

Jonah Warren
Thesis Proposal Document
September 3rd, 2002

Abstraction in Computer Game Design

Background

Abstract thought isolates phenomena, thought, or ideas and stresses internal coherence over integration with wider phenomenon [Hooker, 1999].

In 1958 at Brookhaven National Laboratory, William A. Higinbotham created *Tennis for Two*, a small analog computer that displays the trajectory of a moving ball on an oscilloscope with which users could interact. A few years later at MIT, Steve Russell designed a two-player game of dueling spaceships called *Spacewar* for the Digital Equipment Corporation's new computer the PDP-1. Though both of these systems were initially designed as real-world simulations to help people appreciate how objects maneuver in space, their entertainment value was quickly discovered, and the medium of computer gaming was born. Students and engineers that had access to PDP-1's across the country could be found after hours in labs huddled next to the hulking machines playing *Spacewar*. As with any new medium, the first computer game developers borrowed many of their initial ideas from previous mediums, in this case, analog games. Like *Spacewar* and *Tennis for Two* most of these new games could be considered simulations, in that they borrowed their game logic and graphics from games and competitions in the real world, such as sports, car racing, and space games.

Due to the limited graphics and animation capabilities of the early game systems, game developers in the 1970s and 80s were challenged to abstract both representation and interaction in

order to create their simulation-inspired games. These abstractions started to follow recognizable patterns as successful strategies were discovered, and as a result, a vocabulary of video game related interactions and elements began to emerge (e.g. paddles and balls, sliders, bad guys, goodies, missiles). Striving to make new and more interesting games, game developers started using this vocabulary in creating hybrids games that borrowed their game logics and interactions from other video games rather than the real world games. An example of one of these new hybrid games was *Breakout*, developed by Atari founder Nolan Bushnell [Sheff, 1999], who had also years earlier created *Pong*. *Breakout* took the core mechanic of *Pong*, moving line along an axis to keep a ball in play, and placed it in a new context resulting in a new abstract game. *Breakout* had no recognizable characters or narrative and yet it became an enormous success purely because of its simple and addictive game play.

As technology has advanced, the video game industry has continued its pursuit of the ultimate in simulation and narrative based games. However there have been a few notable exceptions. The biggest one being *Tetris*, developed by a Russian computer programmer named Alexey Pajitnov. Pajitnov took an idea from the existing puzzle game Pentominoes, reworked it and placed it into an arcade video game context. The result was arguably the most widely played and popular video game ever created. *Tetris* opened up a whole new way at looking at video game design. It showed game developers that it was possible to create an enormously popular game that didn't rely on the newest technologies, an intriguing storyline, or a household superhero. It simply needed an elegant game design. However, these strategies were well tested formulas for creating commercially successful games without the the risk of experimenting with new game play or waiting for a moment of divine inspiration from one of their game developers. As such, the gaming industry continued to create simulation and narrative-based games, and *Tetris* became an a bit of an anomaly in video game history.

Tetris challenged the gaming industry to rethink what a video game actually is. One of the earliest books to address computer and video gaming from an academic perspicitve was *The Art*

of *Computer Gaming*, written by Chris Crawford in 1984. As Jesper Juul points out, after *Tetris*, Crawford's very definition of a computer game became flawed:

According to the game designer Chris Crawford, computer games have four basic characteristics (Crawford 1982):

1. Representation: A game is a closed formal system that subjectively represents a subset of reality. (By subjective, Crawford means that a game is not necessarily trying to represent reality).
2. Interaction: The game acknowledges and reacts to the player. (Unlike a puzzle, which simply lies still).
3. Conflict: A game presupposes a conflict. This can be either between several players or between the players. goal and whatever prevents the player from reaching that goal.
4. Safety. The player is safe (in a literal sense) from the events in the game. (Gambling presents a special case, where the outcome of the game is designed to have impact in the real world).

