Spatial Communication in Videogame Environments: Exploring, Enacting, Perceiving

by

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Abstract

Videogame environments constitute a vast expansion of the built environment, offering new worlds to explore and new spaces for engaging in a range of activities. While often framed by their activities, these virtual spaces are also meaningful for how they communicate values and shape behaviour, much as physical ones do. Theories of embodied cognition argue that human cognitive processes are grounded in our body-based engagement with the world, and they provide a robust way into analyzing how spaces communicate to their inhabitants and interactors. Using analyses of nine videogames, this study argues that virtual environments communicate spatially through the design of their interactive affordances, and how these evoke cognitive schemas, metaphors, and frames through interactions within the space. The nine works span three types of virtual environments: spaces designed (1) as rich worlds to explore (e.g. gardens), (2) as settings for meaningful action (e.g. workplaces), and (3) as scaffolds for training new modes of perception (e.g. installation artworks). These categories address players' differing forms of engagement with each type of space, and the comparative analyses between works (within and across categories) capture a range of spatial communication strategies by revealing important commonalities and differences between works. Together, the analyses reveal the semiotic strategies used to create meaningful virtual places, while also suggesting approaches to designing meaningful built environments of all sorts.

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1. Expanding the Built Environment

A space does not mean a volume defined by walls, but an area where consciousness brings the bright light of attention into play. When a single stone is placed on an otherwise empty tabletop, it creates a particular tension. Through the medium of this tension, one's awareness is suddenly drawn to this "space." As if lit candles were placed one by one in the surroundings, the conscious mind, gradually illuminated, creates a space within. (Hara 2018, 105)

1.1 INTRODUCTION

Videogame environments have vastly expanded the built environment, offering new worlds to explore and new spaces to engage in activities as diverse as racing, dancing, fighting, collecting, and strategizing. While often framed by their activities, these virtual spaces are also meaningful *as places*, as new environments that communicate values and shape behaviour much as physical ones do. Theories of embodied cognition stress that human cognitive process are heavily shaped by our body-based engagement with the world, and they provide a robust way into analyzing how spaces communicate to their inhabitants and interactors. This study will analyze spatial communication in videogame environments, arguing that structures of embodied experience can be used to reveal the multifaceted communication that takes places in these virtual spaces. Three types of virtual environments will be explored: spaces designed (1) as rich worlds to explore, (2) as settings for meaningful action, and (3) as scaffolds for training new modes of perception. This tripartite distinction is proposed here to address players' differing forms of engagement with each type of space, and to capture the breadth of spatial design approaches that support this. Together, these analyses will reveal the semiotic strategies used to create meaningful virtual places, while also suggesting approaches toward designing semiotic environments of all sorts.

The virtual environments of videogames, websites, and software applications constitute an astonishing enlargement of the built environment. While we once lived solely in buildings and

constructed landscapes, humans now spend increasing hours interacting with these concrete-yet-ephemeral spaces made possible by computer hardware. Software environments act as powerful scaffolds for writing, drawing, and any form of media manipulation. Social networks have reshaped the flow of information between people and the development of friendships and kinships. We carry smartphones with vast media libraries that allow us to have an atmospheric soundtrack to our day, and the spaces of videogames invite us to explore and engage with their vibrant worlds, weaving ourselves into complex interactive feedback loops with the elements of their environments. Alongside earlier built environments, virtual spaces can be understood as "frameworks for activities, significantly affecting patterns of use, behaviour, and expectations" (Heskett 2002, 102). Taking 'environments' as "the places, circumstances, objects, or conditions that surround us" (Goldhagen 2017, xxiii-xxiv), and 'built' as a prefix for environments created by humans and "constructed to look and function as they do because people made decisions" (Goldhagen 2017, xvi), these computer-supported spaces have exponentially expanded both the scope of the built environment and the diversity of environments that we regularly engage with. What do these new spaces offer us that we have so rapidly embraced them?

Videogames are a charged subset of virtual environments: while software, websites, and social media have instrumental purposes, videogames are often viewed as imaginative places of leisure. Their interactivity is widely seen as a core trait (Bogost 2007; Laurel 2014; Murray 1997), and it gives them many commonalities with architecture, installation art, and designed landscapes. Like these older forms, videogame environments are egocentric spaces, "experienced in perceptual fragments that are built up to create a whole through the process of physical movement" (Dade-Robertson 2011, 115); navigating a space and interacting with its objects constitutes a core aspect of a person's involvement with these works. This engagement, and a

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person's resulting spatial experience, is fundamentally embodied: the materiality of a place, the activities it holds, and the affect of wandering through it are all framed by the affordances and perceptual biases of the human body. The sense of shelter beneath a garden trellis, the grandeur of a cathedral's soaring vaults, and the calm of a long drive at night all leave strong impressions. Scholars across a range of fields including philosophy, cognitive science, psychology, and linguistics have explored the central role that the body takes in shaping human experience and understanding (Barsalou 2008; Clark 2008; Gibson 1979; Lakoff and Johnson 1999), and their findings provide a robust starting point for analyzing the structures of designed space and spatial experience, be it physical (Goldhagen 2017) or virtual (Begy 2010, Calleja 2011).

This thesis will explore videogames as a new corner of the built environment, seeking to understand their virtual worlds in relation to physical antecedents while unpacking their unique qualities. As these spaces do not need to provide physical shelter in the way that architecture does, they can place a far greater emphasis on expression and communication. Communicating through a built environment has traditionally been a very costly undertaking, and semiotically-charged buildings have often been tied to religion or the state in the form of temples, palaces, gardens, and grand public buildings. The arrival of installation art in the twentieth century began to democratize the creation of explicitly semiotic spaces, and the ease with which individuals can now author virtual environments has meant that more people than ever are experimenting with the expressive potential of designed environments. Yet, compared to writing and image, which declare their semiotic status as meaningful figures against some kind of ground, space has received much less attention as a mode of communication in its own right. As the underlying scaffold of our experience, space often recedes from conscious awareness in favour of figures demanding attention (McLuhan and McLuhan 1988, 5; Stockwell 2005, 15), yet this does not

diminish its primitive importance in our experience of the world (Tversky 2011), and the unique potential for communication that its background position affords. Since a person's body fundamentally shapes their engagement with a semiotic environment, the findings and theories of embodied cognition are ideal tools for unpacking how spatial communication takes place, and for addressing why some environments leave strong impressions while others fall flat.

Using analyses of nine exemplary videogames, I will argue that virtual environments communicate spatially through the design of their interactive affordances, and how these evoke cognitive schemas, metaphors, and frames through interactions within the space. Put differently, certain schematic structures can be encoded into environments, and interacting with these environments instantiates discourses that are tied to these structures: a videogame where players collect objects to grow larger can instantiate a discourse around excessive consumption (as is the case in *Katamari Damacy* (Namco 2004), analyzed in chapter 4). As such, the method of analysis employed here will be a structuralist one that seeks to reveal the elements that structure videogame environments. Designed spaces can encourage many different forms of embodied engagement, and this thesis will explore three types of virtual environments: (1) ones that exist as places for exploration and inhabitation (e.g. gardens), (2) ones that allow a player to enact situated behaviour (e.g. workplaces), and (3) ones that are structured to teach new ways of perceiving the world (e.g. installation artworks). Many videogame worlds combine the above types of space, and so care has been taken to select works that strongly exemplify a single one. Using a comparative method helps this study capture the diversity of spatial communication strategies, both within and across types, revealing important commonalities and differences in the process. Before exploring theories of embodied cognition in the next chapter, it is necessary to define 'spatial communication' and review the existing studies on videogame spatiality.

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1.2 SPATIAL COMMUNICATION

1.2.1 DEFINING 'SPACE'

As a primitive aspect of experience, space can be a challenging concept to define (Nitsche 2008, 8; Tversky 2011). It acts as a medium for things to exist in and relate to each other in, and our sense of it is heavily shaped by which senses we are using to perceive it: the experiential qualities of visual space differ greatly from those of acoustic or haptic space (McLuhan and McLuhan 1988). An immediate and useful distinction we can make is between topologic and topographic space. Topologic space is the space of relationships between things, and is defined solely by the existence of the relationships (Ciccoricco 2007a, 45-6; Dade-Robertson 2011, 158). It can be visualized as a collection of discrete objects floating in a void with lines drawn between them, and the quality of this space is synonymous with the quality of the relations. Topographic space (often called Cartesian space) is coordinate-defined space, where every object exists at a measurable x,y,z position, resulting in a sense of space defined by the geometric configuration of objects (Ciccoricco 2007a, 45-6; Dade-Robertson 2011, 158). These two foundational ways of understanding space can be mapped onto the senses, with topologic space arising from acoustic and haptic experience, and topographic space arising from vision.

Space plays a foundational role in theories of embodied cognition, and a range of concepts for engaging the space of the body and the world have arisen out of it. One key question is how the body understands its position in space, and two perspectives have been identified: egocentric space, where the locations of things in the world are understood in relation to the body's location (as a center point), and allocentric space, where a person has a schematic mental map of an area and understands their body's position by placing it on the map in relation to landmarks (Dade-Robertson 2011, 155-6; Goldhagen 2017, 95). The lived-body experiences space in relation to

how it can act upon the world (Gibson 1979), and cognitive scientists have defined three zones that are engaged with differently: personal space, the space of the body itself; peripersonal space, the space of things within reach; and extrapersonal space, everything beyond reach (Kirsh 2013, 7). Surprisingly, research on macaque monkeys trained to reach distant objects using a rake has shown that holding the tool expands their peripersonal space, a finding expected to also apply to humans (Craighero 2014; Kirsh 2013, 7-8; Maravita and Iriki 2004). This suggests that a virtual avatar may extend a player's peripersonal space into the videogame world itself, incorporating the virtual space into their brain's measure of actionable space (Calleja 2011). Finally, embodied cognition has made strong claims for the meaning of spatial relations like 'up' and 'down' via metaphoric thinking (Lakoff and Johnson 2003) and this will be explored in chapter 2.

Other domains have also put forward noteworthy theories of space. The human geographer Yi-Fu Tuan's *Space and Place* (1977) argues for a common human distinction between these two concepts, where 'space' is understood abstractly, and 'place' is deeply lived-in and meaningful. The contrast in what is evoked between the words 'house' (a space) and 'home' (a place) demonstrates this. Importantly, unfamiliar spaces can become places in our experience once we familiarize ourselves with them, and the architectural phenomenologist Christian Norberg-Schulz (1980) has explored how certain locations can develop a powerful sense of place ('genius loci'). Coming from a different angle, the sociologist Henri Lefebvre has proposed an influential tripartite division of space (1991): 'spatial practice' is the physical movements and routines of a body in an environment; 'representations of space' are a society's artificial conceptions of space (in the form of diagrams and words), created by specialists such as scientists, engineers, and architects; and 'representational space' is the cultural space that a person passively inhabits, shaping their engagement with the world. In the context of videogame

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environments, the actions of the player can be understood as a form of spatial practice, and involvement and immersion in the gameworld as a form of living within a representational space. Yet as a computer-supported environment, the gameworld itself is paradoxically both an interactive space and a representation of space via computer graphics (see Aarseth 2001). The aesthetic style in which a videogame's spaces are represented thus serves as a significant frame around its virtual environment. These perspectives on space all provide valuable starting points for unpacking the communicative power of designed environments.

Before proceeding any further, it should be clarified that 'virtual environment' is used here in a reduced manner to only address computer-supported interactive spaces. The term 'virtual' has also been used to refer to spaces that only exist in the imagination (e.g. the storyworlds of narrative fiction (Ryan 2001)) or that only exist as conceptualized spaces (e.g. the space of common customs shared by members of a culture (Shields 2003)). These spaces that allow the free play of the imagination, or that use space as a metaphor to describe shared social realities are very different from the concretely experienced spaces that are investigated in this study.

1.2.2 COMMUNICATION AND MEANING

In order to fruitfully discuss spatial communication, we need a clear paradigm for how it occurs. Following multimodal communication theorists such as Kress and Van Leeuwen (2001), this study takes communication to be a process where an author, artist, or designer creates an evocative work, and a reader, viewer, or interactor creates meaning out of their engagement with it. While an individual's unique background will shape the meanings that they read out of the work, if the creator is an effective communicator then much of what they want to share will come through. This communication paradigm addresses a major flaw of the commonly held 'conduit' metaphor for communication, where "[t]he speaker puts ideas (objects) into words

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(containers) and sends them (along a conduit) to a hearer who takes the idea/object out of the word/containers" (Lakoff and Johnson 2003, 10). As Lakoff and Johnson note, this model problematically assumes that meanings have an existence independent of the hearer of the message and the context it is being communicated within (2003, 11). Further, this theory's linguistic bias is not well suited for the analysis of visual and spatial communication, areas where a viewer's direct experience of colour, shape, tactility, and sound are experienced as meaningful.

Theorists of embodied cognition assert that meaning is non-propositional and embodied, that it "arises from our feeling of qualities, sensory patterns, movements, changes, and emotional contours" (Johnson 2007, 70). The feelings of unease that arise from handling a sharp knife or from having an oppressive building loom over us are paradigmatic of the way that our body's relation to its environment is meaningful. Meaning itself is multimodal, rooted in mental simulations of our prior experiences of engaging with the world:

> As an experience occurs (e.g., easing into a chair), the brain captures states across the modalities and integrates them into a multimodal representation stored in memory (e.g., how a chair looks and feels, the action of sitting, introspections of comfort and relaxation). Later, when knowledge is needed to represent a category (e.g., chair), multimodal representations captured during experiences with its instances are reactivated to simulate how the brain represented perception, action, and introspection associated with it. (Barsalou 2008, 618)

Johnson unpacks the meaningfulness of objects using the example of a cup, noting that:

> …the meaning of a cup is not just some abstract concept specifying a defining set of features that constitute it as a cup. Rather, the meaning of a cup is all of the experiences, both actual and simulated, it can afford us. Some of those experiences will be … sensory-motor activations, such as the visual properties it presents, the way it feels in my hand as I lift it, the smoothness of its ceramic surface, or its capacity to hold my tea. However, the meaning of the cup is not just what it affords us by way of physical perception and motor interaction, because it also includes the social function of cups, given our cultural values and practices surrounding the use and significance of various types of cups. Finally, in addition to this public and shared meaning, there will be each individual's own personal past experience with cups. (2015, 36)

The importance of this understanding of 'meaning' cannot be overstated, since it underlies the arguments that will be made throughout this thesis. Taking this further, embodied cognition

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argues that even abstract concepts are fundamentally rooted in our bodily engagement with the world (Lakoff and Johnson 2003), thus allowing our concrete interactions with objects and environments to evoke abstract concepts and the discourses associated with them. Summing up, designed spaces are meaningful in two complementary ways: first for the direct experience of inhabiting them, and second for how they can point to things beyond themselves.

