

MINOR BATTLE:
EXPLORATIONS OF A MULTI-SPATIAL GAME EXPERIENCE

by

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Abstract

Adding physical interactivity to the video game experience continues to entice game designers.

Every few years, game designers create new methods for incorporating physical interactions within game systems. With each industry wave of design and hardware (peripheral) innovation, the potential for creating meaningful physical play spaces increases. Minor Battle attempts to create a new platform for physical immersion in video games by use of multiple screens. It requires players to physically move around the game installation in order to effectively engage the virtual space. Motivating the player to physically walk and run with their avatar creates a conceptual connection between the physical and the virtual game space that both reinforces and augments the relationship between the player and his or her avatar.

Keywords: Physical play, Multi-screen, Immersive space, Interactive, Installation, Movement, Video Game

Concept

Interactive digital art installations involve its spectators in a way that allows the system to respond to various changes to the user's motion, body heat, or some other input. One design goal of *Minor Battle* is to create an interactive installation that makes use of the physical space of the audience. Digital art installations often possess elements of using physical interaction as an input from the user to drive the project's experience. Interactive hallways and floors, such as Brian Knep's *Healing*, make great use of user/audience traversal to create a sense of involvement between the user and the system. The Healing system responds to the user's motion by visually changing images and colors on the ground. Interactive installations create a distinct sense of physical immersion by developing an environment for their audience to walk through that disconnects each user from the space outside of the project. Virtual reality art projects presented in mediums such as CAVE Automatic Virtual Environments have been a great inspiration in the development of *Minor Battle* as a project that can create a virtually immersive experience by use of virtual images and sound. As engaging as these installations can be, users do not find themselves having to make meaningful choices in order to maintain their agency within the system. For this reason, *Minor Battle* was designed to also introduce meaningful choices for the user at all times to drive the experience.

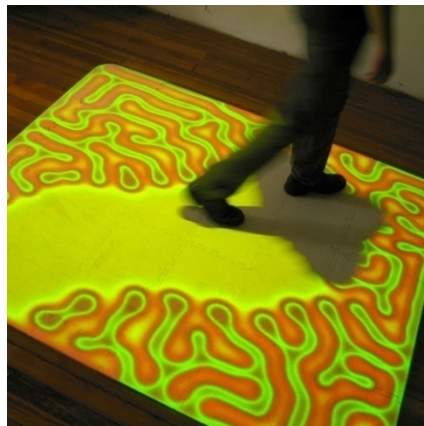


Figure 1: Brian Knep's *Healing* project- interactive floor

The design of *Minor Battle* as a video game required a great deal of attention to the details determining what the player could do at any given moment within the system. The game design goals also had to include provisions on how the player's physical state would be affected by an event instantiated in the game. Video games such as *Guitar Hero* and a number of games on the *Nintendo Wii*, not only provide a sense of player importance to the game's outcome, but also introduce a level of immersion not found in traditional video games. In *Guitar Hero*, the player is given a controller in the shape of a guitar and must press its buttons in a predetermined order and tempo in order to succeed. Through this interaction, the player has a number of options that they can perform in addition to pressing the guitar buttons, such as activating "Star Power" or hitting the whammy bar on the guitar controller. Each mechanic is separate from the others, but each presents clear choices for the player to make during the course of a play session. In *Wii Sports - Tennis*, players must swing the Wii Remote in motions similar to swinging a tennis racket. This physical interaction immerses the player in the game, creating a sense that the method or skill they use in swinging the Wii Remote directly influences how well their avatar in the game swings. Though both of these titles are great examples of mixing physical interaction and game input, there is no system in tact that necessitates a player's physical involvement. There is always an option for the player to use a basic controller or to sit down and not get physically involved. By giving the player an opportunity to not participate physically, the system is downplaying the importance of the physical interaction. Therefore, it turns into a system where the physical component is an accessory and not a vital component.