The most problematic point of Crawford's definition is probably the first one, representation, since it does suggest that games have a mimetic relationship to the world. This is certainly not true for a game like *Tetris*. [Juul, 1999]

The fact that *Tetris* is one of the most successful and widely played games of all time, and yet at the same time, is seen as an anomaly in traditional computer game design deserves some investigation.

Motivation

The multi-billion dollar field of creating video games is the ultimate in multimedia. Calling yourself a game developer or designer today could mean you are anything from a programmer to an artist, designer, musician, 3D modeler, or concept artist. Because technology and gaming have developed as such, the commercial success and popularity of a contemporary video game can be

related to a variety of reasons. However, none of these extras are essential for an addictive and enjoyable game to exist. Abstract games such as *Tetris*, *Breakout* and *Pipedream* all became enormously popular games without 3D animation, narrative elements, representational graphics, or even a recognizable protagonist. Abstract games can be thought of as unadulterated game design. Essentially any computer or video game could be made into an abstract game simply by replacing all representational graphics with more abstract ones and eliminating voices. The question is, how many of these newly abstract games would still be entertaining? And for few that still are entertaining and original, what makes them so?

There is an art to designing game spaces, which involves the designing systems, rules and interactions. My goal is to thoroughly investigate this field within the realm of computation. Computation allows us specific advantages in creating games. I hope to research what these advantages allow in terms of game play and how they effect the process of designing games. I will use the process of abstracting games down to their most basic interactive elements as a lens to look through when examining both my proposed games, as well as those I research, as a methodology for isolating game design and basic interaction (see initial quote).

And lastly, abstract games are the games that I most enjoy playing and find myself actively looking for. These games include *Tetris*, *PacMan*, *Pipedream*, *Snood*, and *Blix*. When attempting to create a game myself for the first time, I found myself borrowing concepts from my favorite games: the blocks from *Pipedream*, the randomness of *Tetris*, and the falling ceiling of *Snood*. What I ended up with was another (albeit rather Frankenstein-esque) abstract game, *Tubes*.

Intended Research

I plan on concurrently researching the history of abstract games and exploring the creation

and design of abstract games from three different perspectives (sure to change), which will hopefully inform each other throughout their development. I also hope that my research into the history of abstract game spaces will inform my design process as well as vice versa.

Since abstract video game design is a relatively unstudied field and the process of their creation so mysterious, I plan on keeping my design process as open to new ideas and experimentation as possible. I see the design process as the critical and driving force in my exploration. This is especially important in the creation of games. Successful games are just that because they are engaging and enjoyable to play. The only way to create entertaining games is to test them, alter them and test them again. Thus, an exploration into game design from a purely academic and theoretical sense is a waste of time, which is probably part of the reason why there is so little academic writing on the subject (most academics don't produce video games, and most game developers are far from academics). It is for this reason that I hope to document my creative and design process as accurately and extensively as possible, and include as much of it as possible in my thesis document. It is also for this reason that I plan on these initial design proposals perspectives to change drastically once I start working. I think is the nature of creating games.

I hope that my three initial design proposals will be beginnings for thought and exploration in abstract design more than anything else, and as such, the more varied and different from each other they are, the more valuable they become for me as entry points for investigation. Here are my three proposed investigations.

I. Game Design for Wireless Devices

Due to the technical constraints of designing for wireless devices and its commercial potential for gaming, there has been a bit of a renewed interest among game developers in this

field in creating games using simple graphics that are centered around simple and elegant game design. Due to these restrictions, designing games for wireless devices is an obvious place for starting to explore abstract game design. The constraints: restricted screen dimensions, computational power and graphics capabilities provide an environment that encourages thought about abstract games, similar to what designers faced when designing games in the 70s and 80s.

Existing abstract games for wireless devices are easy to find and have been developed by the dozen. However, you must sort through hundreds of disguised *Reversi*, *Tic Tac Toe* and *Mancala* clones to stumble upon an original game design. One such game I have found is the game *JezzBall*, (although I recently learned it too is a clone, apparently of a classic Gameboy title, *Qix*).