Returning to communication, theories of multimodality are particularly well-suited for analyzing spatial communication in virtual environments. As space is something of a supramodal dimension that contains and reconciles other modes (Tversky 2011), spatial communication invariably takes places through a range of modes such as colour, shape, tactility, light/darkness, and the rhythm of architectural elements felt as one moves through the space. Some spaces also include text on various surfaces (e.g. building signage) and audio narration (e.g. audio tours or videogames with voiceover narrators). Importantly, each mode has "communicative or representational strengths and weaknesses" (Hawreliak 2018, 4) that differentiates it from other modes and prompts the question 'what mode for what purpose?' (Kress and Van Leeuwen 2001, 46). The many available modes, and the ways of using them in conjunction, are understood as 'semiotic resources' that the creators of a work are free to draw from as they craft an evocative work (Kress and Van Leeuwen 2001). Finally, the different modes in a work can be crafted to reinforce each other (consonance), or to intentionally juxtapose each other to cause meaningful unease (dissonance), such as upbeat music playing during a disturbing scene in a film (Hawreliak 2018). The videogame analyses in this study will place more emphasis on space than on other modes, and the works under analysis were chosen precisely for their primary reliance on spatial communication. This noted, the contributions made by other modes such as written text, orality, and graphic imagery will be discussed since they do influence how space is experienced.

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Having discussed definitions of space and paradigms for understanding communication and

meaning, this section will briefly review major ways that space can be used as a mode of

communication. At the most basic level, designed environments shape the body's movements

within space. The rhythms of this movement can be enjoyable, tiresome, or comforting among a

host of other possibilities (Sheets-Johnstone 1999). These movements can simply be ones of

navigating the environment, as in gardens, or they can be tied into activities that the space is

designed for, as in kitchens (Kirsh 1995). Beyond actual movement, a space also communicates

through its affordances for possible movement: seeing a steep hill with a lookout on top invites

the mental simulation of climbing it (Gallese and Gattara 2015). Space fully beyond reach (extra-

personal space), such as a mountain on the horizon, takes on an imagistic and symbolic quality,

and can communicate through visual metaphor when the form primes associations: a lone

mountain on the horizon becomes a clear goal while priming the metaphor PURPOSES ARE

DESTINATIONS (Kromhout and Forceville 2013). The tactility of a building's materials can also

afford potent spatial metaphors: materials rough or smooth to the touch can evoke those ideas in

a broader sense (Goldhagen 2017, 55-8, 120-3). This is also true at the scale of the entire

building: a building made of thin sticks of wood or steel will have a spindly, delicate quality that

would sharply contrast with the qualities evoked by a brutalist building composed of large

precast concrete elements (fig 1.1). Space can also communicate through the physical

proximities and relationships that it encodes between elements: a single tower in the middle of a

town announces itself as the 'center,' with all of the discursive implications of that position. The

meaning of the tower will vary greatly depending on whether it is occupied by government

offices or corporate headquarters, and whether the culture interpreting it is libertarian or believes

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Figure 1.1: Different qualities evoked by different architectural materials and assemblies. Public washroom in Los Angeles (left), Kanagawa Prefectural Youth Centre in Yokohama (right).

in government as a benevolent force. Finally, every built environment has the quality of being authored, inviting speculation and interpretation of the designer's intent (Calleja 2011, 77). The theories of embodied cognition presented in chapter 2 are useful means for unpacking and better understanding these varied ways that environments can be used to communicate.

The modes of spatial communication presented above have been elaborated in both the embodiment and multimodality paradigms that this thesis is built on. In his chapter "The Embodied Meaning of Architecture," Johnson uses theories of embodied cognition to explore how "architectural structures are experienced by humans as both sense-giving and signifying" (2015, 40; emphasis removed), and likewise, O'Toole's (1994, 85-144) chapter "A Semiotics of Architecture" attempts a social-semiotic, multimodal approach to analyzing architecture that distinguishes the experiential, interpersonal, and textual functions of a building, and how these play out at multiple scales (e.g. a room, the entire building). The overlap between these two paradigms addresses the huge breadth of spatial-semiotic design strategies that are possible, and it provides a solid foundation for this study of semiotic virtual environments (one which will be thoroughly explored in chapter 2).

1.3 APPROACHING VIDEOGAME SPATIALITY

1.3.1 EXISTENT STUDIES

As a relatively young field, game studies is an eclectic mix of scholarship that approaches videogames from a range of perspectives. While early scholars such as Aarseth (2001) and Jenkins (2004) identified videogames' interactive spatiality as an important aspect, space has been a secondary concern in the field as compared to the nature of games and rules (e.g. Juul 2005), narrative (e.g. Murray 1997), and more recently identity (e.g. Shaw 2014). While these are useful perspectives for studying videogames that do touch on spatial concerns, oftentimes they exist at one scale removed from the core spatial interactions of engaging with a videogame environment. Calleja highlights this when he criticizes common ways of talking about videogames: "Although for ease of reference we call *Grand Theft Auto IV* a game, it may be more accurate to consider it as a virtual environment with a number of games embedded in it and a linear storyline that players can progress through by completing a sequence of game-like activities" (2011, 8). This study is firmly interested in the dynamics of how players engage with semiotic virtual environments, and some of the examples in this study are arguably not 'games' at all (while still carrying this label due to their technological similarities with videogames).

Espen Aarseth's (2001) article "Allegories of Space: The Question of Spatiality in Computer Games" is an early entry in the literature on videogame spatiality, and it takes an eclectic approach that explores the evolution of videogame spaces and common configurations. He applies Lefebvre's spatial theory to videogames, arguing that videogame spatiality is simply a representation of space that facilitates gameplay and is not real space at all, since "In real space, there would be no automatic rules, only social rules and physical laws" (2001, 163). This places virtual environments into an allegorical relationship with real space: they are intelligible by

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virtue of taking on the appearance of real space, but that does not make them real space itself. This discussion of the ontological reality of virtual environments continues in many of the texts below, with Nitsche (2008) independently adopting the same allegorical perspective as Aarseth, and Calleja (2011) arguing for them to be understood as experientially real.

Henry Jenkins's (2004) article "Game Design as Narrative Architecture" attempted to overcome the early debate between ludologists and narratologists in Game Studies, "examining games less as stories than as spaces ripe with narrative possibility" (2004, 119). Starting from the idea of 'environmental storytelling,' where the built environment is used to create an atmosphere ideal for immersing oneself in a storyworld, Jenkins presents four different ways this can be accomplished: (1) evocative spaces, which are created to have associations with stories or genre traditions that visitors are already familiar with (e.g. theme parks); (2) spaces for enacting stories that allow players to perform and witness narrative events (e.g. many big-budget videogames); (3) embedded narratives, which leave fragments of the narrative strewn around the environment for players to discover at their leisure (e.g. clues being discovered in a detective novel); and (4) emergent narratives, which are not pre-authored and players construct out of their engagement with the gameworld. While these are useful categories for analyzing and designing narrative videogame environments, Ryan et. al. (2016, 109) rightly note that 'evocative spaces' exist on a different level than the other three types because they point to other stories instead of delivering narratives themselves, and should thus be considered separately. This shortcoming noted, the article remains a strong entry point into the considerations of narrative videogame environments.

The anthology *Space Time Play: Computer Games, Architecture and Urbanism* (Borries et al. 2007) explores the connections between these three fields through a mixture of articles and micro-analyses of games. The authors adopt a range of perspectives, convincingly arguing that

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the connections between these fields are important without settling on a shared framework. While lacking deep explorations of particular issues, it demonstrates the breadth of concerns that arise when studying videogame spatiality and highlights promising avenues for further research.

The same year, Georgia Leigh McGregor's (2007) paper "Situations of Play: Patterns of Spatial Use in Videogames" approaches space from how players engage with it, looking at six conditions: (1) challenge space, where environmental features challenge players; (2) contested space, arenas for opposing forces to compete within; (3) nodal space, where certain actions are tied to certain locations (e.g. talk to villagers in a town, buy weapons at a shop, fight monsters in the forest); (4) codified space, where architectural elements are codified signs that serve as part of the interface (e.g. creating troops at particular buildings in real-time strategy games); (5) creation space, where players construct, destruct, and reform the environment; and (6) backdrops, parts of the game space that cannot be interacted with (e.g. spectator stands in a racing game). She concludes with the notion of played space: "As spatial constructs videogames present us with situations of play from which we learn patterns of spatial use" which players can project back upon the real world (McGregor 2007, 543). This scheme can be criticized for a lack of hierarchy between its six patterns and how they relate to different aspects of a virtual environment, but it remains a valuable foray into this area.

Michael Nitsche's *Video Game Spaces* (2008) was the first book-length study to explore this topic. He proposes a five-leveled approach to unpacking videogame spatiality: (1) rule-based space, made up of the mathematical rules and programming that underpins the virtual space; (2) mediated space, which constitutes the space as it is presented to the player via image and sound; (3) fictional space, the storyworld of the videogame that extends beyond what is depicted, as it is imagined by the player; (4) play space, the physical space of play including the player, screen,

and game hardware, and (5) social space, the space where players interact with each other, either virtual spaces (e.g. MMOs) or real ones (e.g. arcades) (Nitsche 2008, 15-6). While this scheme helps organize his analysis, Nitsche's primary argument is that videogame spaces are comprehended by way of the narratives that players create out of their engagement, where "narrative is best understood as a form of comprehension that can be triggered and affected by the game world" (Nitsche 2008, 42). This takes place through "evocative narrative elements" in the virtual space, "encounters or situations in the game that prime some form of comprehension" and help players situate themselves within the fictional world depicted by the virtual space (2008, 44-5). For players to meaningfully act within the virtual environment, they must understand their position within it, and thus they are motivated to develop this form of narrative comprehension (2008, 42-3). Building this argument in the first major section, the following two sections explore parallels with cinematic spaces and architectural ones. Nitsche's extensive analysis of videogame cinematography is a very strong part of the book, however his application of diverse architectural theories towards unpacking videogame spatiality is far too brief and cursory given the topic of the book, a shortcoming he does acknowledge (2008, 164). Finally, Nitsche makes the strange choice to exclusively address 3D videogame spaces instead of including 2D ones; this is understandable in his section dealing with cinematographic practices, yet 2D games environments can allow many of the same kinds of interaction and exploration that 3D ones can, making them no less spatial (though certainly *differently* spatial).

Steffen Walz's *Toward a Ludic Architecture* (2010) is a sprawling treatment of videogame spaces, reviewing theories from a range of fields and developing an extensive taxonomy of archetypal videogame spaces with the aim of developing a "comprehensive and critical discussion of play and games through the lens of architectural paradigms" (2010, 12). Walz

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begins by exploring play as it relates to architecture and proposes a number of dimensions to consider such as kinetic involvement and enjoyment, then moves into a discussion of how the spaces of games can be understood as architecturally shaping play. Having developed these approaches to play and games, the major portion of the work is dedicated to analyses of recurring spatial types in games, exploring a staggering range of types from Labyrinth and Stadium to Tessellation, Casino, and Mall. In contrast to Nitsche's study, Walz keeps a stronger focus on architecture, yet the extreme breadth of perspectives and theories he addresses weakens the work by overcomplicating it. The framework he develops to combine the respective concerns of play and games is a good example of this (2010, 130) and it serves as a cautionary note against approaches that try to incorporate all of the diverse (and sometimes incompatible) approaches to game studies. This shortcoming noted, the book is a significant advance in the application of architectural theories to the study of videogames.

Gordon Calleja's *In-Game: From Immersion to Incorporation* (2011) builds a theory of immersion in virtual environments by combining cognitive theories (such as those of Lakoff and Johnson) with player studies he conducted. Calleja believes that the term 'immersion' has become problematic for the many differing and loose definitions it has accrued in industry and academia, and he proposes a player involvement model that addresses six different ways that players can be involved in virtual environments: kinaesthetic, spatial, shared, narrative, affective, and ludic. He also makes an important distinction between micro involvement, the moment-to-moment engagement with a gameworld, and macro involvement, the involvement of players thinking or talking about a gameworld when they are not directly engaging with it. When a player is deeply involved with a virtual space in all six dimensions, they achieve a state of dual 'incorporation,' where they have been incorporated as an active agent within the virtual space

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and the virtual space has been incorporated into their lived experience of the world (as a meaningful niche within it). Calleja's work is important to this present study for its argument that a player's lived experience is continuous across their inhabitation of physical and virtual realms.

Finally, Christopher Totten balances industry and scholarly concerns in his book *An Architectural Approach to Level Design* (2014), demonstrating how architectural theories can be applied to the design of videogame environments. This expansive study begins by looking at the history of architecture and spaces designed for games to be played in them, and proceeds to cover a diverse set of areas including architectural tools and techniques that are applicable to level design, common spatial arrangements in buildings and videogames, the task of integrating narratives into a space, and how psychological theories can be used to better understand players' spatial biases and develop things like reward structures to ensure that a videogame is enjoyable. Totten's book is animated by insightful illustrations of the theories he presents, and it makes a better case than previous studies for the direct applicability of architectural design strategies to the creation of videogame environments. Yet since the book is directed towards level designers creating conventional videogames, there is a primary emphasis on optimizing spatial design for player enjoyment, arguably at the expense of more subtle or avant-garde possibilities. Thus, while this thesis shares many concerns with Totten's book, it diverges quite significantly from his emphasis on games and play, a point that will be returned to below. Taken together, these varied studies raise key issues to consider when studying videogame environments, and the following sections explore these further.

1.3.2 THE MAGIC CIRCLE, PLAY, AND GAMES

A major early approach to the study of videogames, ludology, approaches them as a further development of physical games, thus emphasizing their rule-bound nature (Juul 2005, 15-6). A

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prominent spatial idea within this paradigm is the 'magic circle,' the experiential space that participants of a game enter into when they choose to participate in it and give themselves over to its (often arbitrary) rules of engagement (Calleja 2011, 46). The term originated with the anthropologist Johan Huizinga's early study of play and games, *Homo Ludens*, where he develops a comparison between games and ritual (1949, 10), and later theorists such as Salen and Zimmerman (2003) subsequently popularized it within game studies. At the heart of this concept is the notion that engaging in a game somehow pulls the participant into a different world cut off from reality, placing them under the rules of the game and inviting a 'lusory attitude' (Suits 1978) where they are free to experiment and behave in ways that they would not otherwise.