The design of *Minor Battle* is deeply rooted with the objective to create a physically immersive space for a group of players who each make meaningful decisions on how they interact with the game system. *Minor Battle* is a game that allows multiple players to interact in the same game

world concurrently. Each player also has equal agency, meaning all players have the same potential impact on the outcome of the game. As a game that necessitates player movement through the space, there are consequences for those that do not move through the space with their avatar. These consequences do not directly affect what happens on the game screen. Players that choose to not move with their character can hinder their insight on what is going on around your character, thus making it harder for the player to be effective in completing the current goal of the game. Players must feel that their physical traversal is equally important to their skill within the virtual system of the game.

As an interactive space, *Minor Battle* creates a bond between the physical and virtual by use of multiple game screens. Each monitor is a window into a specific section of the game world. Each player controls a single avatar that has the ability to travel to any part of the game world. Therefore, each player can move their avatar from one screen to another. By strategically placing the screens in a configuration, such as a square with all screens facing out, players will be motivated to physically walk and run around the installation as they move their avatar from screen to screen.

Project Logistics

Minor Battle can be categorized as both an interactive installation and a video game. As an installation, the project falls into the genre of multi-user, physical space immersion. The user is motivated to traverse the installation space in order to gain a meaningful perception of the game state. The user will at all times share the physical space with multiple users, making their mobile behavior affected by that of the other users. As a game, *Minor Battle* is a 2D multiplayer

platformer. Gameplay is reminiscent of games such as *Mario Bros.* and *Sonic the Hedgehog*, where players must run and jump through the game world to get from one point to another.

Aesthetically, *Minor Battle* has a dark, yet charming art style. The characters in the game are animated as stick figures, with visually distinct heads, giving each avatar its own personality. The goal is to create a game environment with personality, which also allows a level of connection between the player and their avatar. The sound design of the game supports the theme of being a bit magical and dark, but still adding a level of action and intensity as the game progresses. The presentation of player information, such as health or score, is designed to allow game objects and the appearance of each player's avatar to visually represent the current state of the game without the system providing players with individual on-screen text information. In his book, *Understanding Comics*, Scott McCloud describes that by using simplified details for objects with which we associate our current existence, our self-extension onto that object will be augmented (39). Applying this philosophy to the design of *Minor Battle* increases the possibility of enhanced engagement of each player as they experience the game.



Figure 2: Opposing players in the game world

The multi-screen setup defines the look and feel of the physical space. The number of screens which *Minor Battle* can operate on is scalable. *Minor Battle* levels are primarily designed for four screen configurations, but it is plausible to create a level that would stretch across six or more screens. *Minor Battle* uses a squared configuration of screens. Looking down at this configuration, each screen would appear as a side to a square. The screens face away from the center of the square. In order for players to move with their characters, they must traverse the outside of the screen setup.

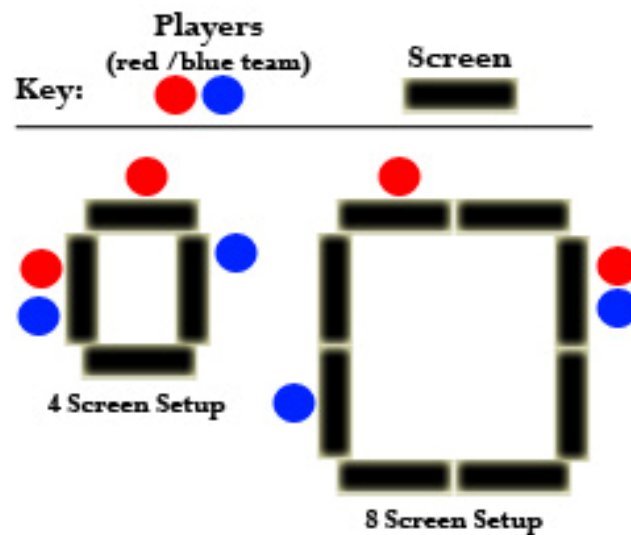


Figure 3: Top-Down view of screen setup

In the development of the theme park ride, *Pirates of the Caribbean: Battle for the Buccaneer Gold*, Jesse Schell and Joe Shochet documented the design philosophy for creating a virtual environment within a physically interactive theme park ride. One of the key ideas of Schell and Shochet's philosophy is that interactive theme park rides are not video games, not rides, but a new medium (1). Similar to the *Pirates of the Caribbean* ride, *Minor Battle* incorporates two different realms of spatiality into a central experience. *Minor Battle* is a project that makes the argument that a design philosophy is necessary for the development of installation based games

as a new platform. This philosophy must outline the key concepts that must be realized when designing a multi-screen game.