I hope to design very quick prototypes using Director in my game development process that experiment with core mechanics and interactions of the game ideas that I produce.

II. Expressive Interaction in Game Design

Not all games tell stories. Games may be an abstract, expressive, and experiential form, closer to music or modern dance than to cinema. Some ballets (The Nutcracker for example) tell stories, but storytelling isn't an intrinsic or defining feature of dance. Similarly, many of my own favorite games - *Tetris*, *Blix*, *Snood* - are simple graphic games that do not lend themselves very well to narrative exposition. To understand such games, we need other terms and concepts beyond narrative, including interface design and expressive movement for starters. Games may be an abstract, expressive, and experiential form, closer to music or modern dance than to cinema... to understand such games, we need other terms and concepts beyond narrative, including interface design and expressive movement for starters. [Jenkins, 2002].

This area of exploration is centered around thinking about creating computer games that go beyond keyboard, mouse, joystick and console controller interaction and how to incorporate more gestural and expressive movements and interactions in gaming, something like what Henry

Jenkins calls for in this quote.

There has been a fair amount of research and projects centered around the creation of more expressive machines and interactive devices. This is a huge area of study which could very well be a thesis in itself. I think there is an enormous potential in the application of these some of these techniques in gaming. Potential for more expressive interaction in gaming range from simply creative reinterpretations of interaction using existing traditional input devices, such as the mouse interaction that occurs in Paul Haeberli's *DynaDraw*, to existing input devices not ordinarily utilized in gaming, such as video or other sensory input devices.

There are quite a range of potential directions to go in this field. I intend attempt to explore video as input as well as potentially recontextualizing some other existing expressive interactive experiments into a game space to see how successfully they function. Some existing projects in using video as an input device while incorporating ideas of play include:

Myron Krueger (<http://www.artmuseum.net/w2vr/timeline/Krueger.html>)

MIT Media Lab's Alive System

(<http://alive.www.media.mit.edu/projects/alive/>)

Using Video Input for Games By Richard Marks

(http://www.research.scea.com/gdc2001/gdc_videoinput.htm)

III. Using Sound and/or Music to Define a Game Space

This idea is the least researched of the three entry points for investigation as of yet, so my potential explorations concerning this topic are also the least defined. The initial concept behind this investigation is simply the idea of using music and sound to define a game space rather than

using a visual vocabulary. The gamer would be interacting in response to audio cues and elements rather than visual ones. In the limited research I've done, I've found a few games designed for blind and visually impaired people that attempt to address gaming from this perspective (<http://www.sonokids.com>).

Bibliography

Chris Crawford. *The Art of Computer Game Design*. Osborne McGraw-Hill, 1984.

J.C. Herz. *Joystick Nation*. Little Brown and Company Limited, 1997.

Henry Jenkins. "Game Design as Narrative Architecture," *First Person*,
<<http://web.mit.edu/21fms/www/faculty/henry3/games&narrative.html>>, 2002.

Jesper Juul. *A Clash Between Game and Narrative*. M.A. Thesis. Institute of
Nordic Language and Literature, University of Copenhagen, February 1999.

Markku Eskelinen. "The Gaming Situation". Game Studies. *The international
Journal of Computer Game Research*, <<http://www.gamestudies.org/0101/eskelinen/>>, 2001.

Markku Eskelinen. "Towards Computer Game Studies, Part 1: Narrative and Ludology."
SIGGRAPH 2001, <<http://www.siggraph.org/artdesign/gallery/S01/essays/0416.pdf>>.

David Sheff. *Game Over Press Start To Continue*. CyberActive Publishing, 1999.

Softex India. *JezzBall*.

<http://www.wirelessgamingreview.com/games/j2meemu.php?gameplay_id=5>

Kurt Squire and Henry Jenkins. "The Art of Contested Spaces," *Game On*,
<<http://web.mit.edu/21fms/www/faculty/henry3/contestedspaces.html>>, 2002.