This argument for an ontological separation between the worlds of games and the real world has not gone without criticism, and Calleja (2011, 46-51) thoroughly argues against it by claiming that play and ritual cannot truly be a "stepping out of 'real' life into a temporary sphere of activity" (Huizinga 1949, 8) since "there is no reality outside of the culture that constructs it" (Calleja 2011 48). The concept of the magic circle covers both spatial and psychological separation, and Calleja (2011, 48-51) usefully separates these, appearing to affirm the spatial by presenting Juul's (2005) formulation of it without any criticism. Here, Juul makes a useful distinction between physical games, where the rules of a game are projected onto a bounded part of the world and are socially upheld for a period of time, and digital ones, where the reality of interacting with their world through screens and videogame hardware clearly marks them as separate from the rest of the world. Psychologically, Suits's (1978) theory that players of a game voluntarily adopt a playful 'lusory attitude' while submitting to the arbitrary rules of a game is closely related to the magic circle. Yet it creates a circular argument, "essentially claiming that games are activities which require a lusory attitude and that the lusory attitude is an experience

which occurs while playing a game" (Calleja 2011, 50). Finally, a range of qualitative studies with players, including Calleja's own, give "no indication that players enter into an experiential mode that is specific to games" (2011, 51).

These criticisms noted, the magic circle remains a useful concept when used carefully, and it can be fruitfully understood as a person framing their engagement with the world as 'play', and projecting (Kirsch 2013) the rules of a game onto the world. Bogost (2016) makes a strong case that 'play' itself is a deep involvement with things, where we accept the rules of engagement that are presented by the material we are engaging with (e.g. the qualities of wood when playfully carving it), or the arbitrary rules of a game we choose to play. Another account of this playful engagement with arbitrary restrictions is Dant's (1999, 110-29) study of the material culture of windsurfing, where windsurfers play with the forces of the sea and sky through their extended body comprising human and windsurfing kit. In both cases, our bodily engagement with the world changes—experientially, and sometimes physically—when we frame our engagement as play (framing theory, and why it is useful for understanding spatial communication, will be thoroughly explored in chapter 2). Equally important, Kirsh's discussion of projection is helpful in unpacking the way that game rules change our relation to the world:

> Projection is a mental process akin to attaching a mental image to a physical structure. When we project onto an object, whether kinesthetically or visually, we experience ourselves intentionally augmenting the object. The object anchors our mental image, and successful projection requires spatially or temporally locking the projected image onto the anchoring structure. (2013, 18)

During a game or ritual, objects and spaces take on a newfound significance as one projects the rules of a game or the mythic structures of the universe upon them. Elements such as the lines marked on a tennis court or the symmetry of a religious building help the physical structure better serve as an anchor for the projections it is designed for. Further, elements not designed as anchors can become ideal ones (e.g. two streetlights becoming the finish line for a foot race).

The virtual environments that will be analyzed in this thesis are generally ones which lack strong game-like qualities, making their relation to the idea of the magic circle less clear. Salen and Zimmerman compare eight different ways of defining 'games' in their study, synthesizing their own definition that, "A game is a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome" (2003, 80). While this can technically be applied to all of the works in this study, it is not a natural fit, since qualities other than conflict, rules, and winning/losing are often more salient in the experience of playing them. Regardless of this, the fact that players' actions in a virtual environment do not bring consequences outside of it surely goes a long way to inviting a playful, exploratory stance on the part of the player. This complicates their relationship to space, encouraging hyper-explorative behaviour comparable to that of infants and children: here in the virtual space, the player may jump off a building simply to test the affordances of the world and see if their avatar will survive the fall. This possibility of a hyper-explorative mindset on the part of the visitor is a key difference between virtual spaces and semiotic physical ones such as gardens and the spaces of installation artworks, and designers can use it to push the player to commit uncomfortable acts such as killing their avatar in order to progress (as in *SUPERHOT* (SUPERHOT Team 2016) analyzed in chapter 5). Yet even here, and in contrast to Suits's (1978) idea of a universal lusory attitude, I have witnessed players not adopt this mindset and instead take care of their avatar as though it were a person facing real danger—a nearly impossible task in many videogames.

1.3.3 NARRATIVES IN VIRTUAL ENVIRONMENTS

In contrast to a focus on rules and mechanics above, another major approach to videogames has been to understand them as narrative works and explore their relation to earlier story-driven media (e.g. Murray 1997). Many videogames place a significant emphasis on storytelling, and so

it is prudent to note how this study will address the narrative dimension of videogame

environments. Put simply, this study follows the perspective advanced by Ryan et. al. (2016) that

virtual environments, like their physical counterparts, have the ability to evoke narratives for

their interactors. A narrative about a space can help a visitor situate themselves and their actions

within it (Nitsche 2008), but if a visitor arrives in an unfamiliar space and interacts with it, they

will develop a personal narrative of that involvement. Calleja has termed this an 'alterbiography'

to distinguish it from narratives about the player character that were pre-scripted by the creator

of the videogame and not the player themselves (2011, 115). Since the focus of this study is

spatial communication, the works selected for analysis privilege evocative spatial experiences

(which players may narrativize) over narratives presented textually or orally. In the works that do

have clear scripted narratives, these will be approached as framing elements which situate

players in the virtual environment and influence how they engage with the space.

1.3.4 DIMENSIONS OF VIRTUAL EMBODIMENT

As a thesis using embodied cognition to approach the spatiality of virtual environments, the

nature of virtual bodies (commonly termed 'avatars') must be addressed. Avatars serve a range

of purposes and touch on many different phenomena: (1) they are the player's primary means of

interacting with the virtual environment, linking movement in the physical world with movement

in the virtual one (Calleja 2011, 61-2); (2) they situate the player within the virtual space, giving

them a virtually-embodied relation to its space and potentially a narrative explaining their place

in it (Nitsche 2008); (3) they can allow players to engage with pre-scripted identities other than

their own by acting out roles (Murray 1997); and (4) in both single-player videogames and

online multiplayer worlds that allow for avatar customization, they can allow players to create

and perform a range of identities, exploring and experimenting with the very notion of identity in

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the process (Ensslin and Muse 2011). Given the focus on spatial communication, this thesis is primarily concerned with aspects (1) and (2) above, and to a lesser extent with (3); the questions raised by (4) are entirely beyond the scope of this study.

These questions of virtual avatar embodiment are directly addressed in Gee (2008) and Alton (2017) from strongly differing perspectives. Much like this study, Gee (2008) is primarily concerned with the embodied avatar as a means for allowing players to engage with conventional videogame worlds, which he understands as "action- and goal-directed simulations of embodied experience" (2008, 254). Players use their avatar as a surrogate for themselves in the world, yet they also "act in the game as if the goals of [their] surrogate are [their] goals" (2008, 258); exactly the 'incorporation' relationship described by Calleja (2011). Importantly, Gee also highlights that virtual environments and avatars are designed in-tandem, and are thus tightly attuned to each other (2008, 258). This harmonious fit is rarely achieved by the contemporary environments built for the human body (Goldhagen 2017), perhaps hinting at why some virtual spaces can feel smoother and more pleasurable to inhabit. Alton's (2017) article is an argument against views (1) and (2) of virtual embodiment above, believing that they result in a reductive and dehumanizing 'avatar as vehicle' perspective where "a character like Lara Croft … is directly equivalent to a Honda Civic or a Mazda 3" (2017, 216). His major emphasis is on identity and the subversive possibilities of virtual embodiment therein (2017, 220), and while he offers some beginnings for a theatrical theory of virtual embodiment (2017, 224), he fails to argue why an understanding of 'avatar as vehicle' cannot productively coexist with views that engage questions of identity. The works in this thesis feature a wide range of avatars, from 'absent' (Leder 1990) first-person protagonists to narrative characters, and avatars' identities will be addressed in the context of the narrative dimension of each virtual environment.

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1.4 OUTLINE OF THE STUDY

This study approaches virtual environments as new pockets of the built environment, unpacking them as spaces that shape human action, and that offer frames for understanding the action that takes place within them. All designed environments are doubly communicative, through both the sensations that arise when an inhabitant directly engages with them, and through the ways in which the contours of the space call to mind other experiences, concepts, and entities. A growing body of work in embodied cognition offers strong theories for how this spatial communication takes place, and the following chapter will present this work and use it to develop an approach to analyzing the spatial semiotics of virtual environments. The theory of affordances addresses the ways that environments shape their inhabitants' movements and interactions, and the theories of priming and framing address how environments can signal the ways in which they should be interpreted. Most importantly, however, the theories of image schemas and conceptual metaphor argue that physical engagement with the world is tightly connected to abstract understandings of it. Together, these theories can be used to unpack a player's multidimensional engagement with a virtual environment, and how its structures are likely to shape their experience of it. Following other studies into the built environment (Goldhagen 2017; Tilley 1999) and videogames (Begy 2010; Calleja 2011; Kromhout and Forceville 2013; Shibolet 2018) that use theories of embodied cognition, this study's videogame analyses will be conducted by playing them and making note of their structuring elements, supplementing this when possible with additional sources such as critical texts and interviews with their creators. Like the studies noted above, this one's approach to analysis is explicitly structuralist in its goal of revealing and documenting the structures that allow for spatial communication in videogame environments. While I will occasionally present anecdotes of my own play experiences, these are not intended to be autoethnographic, and are

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instead included to emphasize that some structuring elements are encountered inconsistently in these worlds, and that some players may miss them.

The major chapters of this study address three types of designed environment that are optimized for different forms of embodied engagement: spaces for exploration and inhabitation, spaces for enacting situated behaviour, and spaces for learning new modes of perception. While a single environment can support all three forms of engagement, it will likely privilege one form over the others through how it has been designed. Each chapter analyzes three different works, comparing and contrasting them with the hope of revealing the range of semiotic possibilities inherent in each type of designed space.

The first chapter begins with the lowest levels of spatial experience: exploration and inhabitation. The act of navigating space, and subsequently becoming familiar with it and 'inhabiting' it is foundational to other kinds of spatial experience. I will unpack Heidegger's notion of 'dwelling' (2008) and Norberg-Schulz's (1980) elaboration on it as a useful theory for understanding this form of designed space. The three videogame environments analyzed here communicate through the rhythm of moving through their spaces, through evocative elements in the world, and through the evolving relationship between an avatar's body and the gameworld. The first analysis uses the atmospheric, explorative platformer *Knytt Stories* (Nifflas 2007) to explore the sense of place that gameworlds can offer, and how a player's relation to a world can evolve as their avatar gains new abilities for traversing it. The second work, *The Night Journey* (Viola and USC Game Innovation Lab 2018), exemplifies a 'garden' spatial type: an evocative landscape that players are free to wander and read meanings out of. The final work, *NaissanceE* (Limasse Five 2014), exemplifies a processional spatial type, where one takes a linear journey

through a semiotically-charged environment. Together these works emphasize the ways that virtual environments can take on a powerful sense of place and be enjoyed as places to inhabit.

The second chapter explores spaces designed to shape the actions that take place within them. In these environments, the affordances for interaction heavily shape players' movements and evoke particular image schemas, providing them with tightly situated experiences that may have parallels with real world situations. In these 'surrogate situations' (Clark 2005) players enact actions and roles that may encourage empathy with real-world individuals in similar circumstances. The first work, *Shelter* (Might and Delight 2013), asks players to enact the role of a mother badger caring for her cubs, guiding them to safety across a hostile forest. The second, *Shadow of the Colossus* (Team ICO 2005), has players taking on the role of a young warrior who desperately desires the resurrection of his companion and is willing to enact a self-destructive ritual to get his wish. And the final work, *Katamari Damacy* (Namco 2004) satirizes excessive consumption by inviting players to enact it to the utmost extreme. Together, the videogames explored in this chapter highlight how situational structures present in the real world can be recreated in virtual surrogates, serving as powerful commentaries and invitations for reflection.

The final chapter explores videogame spaces designed to teach new modes of perceiving the world. These are comparatively rare environments in both the real and virtual world, and they are often categorized as experimental or avant-garde (Schrank 2014) for the ways that they challenge players' ability to understand them. These works may have environments that are physically hard to perceive and to navigate, or ones that have underlying semiotic systems that are challenging to decode, but most importantly, they prevent players from navigating through them until they have learned new ways of perceiving. Getting deeper into the work becomes a reward for internalizing its favored mode of perception and gaining the ability to perceive new

figures in a perceptual ground (McLuhan and McLuhan 1988, 5). Once these modes are learned, players carry them back into the physical world and are free to interpret it using the frames they have acquired in the virtual one. The first work, *Thirteen Gates* (Snyder 2012b), displays a 3D world solely using vertical patterned strips, forcing players to learn to perceive space out of a bare-minimum of visual stimuli. The second, *SUPERHOT* (SUPERHOT Team 2016), links the progression of time in the environment to the player's movement, helping them learn to perceive the motion paths of bullets and enemies in order to strategically survive its violent scenarios. The final work, *The Witness* (Thekla Inc. 2016) is a strange island full of spatial puzzles, demanding that players internalize their logic and then project it outside of the puzzle-boards and upon the environment itself. Together these works show the potential of virtual environments as places that creatively and forcefully recast our modes of perception, much as earlier media have also done (McLuhan 1964).

These many types of virtual environments all speak to the profound expansion of the built environment, and the new ease with which semiotic environments can be created. In our rapid adoption of computing technology and virtual spaces, societies have scarcely understood the structures at play, or the personal and social implications of living lives that flow unceasingly between physical and virtual environments. As human creations, these environments have the potential to be designed as nourishing spaces that augment our lives, or as dystopian snares that leave them in shambles. This study seeks to contribute a better understanding of the nature of virtual environments, the ways in which they relate to physical ones, and their affordances for personal and cultural expression. A better understanding of these factors will surely strengthen any discussion of the impacts that virtual environments can have on the individuals and societies that create and engage with them.

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2. Embodied Cognition

> To say that cognition is *embodied* means that it arises from bodily interactions with the world and is continually meshed with them. From this point of view, therefore, cognition depends on the kinds of experiences that come from having a body with particular perceptual and motor capabilities that are inseparably linked and that together form the matrix within which reasoning, memory, emotion, language, and all other aspects of mental life are embedded. (Thelen 2000, 5; emphasis in original)

2.1 INTRODUCTION

To fruitfully analyze the structures of spatial communication in virtual environments, we require

a theoretical basis for analyzing the involvement that occurs between agents and environments.