User Experience

The *Minor Battle* play experience begins with each user stepping into the designated play space. Each user takes position anywhere around the setup of screens. The experience is ready to begin when four players have claimed a spot in the installation space. Each player is then given a wireless Xbox 360 controller which acts as the main input to keep the player connected to the actions of their avatar in the game. The wireless controller is an important component to this experience as it allows players to move without restriction around the setup and it has a very familiar feel for players that play video games.

Once all players are equipped with controllers and have taken a position in the space, they are notified which avatar they will control by a sticker resembling the avatar's face on the wireless controller. At this point each player has enough information to recognize who they are in the game space; however, the players need to learn the controls of the game. The main menu of *Minor Battle* presents information to the player regarding the control scheme and the goals of the current game mode. All information of the main menu is mirrored on each screen in the system so that all players have an opportunity to gain the necessary information. After each player feels comfortable with the control scheme and their current objective, it is time to start the game.

Minor Battle begins with four players separated into teams of two. The red team will begin in one area of the map, while the blue team will begin in an opposite location. In the game, the

players have a few mechanics that they can use at any time. These mechanics include: running, jumping, climbing, attacking other players, picking up objects, and throwing objects. The physical space is more of a free roaming play area that allows players to naturally react to the current state of the game. However, there are a few mechanics the player can do in this play area that will shape the overall experience of *Minor Battle*. In the physical space, players can move from screen to screen to gain a visual advantage of the game world around their avatar, communicate strategies to teammates, and gain a physical positioning advantage over other players vying for the same screen space.



Figure 4: Complete view of a level

In the project, a character class system created an opportunity for players to instantly change their role during gameplay. These roles are determined by the current weapon equipped by the player. For instance, if a player's avatar is equipped with a sword, the player's skills and attributes, such as run speed and jump height, are altered in a way to make the player more capable of jumping over higher terrain and move faster through the level. However, when the player's avatar is equipped with an axe, the avatar moves slower, but has a very strong attack accompanied by the ability to pick up and throw other avatars across the level like a projectile. This shift in ability and attributes instantly changes the perception of a player in the game. A player that at one moment appeared vulnerable or useless can instantly become a menacing force to the opposing team. This change in player perception translates to the physical space as

players will appear to be running from another player who has currently picked up an axe in the game. Visually, this change in class is represented by an alteration of the avatar's appearance in the game world. For example, an avatar with an axe will appear bigger and hunch over as if they have transformed into an intimidating ogre. The opportunity for an instant change in the role and perception of each player in the game provides situations for teams to alter the state of the virtual and physical space many times during a single play session.

To add a sense of chaos to the game, there are various environment hazards designed into the game's system. These hazards cannot be controlled by the players and add a sense of tension because the aftermath of each effect can drastically alter the state of the game. For example, a tornado may blow through the level and any avatar that lies in its path will be thrown to a different part of the level, causing players to run around the screens to find where their avatar has landed. This system is designed to constantly keep the player curious about the state of the level on their screen as well as the others. It also provides a way to necessitate movement through the physical space by creating an immediate anxiety for the player concerning the state and location of their avatar.

