Ruiz	

I would like to especially thank my department Chair, Scott Fisher, for his constant support over the past three years. You have been an incredible guide into this world of interactive media, always encouraging me to explore and experience, supporting me through the craziest of my ideas, and I feel lucky to have attended the program at it's most experimental phase, and to see you shape it. Thank you, Scott, for the opportunity(ies).

Contents

0. Functionalia 1

- Title
- Abstract
- Acknowledgements
- Table of Contents
- Table of Figures

1. Introduction 6

- 1.1 Motivation
 - 1.1.1 My goals through this project
- 1.2 Overview of the Thesis

2 Background 9

- 2.1 Background – Physical Theatre
 - 2.1.1 Vsevolod Emilevich Meyerhold
 - 2.1.2 Jerzy Grotowski
 - 2.1.3 Butoh Theatre
- 2.2 Background – Game Design Theory: The New Games Movement

3 Interface Design Practice 13

- 3.1 Peripherals
 - 3.1.1 Nintendo Peripherals
 - 3.1.2 Eye Toy and iSight/web cam applications
 - 3.1.3 DDR, Karaoke Revolution, Guitar Hero
 - 3.1.4 New Apple Tablet
- 3.2 Prior Art

4.0 I Am More Than My Thumb – Process 17

- 4.1 Content Iteration
 - 4.1.1 Choice of Manifestation
 - 4.1.2 Choice of “Cloud”
- 4.2 Technology Iteration
 - 4.2.1 Vicon Motion Capture System
 - 4.2.2 PhaseSpace
- 4.3 Interface Iteration
- 4.4 Installation Design

5.0 Conclusion 23

- 5.1 Results from Instillation(TB Added After Show)
 - 5.1.1 Player Feedback
 - 5.1.2 Installation Feedback
- 5.2 Future Steps, Speculation

Bibliography 25

Figures

- 3.1 Poster of the Nintendo U-Force
- 3.2 Poster from the initial Nintendo Power Glove ad campaign
- 3.3 Sony's peripheral, Eye Toy
- 3.4 Aerobics game for the Eye Toy
- 3.5 Music mixing game for the Eye Toy
- 3.6 Dance Dance Revolution Pad
- 3.7 Guitar Hero guitar peripheral by Red Octane
- 3.8 Karaoke Revolution box cover
- 3.9 Screen capture from Myron Krueger's, "Videoplace"
- 3.10 Screen capture from Paul Kaiser's "Hand Drawn Spaces"
- 3.11 Still from the demo video of Jeff Han's "Multi-Touch Research"
- 4.1 Illustration of Flight Experiment #1
- 4.2 Illustration of Flight Experiment #2
- 4.3 Illustration of Grab & Release Experiment #1
- 4.4 Illustration of Grab & Release Experiment #2
- 4.5 Illustration of Grab & Release Experiment #3
- 4.6 Illustration of Consume & Draw Experiment #1
- 4.7 Illustration of Consume & Draw Experiment #2
- 4.8 Photo of the bare room used for the installation
- 4.9 Photo of the installation room decorated
- 4.10 Photo of the bare wardrobe area
- 4.11 Photo of the decorated wardrobe area

1. Introduction

“The human body is capable of amazing dexterity and control - it can quickly and effortlessly make minute adjustments to objects in any direction. Three dimensional computer graphics systems are sorely unable to represent that dexterity - ironically, causing the computer to hinder the user’s creative thinking process. This fundamental mismatch between human and machine capabilities limits the utility of modern graphics systems and the fluency, productivity, and joy of the people using those systems.” [Bolas, on Fidget]

1.1 Motivation

When I was an undergrad at New York University: Tisch School of the Arts, everyone at my studio was required to take African Dance our first year. My class was an eclectic mix of performers, designers, and directors, so there were many students who had never danced before and did not consider themselves “dancers.”

However, our teacher’s approach was to give every move a motivation. Instead of a leap, you were jumping over a river, reaching towards the sun. He taught us how to use different parts of our bodies to express ourselves, and then gave us expressions instead of dance moves. Within a few weeks, the “non-dancers” were using their entire bodies to move in time with music... and despite themselves, they were dancing.