Embodied cognition (sometimes termed 'situated' or 'grounded' cognition) is an emerging

paradigm which holds that cognitive processes are grounded in the human body's active

engagement with the world (Wilson 2002). Scholars in a range of fields including philosophy,

psychology, linguistics, robotics, and cognitive science have advanced theoretical and empirical

work in this area, building a rich picture where "[h]uman sensing, learning, thought, and feeling

are all structured and informed by our body-based interactions with the world around us" (Clark

2008, xxvi). While this may sound like a common-sense assertion, the major paradigm in

cognitive science holds that sensorimotor experiences are translated into amodal semantic

symbols (knowledge), and cognition is the mental processing of these symbols (Barsalou 2008,

618). Here, the body's perceptual and motor systems are understood as peripheral input and

output devices to cognition-proper, not an active part of it (Wilson 2002, 625). This view accords

with the tradition of Cartesian dualism in Western philosophy that separates the abstract thinking

of the mind from the lived, concrete body (Lakoff and Johnson 1999), and it has been challenged

by philosophers across the twentieth century from James and Dewey to Heidegger, Merleau-

Ponty, and Dreyfus (Gallagher 2009). The work of these philosophers provides an important

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foundation for the rapidly growing number of empirical studies supporting hypotheses put

forward under the banner of embodied cognition (see Barsalou 2008; Lakoff 2012).

As discussed in the previous chapter, embodied cognition is an ideal paradigm for

investigating spatial communication since it directly engages the dynamic interplay that occurs

between a mind, body, and environment, revealing how meaning arises out of involvement with

a space (Johnson 2007). Goldhagen's (2017) study of the built environment and Johnson's

(2015) chapter on meaning in architecture are both instructive examples that inform this study.

Scholars in other corners of the humanities have also began to apply findings from embodied

cognition to direct their work: Turner (1996) and Stockwell (2005) use cognitive theories to

analyze how people read literature and how literary works create complex meanings; the

collection *Embodied Cognition and Cinema* (Coëgnarts and Kravanja eds. 2015) does the same

for film; and Tilley (1999) brings conceptual metaphor theory into anthropology to unpack the

meanings of the objects and landscapes that constitute material culture. A few studies have also

applied work in embodied cognition to videogames (Begy 2010; Bogost 2007; Kromhout and

Forceville 2013; Möring 2013; Shibolet 2018; Stamenković and Jaćević 2015), and these will be

discussed below in the context of the approach to spatial analysis being proposed here.

This chapter will begin by briefly surveying five of embodied cognition's notable claims,

since the field is not uniform in its views. The sections following this will unpack the theories

that this study will use to analyze spatial communication: affordances, primes, frames, image

schemas, and conceptual metaphor. Together, these theories allow us to engage with the broad

spectrum of ways that space can be experienced as meaningful. The chapter will conclude with a

demonstration of the approach proposed here, using *Pac-Man* (Namco 1980) to show how these

theories fit together into a single model for analyzing the spatial experiences of an environment.

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2.2 FIVE AREAS OF EMBODIED COGNITION

Despite a shared rejection of Cartesian dualism, embodied cognition contains many different findings and claims regarding how embodiment shapes cognition, and individual scholars differ wildly on which claims they accept (e.g. Robbins and Aydede 2009b; Shapiro 2011; Wilson 2002). As such, it is more productive to evaluate these varied research trajectories separately when asking what they can reveal about spatial communication. Drawing on the above articles, this section will briefly review five major claims: (1) perception is a form of action, and sensorimotor processes are part of cognition; (2) abstract concepts are grounded in embodied sensorimotor experience; (3) cognition exploits the structures of the environment it is embedded within; (4) cognitive processes can extend beyond the mind and body, incorporating tools and other parts of the environment; and (5) embodied simulation is prominent in cognition. While these claims are often intertwined in a particular piece of scholarship, they do remain discrete.

The first area, enactive perception, emphasizes that "[t]he world makes itself available to the perceiver through physical movement and interaction. … *What we perceive* is determined by *what we do* (or what we know how to do); it is determined by what we are *ready* to do" (Noë 2004, 1; emphasis in original). This paradigm argues that we perceive an environment based on the actions that it affords our body (e.g. we perceive a solid surface as stand-on-able) (Gibson 1979), that we perceive it differently based on the skills we have for engaging with it, and that perception itself is a form of skillful action (Dreyfus and Dreyfus 1999; Heft 1989). Importantly, this area emphasizes that our actions in the world are always purposeful, that we always have some motivating factors (conscious or nonconscious) in our involvement with situations. For instance, when faced with an unfamiliar situation we are motivated to quickly understand it so that we can assess whether it is threatening, benign, or beneficial to us and respond accordingly

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(Gallagher 2009, 37). Some formulations of enactive perception argue that cognition does not rely on mental representations and instead gets information from the world as needed, yet this clear overstatement should not be used to dismiss the genuine and defensible findings in this area (see Clark 2008, 140-6). Taken in its moderate form, enactive perception can be fruitfully used to help reveal the forms of meaning that space communicates by shaping movement and directing our attention to its salient features. Shibolet (2018) does just this in his analysis of *Journey* (thatgamecompany 2012), combining enactive perception with Bal's theory of focalization to argue that movement in videogames can aid narrative focalization.

The second area, which can be termed conceptualization, has advanced a theory that the meanings of abstract concepts are metaphorically rooted in embodied sensorimotor experience, with cognitions about those concepts including neural activation in sensorimotor areas (Lakoff and Johnson 1999, 2003). Thus, having a certain kind of body and doing certain kinds of things encourages the formation of certain concepts and categories for understanding the world. This claim purports to answer the 'symbol grounding problem' of conventional cognitive science, the problem of how abstract mental representations become meaningful to the mind computing them in the first place (Robbins Aydede 2009b, 3). The findings in this area sit at the heart of this thesis, since they offer convincing explanations for how concrete spatial experiences can evoke abstract understandings. The below sections on image schemas and conceptual metaphor will elaborate this position in greater detail.

It should be acknowledged that Shapiro rejects conceptualization in his study of embodied cognition; however, he defines it very restrictively as the claim that, "the concepts on which an organism relies to understand its surrounding world depend on the kind of body that it has" (2011, 4). This definition problematically sidesteps the fact that differently-embodied organisms

may share some forms of sensorimotor engagement with an environment (e.g. different animal bodies that can all swim), and that human use of technologies can radically extend our range of embodied experiences (e.g. skydivers gliding, passengers viewing a landscape in parallax as they ride a train), and thus the concepts we develop. Arguing just this point, Kirsh states that, "the concepts and beliefs we have about the world are grounded in our perceptual-action experience with things, and the more we have tool-mediated experiences the more our understanding of the world is situated in the way we interact through tools" (2013, 3). Key in his refutation is Shapiro's view that conceptualization cannot be empirically validated, since humans share the same body structure (2011, 90). Yet by taking technology use into account, empirical studies could be conducted to determine whether specialist users of particular technologies develop concepts that reflect their unique technologically-mediated engagement with the world. The jargon developed by videogame players, and by other communities of specialists, could be cited as evidence of this (Ensslin 2012, 64-9). Finally, much of the evidence for conceptualization is rooted in cognitive linguistics, and Shapiro fails to engage with it, too-quickly dismissing Lakoff and Johnson and building a straw-man out of one of their poorer examples (2011, 88-90). In sum then, conceptualization provides vital insights into how humans make meaning out of their engagement with built environments, and thus how space can both communicate pre-existing concepts and support the creation of new ones. The concern with technology in this section nicely segues into the next, which argues that cognition is embedded in material situations.

This third claim, embedded cognition, affirms that cognition is deeply enmeshed with the situation it is taking place in (implicit in the previous two claims), and it further highlights how an agent can offload some of their cognitive activity into the configuration of the environment itself. Consider the tasks of separating puzzle pieces by colour before trying to assemble them, or

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of optimizing a commercial kitchen for cooking certain dishes; fundamentally, "[h]ow we *manage* the spatial arrangement of items around us … is an integral part of the way we think, plan, and behave" (Kirsh 1995, 31; emphasis in original). Embedding is a logical extension of embodiment, since "off-loading cognitive work depends heavily on sensorimotor capacities such as visual lookup, pattern recognition, and object manipulation" (Robbins and Aydede 2009b, 7). There is overwhelming evidence for the validity of this claim, and theories of embedding can help us unpack how spaces can communicate through the ways that they can be designed as scaffolds that support particular actions (e.g., how might a classroom design shape the sorts of teaching that take place within it? This scaffolding is the concern of chapter 4).

Evidence for embedded cognition challenges the traditional view that cognition takes place solely in the brain (e.g. Kirsh and Maglio 1994), and this has evolved into the fourth claim that "the mind leaks out into the world, and cognitive activity is distributed across individuals and situations" (Robbins and Aydede 2009b, 8); this is known as the Extended Mind hypothesis, and it has unsurprisingly proven the most controversial. The basic logic is that since cognition is embedded and intertwined with external objects, it is only reasonable that we view these objects as partially *constituting* the act of cognition (Clark 2008). Unlike the previous three areas, this philosophical claim is well beyond the concerns of the present work and does not impact this study. The lesser claim of embedded cognition provides a strong foundation for exploring how technology has extended human engagement with the world across history (McLuhan 1964).

Finally, emerging work in neuroscience underlies a fifth area, embodied simulation. This paradigm responds to the empirical discovery that when a person automatically or consciously imagines something, many of the neurons that would fire if they were actually engaging with it still activate (Barsalou 1999; Gallese and Gattara 2015; Kirsh 2013). Here, "simulation is

conceived as a nonconscious, prereflective functional mechanism of the brain-body system, whose function is to model objects, agents, and events" (Gallese and Gattara 2015, 166). Thus, if we imagine a chair, see a picture of a chair, or read the world 'chair,' our brains reactivate some of the sensorimotor neurons that were active when we viewed, touched, and sat in particular chairs. Seeing a chair that we are considering sitting in also results in sensorimotor neural activation, broadly validating the views of enactive perception: "The cortical motor system is not just a movement machine, but an integral part of our cognitive system … [that] structures not only action execution but also action perception, imitation, and imagination" (Gallese and Gattara 2015, 165). Further, the discovery of mirror neuron systems has shown that witnessing another person performing an action automatically results in much (but not all) of the same neural activation that would take place if we were performing it ourselves (Craighero 2014). This discovery of the 'mirror mechanism' has been a watershed for theories of intersubjectivity and empathy, since it suggests that we try to understand others by automatically simulating their actions and affective states by reusing (neutrally re-activating) actions and affective states we have experienced ourselves (Gallese and Sinigaglia 2011). This raises interesting questions regarding a player's perception of their avatar in a virtual world: might their mirror mechanism simulate some of the bodily acrobatics of their often-superhuman avatars, comparable to the simulations of dancers learning new routines? (Kirsh 2013). Further, work in this area makes the significant claim that we do not have to physically touch a surface to have a haptic experience of it, an important caveat when considering how we respond to surfaces in virtual environments:

> Mental simulations of tactile experiences … feel immediate, because—whether we know it or not—they are prompting us to imagine, or simulate, in our own minds and bodies something of our actual responses to those surfaces. Of the many kinds of intersensory collaborations among our perceptual systems, that joining tactile and visual cognition is especially robust. We know from brain scans that tactile sensations stimulate areas of our visual and auditory cortices, and visual sensations stimulate areas of the auditory and somatosensory cortices. (Goldhagen 2017, 123)

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Pushing views of simulation even further, Gee (2008) claims that videogames themselves can be seen as an externalization of our propensity for mentally simulating situations. While the findings and ideas of embodied simulation are worth considering alongside other areas of embodied cognition, this area remains in its infancy and should be used cautiously. As such, it does not form a significant part of this study beyond the support it lends to other areas (enactive perception and conceptualization).

Taken together, these five areas show the breadth of work in embodied cognition and the challenge it has mounted against computational views in cognitive science. Here, cognition is far from abstract symbol manipulation: it is grounded in sensorimotor experience, situated in an environment, and embodied in an active agent with a particular body structure. The following sections unpack five major theories from embodied cognition that this study will use to analyze spatial communication: affordances, priming, framing, image schemas, and conceptual metaphor.

2.3 AFFORDANCES

The environmental psychologist J.J. Gibson (1979) proposed the theory of affordances to account for the dynamic physical interactions between an organism and its environment. Gibson argues that humans (and other organisms) perceive our environment based on its possibilities for action, that we perceive water as a substance that *affords* splashing, rocks as objects that *afford* grasping, and a solid surface at knee-height as one that *affords* sitting. An affordance is an invariant relationship between an agent and the thing it is interacting with, so the same environment offers different affordances to different organisms regardless of what they perceive: a small branch affords perching to birds but not humans (Rambusch and Susi 2008, 87). While Gibson's original theory fails to engage with how an organism learns to perceive certain

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affordances (e.g. he only offhandedly mentions that a mailbox affords mailing letters), later theorists have elaborated that affordances are learned by directly experimenting with objects (as infants and children often do (Johnson 2007, 46)), and through acquiring skills both bodily and cultural (Dreyfus and Dreyfus 1999, 104; Heft 1989). Kirsh notes that "the more actions you can perform the more affordances you register (e.g., if you can juggle you can see an object as affording juggling)" (2013, 3), and he argues that while using a tool our affordances for action change, so "there ought to be new affordances to perceive" (2013, 9). Fundamentally, affordances describe a space of possible interaction between an agent and an environment, allowing a researcher to map the forms of bodily movement and interaction that a designed space encourages, prevents, and is indifferent towards.

Gibson's theory has been widely adopted in a range of fields, and has gained particularly strong presence in product design and Human-Computer Interaction after being popularized by Norman (2002). Yet as Rambusch and Susi (2008) note, this adoption has resulted in the term being used loosely and poorly to describe the properties of objects themselves, departing from Gibson's relational formulation and making the concept much less useful analytically. Related to this, there is now a wide use of the term to describe what can be done with a particular medium, e.g. 'social media affords new forms of communication' (see Nagy and Neff 2015). By describing a possibility space of representation in a medium, rather than a property of an object, this use of the term is closer to Gibson's while remaining a significant departure. Given the weaknesses that emerge from these looser definitions, this study will primarily use 'affordance' in its Gibsonian sense, as a relational quality between an agent and environment that exists regardless of whether an agent perceives it. Emphasizing concerns of intentionality and situated cognition, Heft's definition of affordances as "the functional significances of environmental

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objects taken relative to what an individual can do with respect to them" is a complimentary definition (1989, 13) (see Heft 1989 for an excellent overview of affordances).

Affordances can be used to analyze videogames at two different scales: there are affordances between the player and the computer hardware, and between the avatar and the virtual environment (Rambusch and Susi 2008, 97). This condition parallels telepresence robotics situations, where there are affordances between the operator and the controls, and between the drone and the real world. In both cases, control interfaces extend the agency of a human interactor into a virtual or physically distant space by linking the human's movements with those of a surrogate body (game avatar or drone) (Calleja 2011, 22). While controlling a surrogate body via interface-mediated interactions is clumsy for beginners, proficiency results in the controller fading out of conscious awareness, and the sense that one's agency is seamlessly extended into the surrogate body (Clark 2003; Rambusch and Susi 2008, 97). This study is primarily concerned with identifying the affordances between avatars and virtual environments, as these directly shape virtual movement and thus virtual spatial communication. While the semiotics of physical affordances for movement should be considered in videogames that use touch or gestural control interfaces, the works selected for this study use conventional game controllers or PCs with mice and keyboards, interfaces which rarely involve meaningful mimetic or symbiotic movement (Calleja 2011, 63) (*Shadow of the Colossus*, analyzed in chapter 4, is an exception to this, and the mimetic dimension of its controls will be discussed).