A prominent game mode in *Minor Battle* is 'Castle Bomb.' In this mode, each team is the defender of a castle. The red team defends the red castle and the blue team defends the blue castle. In a central area of the level lies a bomb. Each team must race to this bomb and attempt to toss it on to the opposing team's castle. Players will venture around the screens in order to discover where the bomb is currently placed. After discovering the bomb, players can decide to tell their teammate where it is or simply pick up the bomb if no one is watching. As input for the game, picking up the bomb and tossing it all happens using the same button. Simple controls

are necessary for this game as players already have an increased involvement in the system. If the player is running around with the bomb, they can toss the bomb in a direction or the bomb can be knocked out of their avatar's grasp by another player's attack. If the bomb is tossed in the air, players still have an opportunity to grab it. The bomb's trajectory usually takes it across to an adjacent screen, so if a player wants to catch the bomb before it hits they must move themselves and their avatar to gain the advantageous position to grab the bomb. Succession this game mode occurs when the opposing team's castle is destroyed. Each time the castle is hit, the players can visually see a key component of the castle's structure become obliterated.

Prior Art

There are a limited number of projects that have created a single coherent experience from the combination of various unique spaces. *xBlocks*, created by Victor Szilagy and Tristram Sparks, is a two player platform game that does not use a television or computer screen. Instead, the game is projected onto a 3D sculpture that allows the players to move their avatar to different heights and depths of the sculpture as they complete their goal. *xBlocks* creates a unique experience as players navigate their virtual avatars in and around a 3D maze. Another project that is aimed at capturing an audience by using multiple screens is *CaveUT 2004*. *CaveUT* uses the Unreal Tournament 2004 game engine to display the virtual space of a game in a CAVE. This allows a player to be fully immersed by a lush 3D game environment within the multiple screens of a CAVE. This is an open source project, so it is possible for many designers to use the tool to create modifications to the Unreal Tournament engine to create their own CAVE game experience.



Figure 5: CaveUT 2004 displays game environment in a CAVE

There are a number of traditional video games that *Minor Battle* use as inspiration for gameplay and experience execution. The *Super Mario Bros.* franchise represents the pinnacle of platformer games. This series has set the foundation for many of the traditional elements that must be in a platformer if it hopes to be successful. The design of *Super Mario Bros.* focused on responsive player controls and interesting level environments that presented a variety of puzzles and challenges. *Worms* is a 2D multiplayer game that focused on the competition and tension between players that exist in the same game space. It is a great example of creating a shared game space that has a progressively increasing tension amongst all players involved. The *Super Smash Bros.* franchise has been known for its intense competitive aspect amongst multiple players and its use of system events to create chaos and support rapid shifts in player control over the rest of the players.

Non-game digital installations have also had an impact in the developing vision of *Minor Battle* as an immersive space project. Electroland's *Target Breezeway* is an interactive project where each person's body motions and movements through the space influence the lights and sounds

within the space. This is a great example of using a collective audience to shape the experience of the physical environment around them. Another interesting example of the natural behaviors that emerge from users as they traverse through an interactive space is Marie Sester's *ACCESS*. In *ACCESS*, web users select a "target" from a set of people walking through a hallway. This "target" is then tracked by an overhead spotlight everywhere they move. The intriguing aspect of this project is that the users being tracked are doing so non-voluntarily. The spotlight essentially becomes the only environment that is of concern to the "target", thus creating an instant disconnect from the world around them.

Similar Work

Minor Battle has some similarities with other small team projects. *Soldat* is a 2D platformer also inspired by the likes of *Worms*. It is a PC title that incorporates multiple players all battling over a common objective. This game draws a lot of its gameplay from 3D games such as *Doom*. By using 3D multiplayer games as a gameplay inspiration, *Soldat* uses very traditional game modes such as 'Death Match' and 'Capture the Flag.'

Another game that uses platformer mechanics for multiplayer play is *Block Blazers*. *Block Blazers* also incorporates the use of two screens that are back to back. It shares the idea of a moving a single character from screen to screen. *Block Blazers* uses a very simple mechanic for players to achieve the game's objective, but the gameplay is enhanced by the physical interaction players have with the system setup.

Soldat is a great example of creating an intense real-time competitive platformer, but it does not fully embrace the fact that it is a 2D platformer. It has the basic platformer mechanics, but

there is a lack of elements that create the appeal of platformers such as level puzzles and environment challenges. *Block Blazers* does an amazing job of creating a bond between the physical space and the game space. However, the design of the gameplay of *Block Blazers* doesn't motivate a player's movement from screen to screen. The majority of the objectives can be completed while standing in front of the same screen.