This experience caused me to reexamine two presumptions I had been making:

- 1) That there were people who inherently could not dance, and
- 2) Dancing involves making precise choreographed movement.

The borders between movers and non-movers had been dropped, and I began to see that at the core of dancing exists a body moving through space, with expression, and that by using this definition, anyone can dance.

By continuing my education in physical theatre and experimental dance techniques, I saw myself and my colleagues go through many transitions as a result of understanding and using our bodies in different ways. Through this experience, I understood that exploring one’s body equates exploring one’s psyche, and that physical freedom inherently leads to emotional freedom. But how could I communicate this to a larger audience?

1.1.1 My goals through this project

My goals through this thesis were to explore the technologies and applications for interfaces to introduce a user to a greater physical experience and deeper connection with interactive media.

From the beginning, I aimed to create an experience that would awaken people (gamers/non-gamers, dancers/non-dancers) to the possibilities that physical play can unlock. While this iteration has evolved into a site-specific installation as opposed to a tool anyone can use, this piece can serve as an example of what those possibilities are, and act as a conversation piece to inspire designers to alternative means of immersion and agency in an interactive space.

1.2.Overview

The rest of this paper is divided into four major sections – *Background*, *Interface Design Theory & Practice*, *I Am More Than My Thumb*, and *Conclusion*.

In *Background* I will go through those arts which influenced me and informed my perspective on this issue of body-based interface design. The first section covers noted artists and theorists in Physical Theatre whose work I find relevant to the practice of physical interface design. The second section reviews play theorists whose work shaped my opinions on game design, and therefore interface design (because the interface is the game in many cases – another problem I see with our current state in games).

In *Interface Design Theory & Practice* I review the more specific and directly relevant work of critical thinkers who have already approached the issue of computer-human interface design. I then cover some of the more recent and topical works of designers and companies who have made commercial products to these ends. Finally, I cover *Prior Art*, which is a collection of works from fine and performance artists who have wrestled with the subject of computer-human interface design not from a consumer standpoint, but from a creative and expressive point of view.

In the section entitled *I Am More Than My Thumb*, I cover the specific process of the installation that was created out of this research. I detail the various interface experiments, play test results, and conclusions drawn, the choice of content, the motion capture technology, and the design and implementation process of the installation itself.

My *Conclusion* sums up the findings from the installation, the audience feedback, and is where I speculate on the future of body-based interface design.

2 Background

My point of view on digital puppetry comes from a cross-section of background in physical theatre and dance, and play-centric game design philosophy. It is in this context that I hope to continue to experiment with the possibilities of physical interface design, and so I would like to begin by laying down the groundwork for it here.

2.1 Background – Physical Theatre

2.1.1 Vsevolod Emilevich Meyerhold

At the turn of the 20th Century, Vsevolod Emilevich Meyerhold, a lawyer-turned-actor in Moscow, left the Moscow Art Theatre to begin practicing his own theory on performance and theatre direction. Meyerhold's theory was in direct opposition to the Stanislavski methods, which were growing in popularity at the time. Stanislavski performance techniques were rooted in discovering the characters and scenes from the "inside-out." It was a process of discovering the reality of emotions within the performer to create "realistic" scenes. Today, it is what we commonly refer to as "method acting."

Meyerhold, however, felt that the key to performance was a process of going from the outside-in. Meyerhold examined theatre as a physical art, that storytelling was a relationship between physical forms, including between the stage and the audience. As applied to acting, Meyerhold focused on the physicality of his actors. This theory became is method of biomechanics.

"The biomechanics, conceived by Vsevolod Emilevich [Meyerhold], is simultaneously both a particular actor's training and a way of an actor's performance, whose purpose is to effect the main request made by Meyerhold on the stage . . . the flexibility of the actor to convey his own creation through his body (consciously controlled!) and his movements . . . "
[<http://www.unet.com.mk/mian/english.htm>]

Meyerhold describes further:

"The material of the actor's art is the human body, i.e. the torso, the limbs, the head and the voice. While studying his material, the actor should not rely upon the anatomy, but upon the possibilities of his body, as a material for stage performance."
[<http://www.unet.com.mk/mian/english.htm>]

Whereas prior to Stanislavski, theatre had been a very physical art, Meyerhold was proposing that the same emotional impact of Stanislavski

techniques could be achieved by first examining the body. The body is a key to human emotion and expression.