The affordances of a virtual world are always intentional and encoded: a floor or wall in a videogame world is only solid and walk-on-able for an avatar if a programmer has written it so. This relationship results in a virtual environment and the player's avatar body being designed in tandem (Gee 2008, 258), a condition that contrasts sharply with physical design where the

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human body is a given. Further, in sharp contrast to telepresence situations, virtual environments declare their safe separation from reality and invite more playful forms of engagement (see chapter 1). Becoming proficient at a new videogame often parallels Johnson's description of infants learning the affordances of their world: "we have to *learn* the meaning of physical objects, which we do by watching them, handling them, subjecting them to forces, and seeing how they can be used—in short, by forms of interactive inquiry that are at once bodily and reflective" (Johnson 2007, 46; emphasis in original). This interactive inquiry can result in players discovering affordances that emerge from the complexity of the game system, and that were not intended by its creators, such as the 'snaking' technique in *F-Zero GX* (Amusement Vision 2003) ("Snaking", n.d.). Beyond this playful learning, players can determine the affordances of virtual objects based on their relationship to physical ones (seeing a virtual object may trigger some of the same sensorimotor simulations as seeing its physical counterpart (Rambusch and Susi 2008, 102)), and based on their past experiences with other virtual environments. Here, we can fruitfully consider virtual environments as particular socio-cultural settings that will—like all other situations—shape an agent's perception of affordances (Heft 1989; Rambusch and Susi 2008). This insight takes us into our next concern: how schematized knowledge of previously experienced situations shapes our engagement with current ones.

2.4 SCHEMAS: PRIMES AND FRAMES

2.4.1 SCHEMAS

While an affordance is a relationship between physical entities, a schema is an "organized, structured set of cognitions about some concept or stimulus" (Taylor et. al. 2006, 78). Schemas can be about things such as common events, social norms, particular people (stereotypes), and

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routine motions. Importantly, people rely heavily on them when interpreting an environment: "each time we are confronted with a new situation, instead of trying to understand it afresh, we draw on our stored [schematized] knowledge of similar past situations" (Taylor et. al. 2006, 78). Schemas direct perception towards salient aspects of a situation—such as which behaviours are typically appropriate in it—allowing a person to quickly adjust to their surroundings. For example, anyone lost in a forest is likely to nonconsciously use a 'path' schema to scan the ground for any faint signs of a path. As dynamic cognitive structures, schemas are formed through repeat experiences and can be changed over time (Stockwell 2005, 79). While some radical approaches to embodied cognition try and do away with mental representations such as schemas altogether, there is ample evidence for their existence (Clark 2008, 140-66), and many scholars such as Lakoff (2012) and Barsalou (1999) give them a prominent role. This section looks at two aspects of schema use, primes and frames, and the following sections look at image schemas, 'cognitive primitives' that arise from routine bodily engagement with the world, and conceptual metaphor, which has a prominent role in cognition by allowing details of one frame to be mapped onto another (Lakoff 2012), and thus allowing abstract concepts to be structured by concrete experiences.

2.4.2 PRIMES

Primes are salient stimuli which trigger the use of a schema, influencing a person's subsequent affect and understanding of a situation (Goldhagen 2017, 59). Put differently, "priming research centers on the temporary activation of an individual's mental representations by the environment and the effect of this activation on various psychological phenomena" (Bargh and Chartrand 2014, 314). Seeing footsteps through snow may prime a path schema, seeing a door may prime a sensorimotor simulation of going through it, and hearing a siren may prime schemas for crime

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and emergency. Primes "so pervade our built environmental experience that it is as though they are literally embedded into the structures and objects of the world, serving as cues to activate our nonconscious cognitions" (Goldhagen 2017, 54-5). Designers can take advantage of this, composing built spaces that nudge people towards certain thoughts and actions: a "change in a visual axis, a spatial sequence, in the way that solids are massed and volumes composed could prime very different cognitions" (Goldhagen 2017, 62). Japanese gardens are an exemplar of this, crafting built forms intended to support rich contemplative thought (Walker 2018). Facing few of the physical and financial constraints of architects and installation artists, videogame designers can freely craft environments with evocative primes like infinite canyons, recursive labyrinths, or objects uncannily out of place, such as the lone streetlamps in the videogame *The Beginner's Guide* (Everything Unlimited Ltd. 2015). Beyond these visual elements, sound effects and carefully-timed pieces of music can also serve as powerful primes.

2.4.3 FRAMES

The concept of framing has taken on a range of meanings in different fields such as sociology, psychology, and communication studies (Borah 2011), and thus requires a more careful inclusion in this study. Coming from embodied cognition, we can define frames as cognitive structures (schemas) that we use to understand and think about the world. Elaborating, Lakoff explains that:

> The neural circuitry needed to create frame structures is relatively simple, and so frames tend to structure a huge amount of our thought. Each frame has roles … relations between the roles, and scenarios carried out by those playing the roles. … A hospital, for example, has roles like doctors, nurses, patients, operating rooms, X-ray machines, and so on, with scenarios like checking in, being examined, having an operation, being visited, and so on. (2008, 22)

Frames were first identified by the anthropologist Gregory Bateson, who noted that a frame around a message automatically gives the receiver instructions for understanding it (1972, 188), an insight soon followed by Erving Goffman's pioneering study *Frame Analysis* (1974) which

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explored how frames instruct our behaviour in situations (such as visiting a doctor). Later work

in linguistics has shown that groups of related words such as 'cost,' 'product,' 'price,' and 'buy',

are defined in relation to the same frame, in this case 'commercial event.' Thus, once we

determine which frame best fits the qualitative unity (gestalt) of an entity or situation, that frame

shapes our understanding, behaviour, reasoning, and use of language regarding the entity or

situation (Lakoff 2008, 22). Given that frames provide instructions for situated behaviour, they

have also been termed 'scripts' (Stockwell 2005, 77; Taylor et. al. 2006, 78), and when the

expectations of a script are broken, other people in the situation become unsettled and confused

(e.g. a patient trying to examine their doctor during an appointment) (see Garfinkel 1984).

A few more properties of frames should be discussed before returning to our concern of

spatial communication. First, complex frames can be created by combining simple ones; Lakoff

gives the example of a 'bake sale' which combines frames for charity event and commercial

event (2008, 23). Second, as dynamic cognitive structures, frames can adapt as a person has new

experiences (Stockwell 2005, 79). Barsalou argues that frames are what we use to unify our

multimodal experiences of things into a single conception:

> After processing many cars, a tremendous amount of multimodal information becomes established
> that specifies what it is like to experience cars sensorially, proprioceptively, and introspectively. In
> other words, the frame for *car* contains extensive multimodal information of what it is like to
> experience this type of thing. (1999, 586)

In his view, it is our frames (as unifiers of multimodal memories) that allow our brain to

"implement a simulator that produces limitless simulations of the component" (1999, 577); after

we have visited a few restaurants and built up a 'restaurant' frame, we can imagine countless

others. The imaginative dimension of frames is greatly extended by conceptual metaphor,

discussed later in this chapter. It should be noted that this view also implies that while our frame

for 'restaurant' may be very similar to that of others, it will never be identical. Finally, and

relevant to this study of videogames, Lakoff argues that simple narratives are a special case of frame-based scenarios, with additional elements such as a protagonist, events, and affective states (2008, 23). Thus, discussions of videogame narratives in this study will emphasize their role as frames for situated behaviour.

Returning to considerations of spatial communication, Miller (2010, 50) has discussed how the configuration of an environment often reflects the activities it was designed for, serving to help an individual rapidly choose a frame. Just consider the chairs in a dentist's office, the ritual objects in a temple, or the seating configuration of an auditorium. This is clearly a case of spatial communication, and ambiguously-designed spaces can toy with our desire for closure by forcing us to project possible frames onto the space to determine which one is the best fit. Dutch architects Aldo van Eyck and Herman Hertzberger have argued for valuing this indeterminacy of meaning, since buildings that evoke a range of associations are experientially richer than ones with a single visual punchline or that blandly lack defining features (Hertzberger 1991, 162; Van Eyck 2008, 80). In any case, this concern with the material conditions of a situation highlights how the unifying atmosphere a place (discussed further in the next chapter), directs our choice of frames for understanding it. In videogames, the qualities of light and background music are both used to create a strong mood: a soft green light washing over a space is more likely to prime frames of sickness and eeriness than ones of warmth and comfort.

Videogames present some interesting issues and possibilities regarding framing. First, players often develop a frame for 'videogame', impacting their perception of affordances within one, and potentially emphasizing that their actions within a videogame have no consequences outside of it. This frame surely encourages a more playful, exploratory mode of engagement in players that develop it, however some players may never experience a harsh separation between

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videogame worlds and their lives outside of them. Second, frames are systems of entities with defined relationships, and videogames excel at simulating systems (Bogost 2007). There is great potential for using videogames to model a frame and let players experience it from a variety of perspectives, gaining a critical understanding of how it shapes their thinking (necessarily reshaping their personal version of the frame). A widely lauded case of this is the videogame *Papers, Please* (3909 LLC 2013), which simulates a 'border-crossing' frame that includes guards, passports, travelers, asylum-seekers, and interrogation among other elements. The work critiques this frame by giving players the stressful task of rapidly screening people wanting to enter a country, letting them experience the harsh dynamics of the system firsthand, and mounting a form of interactive argument that Bogost has termed 'procedural rhetoric' (2007). Third, videogames are free to break the frames of regular human experience in ways both profound and absurd, creating defamiliarization and sometimes humour. This is exemplified by videogames such as *Katamari Damacy* (Namco 2004) (analyzed in chapter 4), which parodies consumption, and *Octodad: Dadliest Catch* (Young Horses 2014) which parodies fatherhood by having the player awkwardly complete simple daily tasks as an octopus pretending to be a human father. More profoundly, frame-breaking can be used to construct unnatural narrative experiences as in *The Stanley Parable* (Galactic Cafe 2013) (see Ensslin 2015). Finally, avant-garde works can push players to develop new frames in order to successfully advance through their virtual environments. *The Witness* (Thekla Inc. 2016), discussed in chapter 5, does this by forcing players to internalize a particular type of puzzle imprinted upon its world.

Summing up, frames shape how players understand virtual environments, and players' involvement with videogames has the potential to teach them new frames and to modify their existing ones. Thus, this study will engage with frames in three mutually-reinforcing ways to

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address their role in spatial communication: (1) frames as pervasive qualities that unify a situation (e.g. a coloured light washing over a space); (2) frames as scripts for behaviour in a situation (e.g. the design of a space priming players for certain types of behaviour); and (3) frames as structures that shape discourses (e.g. the critique of the border-crossing frame above).

2.5 IMAGE SCHEMAS

Having reviewed physical affordances and mental schemas, it is time to bridge these realms and propose a means by which physical interactions shape mental understanding. The shape of a body limits its affordances for movement, and environments structure bodily movement even further. These limitations create a very routine character to most human motion: walking, breathing, grasping, and scanning are just a few of the motions that pervade daily life. Johnson argues that these repeated motions manifest in "a broad range of recurring structures and patterns" (2007, 21) termed 'image schemas' which are learned automatically in embodied experience. These include concepts such as VERTICALITY, SOURCE-PATH-GOAL, LINK, CENTER-PERIPHERY, and CONTAINER, and Johnson elaborates that:

> [I]mage schemas are an important part of what makes it possible for our bodily experiences to have meaning for us… For example, humans will share certain general understandings of what it means for something to be located within a container, and they will understand at least part of this without having to reflect upon it or think about it. Seeing a container, manipulating one, or hearing or reading the word *in* will activate a CONTAINER image schema in our understanding of a particular scene. (2007, 139; emphasis in original)

Image schemas have also been termed 'cogs' (short for 'cognitive primitives'), since they appear to be "universal cognitive structures, either there at birth or developed very early" that "structure visual perception, motor action, and mental images, and … are used in the semantics of natural language" (Lakoff 2012, 775). While the precise contours of image schemas as a phenomenon are still debated, their existence has become firmly established (Hampe 2006). Against some

ways of conceiving them, Johnson (2006) has emphasized that image schema are not simply

skeletal concepts and instead hold the affect(s) associated with them in experience: containment

can feel claustrophobic, and one can feel marginalized when living on a periphery.

Beyond the image schemas for spatial relations above (e.g. CENTER-PERIPHERY), there are

also process schemas and force schemas. Embodied life is full of regularly-occurring action

sequences, and process schemas map these basic action and event structures (what linguists term

'aspect') (Lakoff 2012, 776). Force schemas arise from the fact that all organism-environment

interactions occur through forceful activity, and the differing characteristics of these interactions

"work their way up into our system of meaning and into the structure of our expression and

communication" (Johnson 1987, 42). Examples include compulsion (being pushed), blockage,

and attraction, and Johnson further notes that spatial relations schemas often have forces

attached: CONTAINMENT implies "the limitation, channeling, and restriction of forces" (1987, 41,

45-7; see also Lakoff 2012). This dimension is vitally important to a kinetic medium such as

videogames, where players' interactions with the gameworld allow them to experience a range of

forceful interactions (instead of simply bearing witness to these interactions, as they would in a

still image or film). Thus, one way of analyzing a virtual environment would be to map out the

sorts of forceful interactions that are prominent in players' activity within it.

As primitive spatial relationships, image schemas are encoded by videogame designers as a

fundamental part of structuring virtual environments and the action within them. Kromhout and

Forceville (2013), for instance, have explored how the SOURCE-PATH-GOAL image schema

structures physical movement in videogames as well as in stories about journeys. Analysing the

major spatial relationships of a designed environment will reveal the use of certain image

schemas over others, and looking at typical player actions can reveal the most prominent forceful

interactions and the processes they regularly engage in. Here, the space communicates by inviting the player to experience meaningful image schemas. At the macro scale, a videogame's narrative may speak to a particular kind of process (e.g. purifying a world) with particular types of forces (e.g. spreading-evil-force, resisting-good-force). Harmony between the image schemas structuring a narrative and those structuring the in-the-moment actions of the player builds a powerfully engaging experience (as will be argued in chapter 4's analysis of *Shadow of the Colossus*). In the introduction, I argued that at the core of this study is the claim that "certain schematic structures can be encoded into environments, and interacting with these environments instantiates discourses that are tied to these structures." These 'structures' are image schemas, and the following discussion reveals how they take on an important role in abstract thought through a process of conceptual metaphor.