Previous Iterations

The development of *Minor Battle* has been a product of an intense iterative process. Rapid prototyping and tweaking has been a great production plan to achieve a system that fulfills the intended objectives of the project.

The first prototype involved a visual representation of the game aesthetics using a panoramic image that stretched across 14 screens. This panorama conveyed the gameplay concept as an intense conflict between two opposing factions played out across a 2D world. Having the image stretch across so many screens immediately led to the question, "How would it feel to control one of these characters and battle across this world?" The significant result of this panorama was its immediate portrayal of a unique game experience. It possessed a degree of visual engagement that required viewers to explore each screen before having a scene of the entire scene being displayed. This concept of exploring each panel to gain a greater understanding of the virtual world was a concept that perpetuated through each subsequent prototype.

The second prototype was a Flash game. This game was a single player experience and spanned 4 screens and allowed the player to traverse laterally through the space. The player was able to jump onto objects and attack oncoming enemies. As a representation of intent and focus, this

prototype was successful. However, there was a sense that the linear setup of screens was not ideal if player movement was truly necessary. This prototype showed that having a platformer stretch across multiple screens is definitely a new form factor for the game space, but if the experience was to be genuinely pushed to support the physical interactions, there needed to be more design into the screen configuration. This prototype indicated that there needs to be thorough attention to the design of the physical space.

The third prototype was the first XNA build of the game. It properly explored the gameplay goals that were designed for the game world. It laid the foundation for many of the mechanics players can use in the game. This prototype allowed two players to interact with the same level across two monitors that were back to back. Players were able to move from screen to screen and jump across different level obstacles as well as knock the other player back to the opposite monitor. This prototype was a proof of concept for multiple players running around a setup of screens and also using traditional mechanics. From this point iteration on the various mechanics and interactions each player would have in the game space and physical space was the main focus.

Evaluation Scenarios

Minor Battle has endured various playtests, each with a different focus. Some tests were intended to gain feedback on the physical interaction of the system, while other tests wanted to evaluate the gameplay mechanics and aesthetics.

Early playtests of *Minor Battle* realized the potential for physical immersion of the system.

Visual aesthetics and complete features of mechanics were not implemented during these tests,

so it was more valuable to get feedback from the playtesters on how it felt to move around the screens. A big part of this feedback was whether or not it felt forced or natural. The goal of *Minor Battle* in this respect has always been to make the player feel as though they have an increased sense of self extension onto their avatar. Players felt the physical movement was the strongest part of the game.

As development advanced, the focus was on the game modes and mechanics that were being implemented for the game. Players were asked to provide input on the game's controls, character movement, and object interaction. A major objective for the project is for *Minor Battle* to stand on its own as a solid game with fleshed out controls and mechanics. These gameplay tests were the most useful in the creation of a game that is accessible, fun, and easy to play.

Near the game's final testing phases, the project has a sense of solid gameplay and physical interaction, but there is a level a visual detail that must be addressed. Players are primarily presented information from the game system through object visuals and not text or numbers. Therefore tests at this phase were intended to draw feedback on the clarity of the various visual cues that provided different information about the current game state.



Figure 6: Players move around the screens during a playtest

Discussion of Design Philosophy

Throughout the development of *Minor Battle*, a set of concepts have been realized as necessities for the creation of an engaging game installation which successfully forms a unified spatial experience. A core methodology exists in the game design of the project. The gameplay must keep the player engaged in the actions of their avatar. There must be adequate mechanics to give the player multiple options at all times to ensure they do not lose focus of the virtual space. It is also important to design the game to motivate the player's movement throughout the level. The key ideas that *Minor Battle* incorporates include placing key items on single screens, limiting the number of valuable resources, and creating chaos within the game, causing the player to move to a new screen. Experiments with *Minor Battle's* gameplay have proven that the player's will not physically engage in the game unless the game indirectly gives them a reason to do so.