2.1.2 Jerzy Grotowski

In the mid-20th Century, Grotowski founded the Theatre Laboratory in Poland, a group who focused on those elements which they saw as quintessentially theatre. One element of their studies was the complete release of the performer's body, so that each emotion and impulse would be revealed in its most raw form before the live audience. Grotowski states:

"The education of an actor in our theatre is not a matter of teaching him something; we attempt to eliminate his organism's resistance to this psychic process. The result is freedom from the time-lapse between inner impulse and outer reaction . . . Impulse and action are concurrent: the body vanishes, burns, and the spectator sees only a series of visible impulses." [16]

Like Meyerhold, Grotowski examined the possibilities of expression from the outside-in. However, Grotowski pushed these ideas further by seeing the body as a block between emotion and expression. That is, the more restrained a person's body is, the more restrained the expressions of their emotions will be. Freeing the body of restraint allowed a clear channel, emptied of any repression.

By examining and experimenting with the body in this light, Grotowski illuminated the body as one key to psychological therapy. He saw the body as a direct link to the psyche, and developed a series of exercises aimed at freeing, simultaneously, the actor's body and emotions.

2.1.3 Butoh Theatre

Butoh theatre, in short, is a style of dance in which the dancer stops being himself and becomes someone or something else. In traditional dance styles, the dancer expresses an emotion or abstract idea through his body. However, in Butoh, the dancer becomes something else than what he is in order to communicate a feeling.

In New York City I was the Assistant Director of a project called Shufu Theatre. In it, the Director, Madelyn Kent, used these exercises to assist the actors in the development of their characters and to create a certain rhythm to the play that was neither natural nor unnatural, but fed the emotion of the moment, the line, the word, and down to the breath. In rehearsal I would participate in these exercises, and found a certain physical freedom I had never experienced before. Some compare the exercises to "trance dancing." I could actually let go of my consciousness and move through space as a

wholly different person or thing. I could let go of Kellee's body memory, and attempt to discover another body memory all together. These exercises were freeing and therapeutic.

Through my studies of Meyerhold, Grotowski, and Butoh Theatre, it became apparent to me the truth that we hold tension and repressed emotions in our body, and that unlocking the physical tension in one's body is another path to psychological well being – one that is possibly more comfortable than sitting in an office talking with a therapist.

It also became apparent to me that the day-to-day physical activities of my digital peers was having the opposite effect on their psyche.

My theory is that when we reach a state where we are using more of our body on a regular basis, then the overall psyche of our culture will shift as a result.

2.2 Background – Game Design Theory: The New Games Movement

In the late-60's, "The New Games Movement" was founded by Stewart Brand and others in response to the growing ambivalence that had emerged from a war being fought in another country, over-exposure to violence, and wide-spread drug abuse. The Movement focused on promoting play as a way of releasing energy and having fun, and one aspect to their methodology was designing games with a low barrier of entry, that anyone could play.

"Here we are, together, to have fun. We've already dispensed with the sense of any other purpose . . . We want to celebrate. We want to play."
[De Koven, "The New Games Book," 41]

By designing games that did not have the barriers of physically demanding competition or strong win and lose states, people who did not consider themselves "players" were encouraged to participate in these highly physical activities.

Also, similar to Fullerton and Swain's play-centric design theory, the New Games Movement games relied on the input of the players, so that players were empowered to change rules they did not like, and make up rules they thought would work. Everyone participated in the creation of games and the experimentation of designing new rules.

It is my hope that body-based interface can once again lower the barrier of entry, and people who do not consider themselves "gamers" will be encouraged to participate and play. In addition, players won't feel enslaved

to a control schema they are physical unable to use or ones that are too complicated to understand. By using the body, each player will feel empowered as the user of the system, instead of the slave.