2.6 CONCEPTUAL METAPHOR

Metaphor offers a bridge from embodied action to abstract reasoning. This pervasive cognitive process of "understanding and experiencing one kind of thing in terms of another" (Lakoff and Johnson 2003, 5; emphasis removed) allows humans to structure abstract thought using patterns learned from concrete experience. For example, understanding an idea can be conceived of (and experienced) as grasping an object (Lakoff and Johnson 1999, 45), and theories can be conceived of as buildings, as things that have foundations and are constructed (Lakoff and Johnson 2003, 52). As a cognitive process, metaphor takes place at two scales: First, primary metaphors link subjective judgements to sensorimotor experiences, such as AFFECTION IS WARMTH, IMPORTANT IS BIG, and KNOWING IS SEEING (Johnson 2007, 179; Lakoff and Johnson 1999, 50-1):

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> If you are a normal human being, you inevitably acquire an enormous range of primary metaphors just by going about the world constantly moving and perceiving. Whenever a domain of subjective experience or judgement is [neurally] coactivated regularly with a sensorimotor domain, permanent neural connections are established via synaptic weight changes. Those connections … provide inferential structure and qualitative experience activated in the sensorimotor system to the subjective domains they are associated with. (Lakoff and Johnson 1999, 57)

We learn countless primary metaphors in childhood that "structure our systems of everyday thought", and unlike conceptual metaphors, they "tend to be cross-cultural, wherever appropriate experiences regularly co-occur" (Lakoff 2012, 777). Second, complex conceptual metaphors are created by combining primary metaphors and other frames. These are frame-to-frame mappings, where 'source' frames of concrete experience (e.g. the sensorimotor experience of grasping) are used to make sense of more abstract 'target' ones (e.g. the mental experience of understanding an idea). Importantly, these mappings preserve image schemas between frames: the CONTAINMENT of grasping an object helps structure what it means to understand an idea. This basic structure allows for complex general metaphors such as A PURPOSEFUL LIFE IS A JOURNEY (Lakoff and Johnson 1999, 60-1):

A Purposeful Life Is A Journey

Components:	Resulting Mappings:		
Purposes Are Destinations	Traveller	→	Person Living A Life
Actions Are Motions	Destinations	→	Life Goals
A long trip to a series of	Itinerary	→	A Life Plan
destinations is a journey.	Journey	→	Purposeful Life

This example underscores the powerful role that metaphors play in shaping how we engage with the world: A PURPOSEFUL LIFE IS A JOURNEY is more likely to encourage travelling than an equally tangible metaphor like A PURPOSEFUL LIFE IS BUILDING A HOME, and by emphasizing ideas of travelling, the frame naturally masks those of building. This example also suggests how culture enters the picture: the world can be metaphorically understood in countless ways, and shared cultural beliefs are often shared metaphors. While these metaphors can be nourishing,

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encouraging selfless behaviour and concern for others (e.g. RELATIONSHIPS ARE PLANTS which require care and attention), they are just as capable of doing the opposite, encouraging people to avoid contact with members of another group (e.g. [TYPE OF PERSON] IS IMPURE, a metaphor likely learned from rotten food and the spread of diseases (see Lakoff and Johnson 1999, 307-9)). The example of *Papers, Please* above speaks to this: simulating a border crossing frame allows the work to challenge cruel metaphors that players may hold of immigrants, such as IMMIGRANTS ARE INVADERS, pushing them towards others views such as IMMIGRANTS ARE VICTIMS. There is a large and growing body of work exploring how metaphor pervades human cognition and structures conceptualization, and this study must necessarily engage with only the small portion of this work that is pertinent to questions of spatial communication.

Conceptual metaphor is claimed to occur in thought and not simply in language: if this is true, we should expect to see metaphor in modalities other than language (Forceville and Urios-Aparisi 2009, 4). This has indeed been the case, with a slowly growing number of studies exploring how metaphor appears in architecture (Goldhagen 2017), advertising (Pérez Sobrino 2017), material culture (Tilley 1999), film (Coëgnarts and Kravanja 2015), and graphical computer interfaces (Blackwell 2006). Beyond these areas, the entire history of world religion is overflowing with metaphors that have been wrought into objects (Tilley 1999) and enacted through rituals (see Stephenson 2015). Importantly for this study, buildings can be designed to evoke metaphoric readings by priming certain frames. Giving the example of the Water Cube swimming pool in Beijing (fig. 2.1), Goldhagen notes how the bubble motif in its design primes us to consider "certain aspects of water, such as its buoyancy, ephemerality, and movement. At the same time, the motif glosses over and de-emphasizes water's negative attributes such as wetness, cold, heaviness, and potential danger" (2017, 76). When buildings invite us to

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Figure 2.1: Water Cube swimming pool.

Figure 2.2: MUJI CD player.

understand them by reference to other domains (in this case, the properties of water), it is

appropriate to say they are using spatial metaphor. Looking at spatial metaphor in the objects of

traditional societies, Tilley notes that "[i]n small-scale societies technology is inseparable from

ideas of spiritual or ancestral involvement in the production process. The appearance and

technique of manufacture of cloth, for example, can readily evoke ideas about connectedness or

tying" (1999, 57). One of the examples he provides is the detailed mapping of the human body's

"parts, secretions and actions" onto the houses of the west African Batammaliba people,

concretizing the metaphor BUILDINGS ARE BODIES in houses that are culturally understood to

have a mouth, eyes, a chest, and a backbone (Tilley 1999, 48). Finally, certain contemporary

product designers such as Naoto Fukasawa are particularly adept at designing objects rich in

metaphorical associations. By using a pull-cord in the design, his iconic wall-mounted CD player

asks to be metaphorically understood in reference to ceiling fans (fig. 2.2).

Virtual environments are capable of spatial metaphor in the ways discussed above,

containing evocative landforms and pieces of virtual architecture, and interactive objects rife

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with metaphorical associations. Beyond this, scholars have begun to explore the metaphorical

dimensions of videogames themselves, revealing a number of insights useful to this study (see

Möring 2013 for an extensive study of discourse around metaphor in Game Studies). First, as

discussed in the introduction, Aarseth (2001) has claimed that the spatiality of virtual

environments is itself metaphorical, since virtual space exists in an allegorical relationship to

physical space. Nitsche also raises this, noting how interactive objects in virtual environments

("virtual levers, buttons, ammunition clips, or guns") are metaphorical in a way comparable to

the visual metaphors of 'folders' in computer desktop GUIs: "Just as the desktop metaphor

helped users to gain access to functions, so do these 3D objects provide access and heighten the

level of immediacy *within* the virtual environment" (Nitsche 2008, 34). While this metaphoric

nature of virtual spaces may have a bearing on their ontology, it does not change the fact that

virtual environments are experienced as spatially-real by their visitors (Calleja 2011).

Second, the spatiality of virtual environments is a central concern of this work, and some

scholars have argued that this spatiality allows players to use the frames learned in videogame

experience as the source domains in metaphors about other things in the world. Rusch is an early

proponent of this idea, proposing the term "experiential metaphor" for times where gameplay

experiences "evoke strong associations to experiences from real life" leading players to interpret

the videogame itself "as a physical visualization of abstract ideas such as emotional processes or

mental states" (Rusch 2009, 5). One of Rusch's examples is a grappling-hook level that she felt

captures the precarious feeling of switching jobs, and this emphasizes that the meanings a player

reads into a sequence of gameplay may depart wildly from what the game designers intended.

Making this same point, Möring (2013, 302) argues that Murray's (1997, 144) reading of *Tetris*

(Pajitnov 1984) as a commentary on the barrage of tasks faced by office workers is only one of

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many possible metaphors that can be read from it. Thus, *Tetris* itself should not be viewed as a concretized metaphor for office work, even though playing it does share some experiential similarities with that domain. Alongside many other scholars in Game Studies, Möring has a strong concern with the ontological status of games, and this pushes him to claim that "a game becomes metaphoric when it becomes a source domain in a metaphor and therefore an object of thought" (Möring 2013, 313), a claim that will be minorly disputed below. In a similar vein, Begy (2010) argues that this ability to generate metaphoric readings allows abstract games (ones lacking representational or symbolic graphics) to be experienced as meaningful, and he astutely notes the importance of image schemas in this. After all, abstract games still have image schemas that structure relationships between entities, force schemas that arise from motion, and process schemas that players learn as they learn to interact with the game system: these elements all provide significant fodder for meaning-making. Interestingly, this view of virtual environments as designed scaffolds for spatial experiences highlights how they can be designed to encourage the creation of new primary metaphors in the minds of players by orchestrating the coactivation of sensorimotor activity with a subjective judgement. I have not encountered any discussion of this in the literature, and it remains a tantalizing area to explore.

Finally, and in slight disagreement with Möring, it does appear that videogames can embody particular metaphors, but only in the rare condition when involvement with the gameworld equates to direct involvement with the logic of the metaphor. Stamenković and Jaćević (2015) explore this in the videogame *Braid* (Number None 2008), looking at how the metaphor TIME IS SPACE/MOTION structures both the gameplay and the narrative of the work: playing *Braid* requires learning the logic of this metaphor across a range of situations. Another example is the core role that 'gripping' plays in *Shadow of the Colossus*, an action that resonates

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with a protagonist unable to let go of his deceased companion (Fortugno 2009). In his study of procedural rhetoric, Bogost claims that videogames can present "the metaphors of [their] rhetoric as embodied activities, not as words or images" (2007, 106), however Möring provides detailed criticism of Bogost's example (a crude political game called *Tax Invaders*) arguing that these activities are framed using words and images, not simply embodied gameplay (2013, 226-42). Here the weakness is in Bogost's example, not his claim that games can embody metaphors. *Braid* and *Shadow of the Colossus* can both withstand Möring's critique: unlike *Tetris's* ability to evoke office work, these videogames force players to directly interact with their metaphors.

These four claims: (1) that videogames can use spatial metaphors in their environments, (2) that videogame spaces are themselves allegorical, (3) that gameplay experiences can provide fodder for metaphors about other aspects of life, and (4) that videogames can embody metaphors by having players directly engage with their logic, all provide starting points for analyzing how conceptual metaphors help structure spatial communication in virtual environments.

2.7 ANALYZING SPATIAL COMMUNICATION

The five theories presented above—affordances, priming, framing, image schemas, and conceptual metaphor—speak to the structures central in spatial communication, and they can be used in concert to analyze how players make meaning out of their spatial experiences of virtual environments. The introduction (section 1.2.3) looked at a few different forms of spatial communication, and it is worth reiterating them now that we have looked at theories of embodied cognition. First, environments can communicate by how they shape the body's movements and actions within space. Here, affordances and image schema are powerful tools for exploring bodily movement, revealing an avatar's possible actions in a virtual world and the meaningful

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force schemas that players regularly experience. Second, an environment can communicate through the physical proximities and spatial relationships that it creates between entities. I gave the example of a tall tower in the middle of a low town, and we can now see how this creates a CENTER-PERIPHERY image schema between the tower and town. Finally, space can take on a symbolic quality and prime frames or metaphors: the example of the tower invites metaphoric readings of triumph or oppression depending on one's views of centralized power. The materials used in a space (e.g. wood, brick, plastic) carry metaphorical associations to how they are produced (respectively: natural, handmade, artificial), and to their tactility, and these contribute to the associations that arise from the design of the space as a whole, and to the unique qualitative unity ('atmosphere') that colours the situations taking place within it (see chapter 3).

Following Dewey, Johnson (2015) argues that we first experience spaces as qualitative unities, and only then go on to understand their parts by relating them back to this central gestalt. This underlies the impossibility of using a linear method for analyzing spaces, since the elements under analysis are related in ways that resist sequential study. Noting this limitation, the approach this study is proposing can be undertaken from two major poles: movement and priming. The first approach begins by cataloguing the affordances for movement and interaction between the game avatar and virtual space. The limitations of videogame environments help us considerably here, since the forms of possible interaction can often be comprehensively noted in a way that would be impossible in the real world. Once catalogued, these affordances can be analyzed to see which image schemas they most commonly instantiate, and what meaningful sensorimotor engagements they create. Knowing the major image schema that arise in an experience's movements can help us consider the possible primary and conceptual metaphors embodied by the environment's typical spatial interactions. The second approach instead begins

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by looking at the frames that are primed by a virtual environment. Is there a charged atmosphere enveloping the space? Are certain colours used more prominently than others? Do spatial layouts or structuring elements imply certain image schemas? Do spaces prime understandings of their functions (within the fictional world of the videogame)? Are certain elements evocative enough to invite metaphorical readings? Unlike considerations of movement, this approach is more demanding on the interpreter and pushes them to thoughtfully reflect on which spatial elements are most salient in players' experiences (qualitative players studies could be used to verify hypotheses here). Summing up, these complimentary concerns of movement and priming can help us develop a rich picture of how a space can become meaningful to its players.

2.8 DEMONSTRATING THE APPROACH: PAC-MAN

Given the complexity of the analytical approach that this study is proposing, a demonstration with a small work can help to quickly clarify how it functions in practice. My criteria for selecting a work for this demonstration was that: (1) it would be widely known, (2) it would be structurally simple, and (3) it would lack a definitive meaning, either as intended by the creator or as widely agreed-upon by players. This approach, after all, aims to reveal the multiple ways that players can read meanings out of a particular spatial experience (as opposed to the futile task of looking for a definitive reading of a particular space). In light of this criteria, I have selected *Pac-Man* (Namco 1980) as an iconic work for demonstrating the embodied cognitive approach to analyzing spatial communication that this study is proposing (fig. 2.3). It is one of the few videogames held in the collection of the Museum of Modern Art, and the gallery label (2013) concisely presents the work:

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Pac-Man is one the earliest examples of an interactive flat landscape—a maze, in this case—in a computer game. At the time of its genesis, the most popular arcade games were shooter games, like Space Invaders and Asteroids. Iwatani wanted to develop a nonviolent game for the teenage couples and groups that were beginning to frequent arcades in addition to boys. While eating pizza for lunch one day he had a vision of his character—a giant yellow circle with a wedge removed for a mouth. In creating the colorful ghosts that are Pac-Man's nemeses, Iwatani chose cuteness over scariness, hoping to appeal to female players. The player controls Pac-Man with a joystick, directing him to eat all of the dots in the maze while eluding the ghosts, who can end his life. If he succeeds, he moves up a level. Eating special power pellets gives Pac-Man the ability to attack the ghosts, and by eating transformed ghosts, assorted fruits, and other objects the player can gain bonus points. Eating to gain power, Iwatani has said, was a concept he borrowed from Popeye.

Figure 2.3: *Pac-Man*, designed by Toru Iwatani.