The correct screen configuration is necessary to have optimal physical interactivity within a multiple screen game. *Minor Battle's* evaluations have proven that a minimum of four screens configured in a square, with each screen facing outwards is the best setup to entice players to move around. This square setup hides key information from the player throughout gameplay, limiting the player's knowledge of the current game state and at the same time encouraging them to move to discover the information on the other screens. Just as the game design must encourage players to move around, the physical setup of the monitors must do the same. Playtests of *Minor Battle* have shown that having a linear setup of screens doesn't enhance the play experience as the player feels the game is being played on a widescreen display. Furthermore, having the players within a square of screens, similar to a CAVE setup, allows the players to find an optimal spot in the physical space where they can simply see the majority of

the game space without moving. In this setup, there is no sense of hidden information to stimulate the player's curiosity. The screen setup must place a priority on enhancing the physically immersive properties of a multi-screen game.

Above all, the shared experiences of each participant in the physical space must be taken into consideration at all phases of design. The game must be developed by simultaneously designing the aspects of the physical and the virtual space into a single experience. Multiple screen games must be thought of as a new medium for creating games and must incorporate a new methodology for designing the experience.

Discussion of Notable Contribution

There are several elements to *Minor Battle* that stand out amongst its peers in the video game community. On the surface, the most obvious is its use of multiple screens. Each screen has a designated area of the level that is displayed at all times and it is up to the player to move to each screen to advance through the environment. In traditional 2D platformers, the camera moves with the player to display the next piece of information about the level. *Minor Battle* removes the dynamic behaviors of the camera and embraces an approach that allows the game's camera to remain static, but still present all of the necessary information about the terrain to the player. This concept creates a sense of virtual integrity in the game world. There is no hidden information in regards to the display of the current game state. In this setup, it is up to the player to physically explore each screen to gather the knowledge required to complete the current task.

Distinct social interactions are a key component of *Minor Battle's* experience. Because the game incorporates a great deal of physical engagement, *Minor Battle* uses many mechanics that resemble childhood playground and sports games. Designing the game this way allows players to naturally engage with the system as a whole because they get a sense of familiarity as they walk and run around the screens with their team and opponents. Each player will behave differently in this system. Some players will be very communicative to both teammates and opponents, presenting different ideas for strategies or trying to distract the other team. Some players will behave physically aggressive as they move around the screens, using their body to block the view of another player, or playing shoulder to shoulder with their teammate to accomplish a task. No matter what type of player is playing the game, the behavior that they exude in *Minor Battle* will be much more natural than it would be in most other public games or installations. This is attributed to the physical immersion and the nostalgia of childhood play created by *Minor Battle's* goals and mechanics.

Minor Battle's most significant contribution to the field of Interactive Media is its exploration of a new platform for playing games. As a public installation piece, this project initiates an arousal of curiosity regarding new games that could be designed with the use of multiple screens. It creates conversations about different ways of having the player physically exist within the game system. It sparks ideas regarding game rules designed specifically for multiple screen play. Above all, *Minor Battle's* arrangement requires designers to incorporate physical and social dynamics of the real world play space into their game design documents. At its essence, *Minor Battle* is a game that creates a union between the virtual space and physical space, but to achieve this, both realms must be designed with equally rigorous scrutiny. If this new multi-screen framework is going to thrive in the gaming and physical installation community, the

design of the physical space must be regarded with the same vigor as the design of the virtual game itself.

Conclusion

Minor Battle broadens the idea of what makes an interactive installation by providing its users a set of unique and viable choices to make during the physically immersive experience. *Minor Battle* also delves into new methods for games to include increased physical activities for the player to perform. Deliberate design decisions for the gameplay of *Minor Battle* have led to the creation of player mechanics and game systems that utilize the multiple screens by necessitating players to walk around the screens, communicate with their teammates, and explore the physical space for more information about the state of the game. The evaluations of players following their avatar around a setup of screens have proven that players thrive for more physical involvement in games. Though *Minor Battle* draws multiple inspirations from video games and digital art, the game creates a new platform for playing in public spaces that open the possibilities for increased player physicality in future games.

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