This summary aptly describes *Pac-Man*, but does not tell us much about the frantic, virtually-embodied experience of playing it.

Beginning with affordances for movement, the eponymous Pac-Man can move in four directions, consume dots and fruit by touching them, be killed by ghosts by touching them, and consume ghosts by touching them during the special phase that is triggered by eating large dots. Consumed ghosts will respawn in the center, so there is no true relief from them. Because the world is structured as a MAZE image schema and paths through it are never wider than the player character, the space emphasizes CONTAINMENT and claustrophobia. Based on the above affordances, the player is always being chased by the ghosts or is chasing them (and items), and this instantiates force schemas of REPULSION and ATTRACTION, as well as BLOCKAGE whenever the player is cornered and has no way to escape. Thus, movement in *Pac-Man* is a frantic back-

and-forth between fearful running and empowered chasing. Moving on to priming, the presence of the fruit and the basic activity of 'eating' dots primes frames for consumption. While cute, the enemies are clearly ghosts, priming frames of 'danger' and perhaps 'enemy.' If there is any doubt of this in players' minds, dying when they touch one will quickly clarify this. *Pac-Man* uses metaphor to represent the player's number of remaining lives by showing a small icon of Pac-Man to represent each life. Following Aarseth (2001), we can also say that the virtual environment is intelligible to players since the virtual labyrinth is an allegory of the same structure in the real world, as are the ghosts and the fruit. Finally, the experience of playing *Pac-Man* can also be used as a source domain for metaphors about the world. When we combine the elements described above: a claustrophobic space, frantic running and chasing, and the central action of consumption, it starts to seem like *Pac-Man* is about experiencing drug addiction. The addict (Pac-Man) eats pills as he is chased by his ghosts, and gets high off large pills that leave him feeling (temporarily) empowered enough to eat the ghosts, which only respawn to chase him further. This metaphor is not original—I first encountered it in Japan, depicted on a t-shirt with a sweating, drooling, blood-shot-eyed Pac-Man chasing pills—and it remains entirely debatable whether Iwatani had any of this in mind while developing the game. Other metaphoric readings are also possible from its sparse elements, such as a nightmarish scenario where Pac-Man is a person trapped in an infinite Borgesian labyrinth, or one where Pac-Man is "the ultimate modern shopper, trapped in a cycle of meaningless consumption and endless binging" (Stuart 2015). It must be said that *Pac-Man* is an enjoyable videogame regardless of these metaphoric narrative readings, though its ability to support them surely makes it a more compelling one.

This analysis has sought to reveal the evocative elements that shape the spatial experience of playing *Pac-Man* and invite players to read meaning into it. Affordances, image schemas,

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primes, frames, and metaphor helped reveal how the structure of the space asks to be read as meaningful in particular ways. While this analysis was a linear progression from affordances to image schema, frames, and conceptual metaphors, the analyses in the following chapters will rarely be this formulaic. They will instead seek to weave these considerations into a rich account of the videogame spaces under study, highlighting their memorable and meaningful features.

2.9 SUMMARY

This chapter has introduced embodied cognition as a powerful paradigm for analyzing spatial communication. It began by surveying five sub-areas and presenting their claims: enactive perception, conceptualization, embedded cognition, the extended mind hypothesis, and embodied simulation. These areas provide a solid background, helping contextualize the theories this study is arguing should be used to analyze spatial communication. The following sections explored them, beginning with affordances, then looking at priming, framing, image schemas, and conceptual metaphor. After an explanation of each theory, examples illustrated how it has been used in other spatial analyses and how it will be used here. Used in concert, these theories offer two different 'ways in' to analyzing a space: movement and priming. These are complimentary perspectives and any analysis should have both, even when works emphasize one over another (e.g. priming in chapter 3's works and movement in chapter 4's). Given the seeming complexity of this approach to spatial analysis, I concluded with a brief demonstration by analyzing *Pac-Man*, showing why the spatial experience of playing it can justifiably lead to interpretations of it as a metaphor for drug addiction. The following chapters apply this approach to explore virtual environments designed for exploration and inhabitation (chapter 3), ones designed for situated action (chapter 4), and ones designed to teach players new forms of perception (chapter 5).

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3. Exploration and Inhabitation

Contemporary digital games offer players geographical expanses to inhabit, interact with, and explore. … What is attractive is not only the beauty of the landscape but the element of pleasant surprise at making the discovery. There is an important difference to be appreciated between ergodic, simulated landscapes and non-ergodic representation of landscapes. Although one can imagine roaming around the represented space described in a piece of literature, traversal is limited to mental imagery. To move from one point to another in a game world, players must literally navigate their way, not merely imagine it. (Calleja 2011, 74)

3.1 INTRODUCTION

3.1.1 DWELLING IN A WORLD

One of the great promises of virtual environments is that they are exciting places to explore and

inhabit, taking players somewhere far away from the dullness and drudgery of daily life. Over

their short existence, videogame creators have sought to develop ever-more immersive worlds

through graphics, sound, and the physical interfaces used to engage with them, such as the

current wave of virtual reality headsets. As Grau (2004) has explored, this desire for immersion

has a history in art that long precedes videogames, and many human societies have histories of

creating experientially-rich spaces as places to escape to. There are long traditions of gardens

designed for contemplation in Asia, the Islamic world, and Europe; carnivals, world expositions,

and theme parks resonate with the exuberance of many videogame spaces (Jenkins 2004); and

resort hotels around the world cater to patrons' desires for a relaxing getaway in a comfortable-

yet-unfamiliar place (Hara 2018, 90-130). Some videogames such as *Flower, Sun and Rain*

(Grasshopper Manufacture 2001) and *Wii Sports Resort* (Nintendo 2009) playfully reference this

by using island resorts as their settings. Beginning this study with a look at videogame worlds

designed primarily as rich places to explore (as opposed to ones designed as settings for action),

we can directly engage with issues that underlie spatial communication in all videogames: what

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does it mean to engage with—and perhaps inhabit—a virtual environment? And what can be communicated through the experiences of observing, exploring, and traversing a world?

Before discussing how players inhabit virtual environments, we need to clarify what it means for a person to 'inhabit' any physical environment. Many philosophers across the twentieth century have addressed this enmeshing of person and environment, and a major approach that Ingold (2000, 173) terms the 'Dwelling Perspective' has emerged (this view appears in many studies of videogame spatiality, e.g. Nitsche 2008, Walz 2010). In his watershed essay "Building Dwelling Thinking," Heidegger (2008) argued etymologically and phenomenologically that 'dwelling' in an environment arises out of the act of building within it, both through cultivating the land and creating structures of human habitation (houses, bridges, etc.). Developing this perspective further, the architectural phenomenologist Christian Norberg-Schulz (1980) argues that the act of building things in a natural environment provides humans with an "existential foothold" (1980, 5) in it, supporting our dual psychological needs of orientation and identification: "Man dwells when he can orient himself within and identify himself with an environment, or, in short, when he experiences the environment as meaningful" (1980, 5). Manmade elements can give a natural location a sense of directionality (e.g. a path heading towards the horizon), and the aesthetic character of a building can resonate with its natural surroundings, speaking to humanity's place in the world. Here, the presence of manmade structures transforms a part of nature into a meaningful 'place,' "a totality made up of concrete things having material substance, shape, texture and colour" which together determine an overall 'atmosphere' or 'genius loci' (spirit of place) (1980, 7-8). These dual concerns of orientation and identification resonate with the discussion of the movement and priming approaches to analyzing

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spatial communication in the previous chapter: purposeful movement requires a sense of orientation, and the priming of frames and metaphors is a process that allows for identification.

While the 'dwelling perspective' is typically concerned with how the atmosphere of a place can help its inhabitants feel 'at home in the world', there are many places in both the natural and manmade environment that are experienced as hostile and alienating. Here, if a space primes frames that resist identification, it exists as an engulfing adversary, coldly ignoring or threatening our presence within it. And if a place denies us orientation, it leaves us feeling lost and unable to escape it to search for a more hospitable one (these conditions define *NaissanceE*, analyzed at the end of this chapter). Taken as a whole, the 'dwelling perspective' argues that feeling 'at home in the world' can only arise from the deeply involved process of building things within it. This position closely aligns with Calleja's (2011) argument that feelings of immersion in a virtual environment arise out of multidimensional involvement with it, and we can thus take 'inhabitation' to be the condition of deep involvement and familiarity with an environment.

Norberg-Schulz's (1980) analysis of how places can support orientation (while exploring) and create a meaningful ambiance (to identify with and inhabit) provides important insights into how players can engage with virtual environments. An important third dimension arises when we consider how places shape a body's motions through their affordances, and thus how different bodies can experience the same place differently (e.g. a hiker versus a skier on a snowy mountain slope). This is a key dimension when analyzing virtual environments, since players' avatars can have vastly differing affordances for interaction; for example, the *Metroid* series pioneered a spatial design where players are able to explore deeper into the world as their avatar gains new abilities (Nitsche 2008, 39). Together, these three dimensions of affordances, orientation, and atmosphere address this chapter's concern with virtual environments designed for exploration

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and inhabitation. The following sections expand upon orientation, relating it to image schemas, and atmosphere, relating it to framing, before the chapter moves on to analyze three videogames designed for exploration and inhabitation (chapter 2's discussion of affordances is sufficient).

3.1.2 ORIENTATION

Having a sense of orientation is a central requirement for navigation, the purposeful traversal of space. "[S]patial relations in the space of navigation are relative to a reference frame … based on viewer, object, or environment" (Tversky 2003, 72). As noted in chapter 1, an egocentric frame of reference uses a navigator's body as a centerpoint and understands the environment in relation to it (e.g. 'left', 'right', 'in-front'), while an allocentric frame positions the body within a schematic mental map of the area (e.g. 'wait in the park between the river and the library') (the representational nature of these 'mental maps' is an ongoing debate (Tversky 1993)). This question of orientation often begins with a discussion of Kevin Lynch's pioneering study *The Image of the City* (1960) (e.g. Nitsche 2008, Totten 2014), which explored how people develop mental images of cities in order to navigate them, and how cities could be designed so that their spatial logic was clearly legible ('imageable') to inhabitants. Lynch proposed five schematic elements, developed out of qualitative analyses and interviews with residents of three cities: (1) *Paths*, routes that people often move along; (2) *Edges*, "linear elements not used or considered as paths" such as coastlines or walls; (3) *Districts*, areas which have a "common, identifying character"; (4) *Nodes*, "strategic spots in a city" that may be junctions or important buildings; and (5) *Landmarks*, "another type of point-reference … usually a rather simply defined physical object: building, sign, store, or mountain" (1960, 47-8). Later empirical studies on spatial cognition have broadly validated this scheme, emphasizing the importance of paths, landmarks, links, and nodes (e.g. Tversky 2003). These elements have a clear image-schematic character,

and I would posit that individuals use them to construct topological models of their surroundings, relying on image schemas such as PATH, CONTAINMENT (places), BARRIER / BLOCKAGE-OF-FORCE (edges), CENTRE-PERIPHERY (landmarks), and LINK (paths that connect two landmarks), among others. When a person has a clear reference frame orienting them (e.g. a coastline), exploring an unfamiliar space can be an enjoyable task of discovering new elements and places, weaving them into a broader topological, and sometimes topographic, understanding of the area.

3.1.3 ATMOSPHERE

The notion of atmosphere returns us to an important claim from the previous chapter: that spaces are first experienced as qualitative unities, and we only understand the elements of the space in relation to this gestalt. "Before you perceive *this* or *that* tree, bush, rock, pond, stream, tree trunk, or deer path, you are caught up in the pervading spring-light-bathing-the-valley quality of the *entire situation*" (Johnson 2007, 73; emphasis in original). Tversky notes how we understand spaces as "integrated whole[s]" despite experiencing them as a multitude of perspectival fragments (2003, 72), and Norberg-Schulz emphasizes that a place must be taken as "a qualitative, 'total' phenomenon, which we cannot reduce to any of its properties" (1980, 8). Discussing this regarding architecture, Johnson notes that, "At the level of the overall qualitative unity of the work, it can be said that each building gives us a world that we can inhabit—not just a physical world, but a social and cultural world with its defining values" (2015, 46), hinting at how the elements that contribute to an overall atmosphere will prime frames and metaphors that invariably have sociocultural significance. Just think of the organic wrought iron of Art Nouveau buildings or the arches of a Gothic cathedral. Thus, a place's atmosphere arises as much from primed cultural associations as it does from the direct experience of, say, light washing across it.

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Norberg-Schulz believes that when it comes to dwelling, having a strong atmosphere is more important for a space than aiding orientation, since it is "possible to orientate oneself without true identification" and "it is possible to feel at home without being well acquainted with the spatial structure of the place" (1980, 20). This is surely the case for visitors' experiences of resort hotels, and for new players beginning to explore a rich videogame environment. Finally, this discussion emphasizes the importance of engendering a sense of place when creating virtual environments: without one, the virtual world will lack elements to identify with, remaining experientially-schematic and inviting neither exploration nor inhabitation. To clarify, this is no call for realism or representational graphics: by using a cohesive and evocative visual style, the spaces of abstract videogames can create strong atmospheres akin to those found in abstract paintings. That the limitations of early videogame graphics have in hindsight become a strength, creating a strong cultural nostalgia for blocky pixels and limited colour palettes, speaks to the kinds of evocative, minimal atmospheres present in works such as *Pac-Man*.

3.1.4 BODIES, GARDENS, PROCESSIONS

Videogames designed primarily for exploration highlight three forms of spatial experience: the processes of (1) learning affordances, (2) exploring a space, and (3) traversing paths. These processes underlie all of the virtual environments discussed in this thesis, but it is only the works in this chapter that primarily rely on them to communicate. Virtual environments and avatars can be designed to support these spatial experiences, and this chapter will analyze three videogames that correspond to them. First are spaces that allow a visitor to change bodily affordances within the same environment, experiencing it from different perspectives. Unlike the other two, this case is concerned with a body's configuration, not an environment's. A physical parallel would be the way in which people experience the same city streets with the differing affordances of

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their own body, a bicycle, or a car. The first analysis explores the platformer *Knytt Stories*, looking at how it uses sparse graphics and changing bodily affordances in a labyrinthine world to create a strong sense of place. Second are garden-like spaces filled with evocative forms and imagery that invite visitors to read meaning out of them as they wander sprawling interconnected paths; Japanese gardens can be taken as a clear physical precedent. *The Night Journey*, an evocative virtual environment that invites players to aimlessly wander it and reflect on life's journey of enlightenment, will be analyzed to explore this type of space. Third are processional spaces that take players along a single path with a well-defined rhythm of spatial experience, charging their journey with meaning. Religious structures designed around particular rituals, such as the Christian Stations of the Cross, are clear physical precedents (Ryan et. al. 2016, 166). *NaissanceE*, a videogame that challenges players to traverse a hostile, alienating, and richly evocative megastructure, will be analyzed to explore this type of space. While many physical and virtual spaces combine the above types of space, this chapter's works each exemplify a single one, letting the analyses concentrate on how virtual environments can be meaningful *as places* in their own right, as opposed to their more typical role as settings for meaningful action.

3.2 KNYTT STORIES: A DEVELOPING WALK

3.2.1 OVERVIEW

Despite the wide advance towards 3D videogame worlds, 2D platformers like *Super Mario Bros.* (Nintendo 1985), where players run and jump through an obstacle course, have maintained an enduring appeal. A popular subgenre of platformer termed 'metroidvania' toys with the avatar's affordances: players gain abilities by finding powerups as they explore, which let them reach previously inaccessible parts of the world. Building a cognitive map of the world as one explores

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Figure 3.1: *Knytt Stories.*

it, and perhaps drawing a physical one (while making special note of the places that are presently

inaccessible), is a defining part of the experience. Here, the 'game' is an enjoyable task of

learning a world (Nitsche 2008, 42-3). To aid players' spatial comprehension, metroidvania

videogames often have a few different regions with distinct atmospheres, and this has resulted in

them becoming a genre with a strong emphasis on exploring memorable places.

This brings us to *Knytt Stories* (fig. 3.1), an independent Swedish videogame that strips this

genre down to its core elements: exploration, changing affordances, and atmospheric places.

Knytt Stories casts players as Juni, a folkloric woman about whom many stories are told, "a small

number of [which] are known to be true" (Nifflas 2007). The videogame comes with a world

editor, and it contains a few different 'stories' created by its developer Nicklas Nygren (who

goes by 'Nifflas') and it allows players to download user-created stories separately. Each of

these stories is a standalone world, and they are accessed from a menu. The virtual environments

of stories are composed of individual one-screen rooms, and moving through the four sides of a

room takes players into the adjacent one (the screen never scrolls). This analysis will be limited

to observations from two of Nygren's stories, *The Machine* and *A Strange Dream*, as they are

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Nygren's most prominent ones and are representative of two distinct world-design strategies. While the level editor allows for a wide range of visual styles in user-created stories, Nygren's have a beautiful, sparse aesthetic of patterned tiles, atmospheric perspective (things in the distance fade into the horizon), and often subtle and not-so-subtle gradients for the sky. The world is alive with little creatures, animated natural elements like falling leaves and snow, rich sound effects, and short ambient music tracks that fade out (instead of repeating). Together, these elements give the regions of Nygren's worlds a strong sense of place and make them a delight to explore. Spatial communication in *Knytt Stories* takes place through the changing feeling of being-in-the-world as Juni gains new affordances, gliding past obstacles that were formerly a challenge; through the carefully crafted atmospheric gestalts that make up each region of the world; and through the image schematic macro-structure of each world's space, be it linear, branching, or labyrinthine. This analysis will move from the affordances of traversing the virtual environment up to the image schemas and frames that define particular stories.

3.2.2 EXPLORING: AFFORDANCES AND HAZARDS

Different stories start players off with different affordances, so it is easiest to describe them from the ground up. At her weakest, Juni can only walk and jump the height of a single square (rooms are composed on a clearly visible square grid). The slow speed of the walk encourages players to take in the scenery, however most stories quickly provide them with the ability to run (they can now hold a key on the keyboard to walk). Juni's affordances can be broken down into five for movement, two for perception, and a social one for interactions with hostile creatures. Beyond running, other affordances for movement are the ability to climb walls, the ability to jump higher, the ability to jump a second time while in the air, and the ability to glide in the air by opening an umbrella. The umbrella can also be used to ride updrafts of wind, and some areas

Figure 3.2: Speech bubbles that appear when the player stands in particular spots.

challenge players to open and close the umbrella to avoid floating up into a ceiling of spikes by falling a little before rising again. The two affordances for perception change what the player can see in the world: one powerup is an enemy-sensor that makes Juni glow red when she is near a hazard, and the other gives her the ability to see ghosts, enemy ghosts, and ghostly platforms for walking on. Finally, a social affordance for deception lets Juni place a hologram of herself where she is standing, making enemies believe that she is there and letting her walk past them without being killed. Interestingly this is the only social affordance: while the world is filled with creatures, and occasionally other knytts (Juni's fictional species), they often ignore the player and lack social affordances. Intersubjectivity is actually stronger with some creatures, whose movement patterns sometimes take cues from Juni's (e.g. they jump when she does). Sometimes walking near a knytt (or a signpost) can trigger a single text bubble, but it is not possible for level designers to show conversations or large texts (fig. 3.2). While *Knytt Stories* does not have items or temporary powerups, some worlds do have four colours of keys which can remove barriers of the same colour. These many affordances can be combined into many different modes of

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Figure 3.3: Encountering a spikey creature.

traversing the world: e.g. having a high jump but no ability to run can let players get to higher

areas while preventing them from crossing large gaps.

Notable in the context of contemporary videogames (though unexceptional in this study),

Knytt Stories is a nonviolent experience and Juni is not given ways of attacking creatures in the

world. This does not leave her without threats, however: a range of environmental elements and

hostile creatures do impede her exploration, such as water, fire, lasers, projectiles shot by certain

enemies, and all manner of spikes. Hostile creatures all have spikes, making the affordance of

safe-to-touch very clear to players early in their experience and helping them determine if a

newly-encountered entity is safe or dangerous (fig. 3.3). Touching any hazard instantly kills Juni,

turning her into a few little clouds of smoke, and shortly thereafter resetting the game to the most

recent save spot. The world is full of these glowing white spots on the ground, and the player can

save their progress by pressing the 'down' key while standing on one; stories designed to be

challenging can offer fewer places to save, while easy ones meant for enjoying the atmosphere

can offer them liberally. Returning to the note in chapter 1 that many works in this study lack

'game-like' elements (e.g. challenge, winning/losing) reveals the interesting line that *Knytt*

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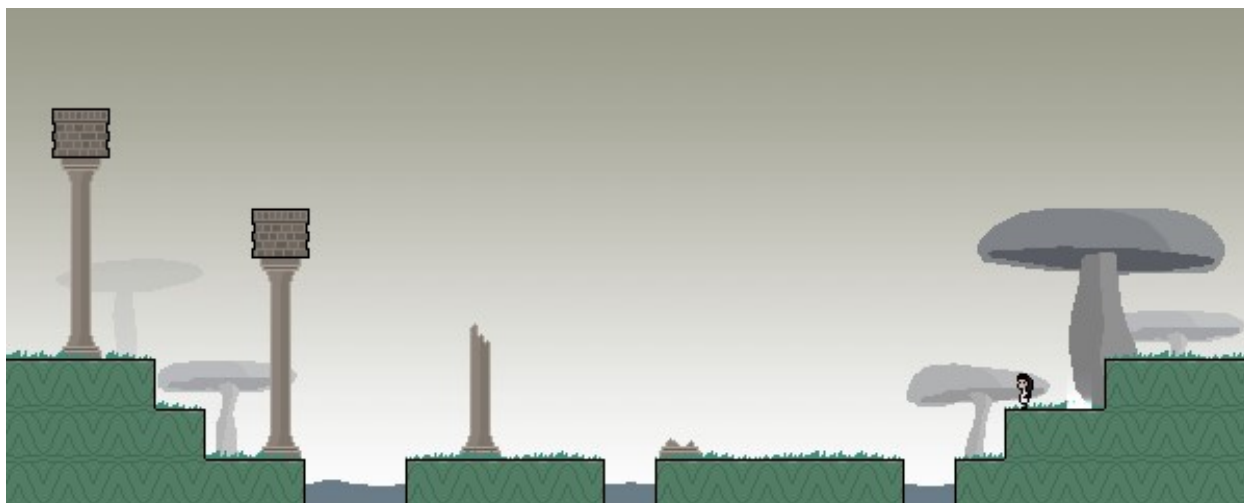
Figure 3.4: With higher jump abilities, Juni will be able to reach the top of the column.

Stories treads between 'game' and 'explorative experience'. While some stories are hard to traverse, and completing them brings the satisfaction of overcoming obstacles, others feel more like a going on a peaceful walk. Some user-created levels even lack explicit endings, leaving players to just quit the game when they are tired of wandering. In sum, then, the central act of traversing the landscape *is* the gameplay of *Knytt Stories*, and when obstacles and hazards are used sparingly a story emphasizes its world as a place to be, not an obstacle to overcome.

Looking at the affordances for movement and those for encountering hazards, some key qualities of playing *Knytt Stories* emerge. First, Juni's strengths are all related to traversing the environment: players can experience the empowerment of going from slowly, cautiously moving through spaces to rapidly gliding through them, yet hazards will always remain a threat. Here, mastery is about traversing the world, not becoming a powerful force that destroys things in it. Second, most obstacles in the environment experienced as BLOCKAGES are understood to be provisional: experienced players know what skills they may have later, and can anticipate how they could return to the same place and overcome the obstacle with new abilities (fig. 3.4). This has an interesting resonance with Heft's discussion of how individuals' loss of function "through

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aging, disease, or accident" changes their affordances: "stairs may no longer afford locomotion, but instead signify an obstacle. As the intentional capacities of an individual change, the affordances of the environment change concurrently" (1989, 19). The *Knytt Stories* level editor does permit creating stories which slowly reduce Juni's abilities, however these are uncommon. Finally, changes in affordances encourage a multi-dimensional experience of the same place. Returning to the same location with different affordances will result in very different types of movement within it, and the frame that a player develops for a certain place will invariably include all of these different experiences of it. While videogames such as *Super Mario Odyssey* (Nintendo 2018) use changing bodily affordances to layer multiple puzzles within the same space, *Knytt Stories* uses them to build a richer sense of place. Here as elsewhere, the feeling of being-at-home-in-the-world arises from a comfortable fit between agent and environment.

3.2.3 CREATING ATMOSPHERES

As a qualitative unity, the atmosphere of a place cannot be broken into the parts that comprise it, even though it arises out of them. This brings us back to the discussion of multimodality in chapter 1, since the various qualities that contribute to a cohesive atmosphere can occur in different modes. Elements in different modes can reinforce each other (consonance) or be juxtaposed with each other (dissonance) (Hawreliak 2018), yet there is also a third condition where they lack a decisive relation to each other. While a strong atmosphere can arise in situations of consonance or dissonance, the third condition (arbitrariness) resists any sense of place emerging, since the situation lacks the sense of wholeness and pervasive unity that comes from consonance (or well-executed dissonance). Nygren expertly navigates this territory in *Knytt Stories*, creating strong atmospheres through minimal sound and graphics.
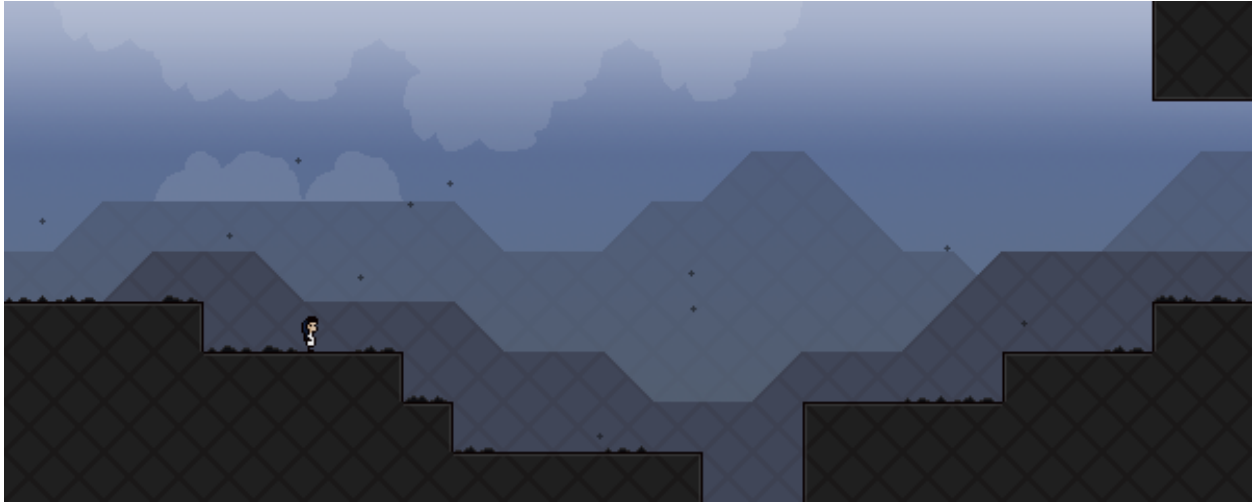
Figure 3.5: A screen in *Knytt Stories* selected for its composition.

First, as noted above, the graphics are stripped-down to simple textures in the foreground, faded out elements in the background, and single colours or gradients for the skies. Areas often have a minimum of hues, and colour serves as a strongly unifying force, much as it does through 'washes' in paintings when one colour is faintly painted over top of the entire composition to unify it (the blue light before sunrise that washes over the world does this, too). Second, *Knytt Stories* benefits from its lack of scrolling, since each screen can have a strong visual composition (e.g. fig 3.5). Taking this up one scale, each atmospheric area is made from a collection of screens, and compositional motifs can be used across the screens of an area. Third, regions can have distinct rhythms of movement through their placement of platforms and hazards (e.g. the lasers often used in mechanical areas). Fourth, animated elements such as water, falling leaves, and little creatures running about give a sense of life to the world, and a meaningful sense of lifelessness to the areas without them. Fifth, stories are full of subtle sound effects, and one of the most distinctive elements of playing *Knytt Stories* is the pitter-patter of Juni's footsteps and the shuffling noise of her climbing. This contrasts sharply with most platformers, where the player character only makes noises when jumping, attacking, or being injured. Finally, music is

used sparingly to set a mood instead of to maintain one: a short song plays when entering a new region, but it does not repeat, instead fading out and leaving players immersed in the sounds of the area and the pitter-patter of their footsteps. This makes *Knytt Stories* a quieter experience than many videogames, literally and figuratively.

Returning to the core of this study, spatial communication, it becomes pertinent to ask what, exactly, does an atmosphere communicate? At the very least, it will serve as a distinct frame for the activities taking place within it, 'colouring' them with its pervasive quality. This has affective implications, since every atmosphere will encourage a particular affective response based on its configuration of elements and the associations of the experiencer. Van Eyck (2008, 61) speaks of the dynamic foreground/background relationship between *place* and *occasion* in every situation, and the atmosphere of a place frames the activities within in while also itself being changed by those activities (consider a concert held in a cave instead of an auditorium). Norberg-Schulz's (1980) discussion of this in terms of 'character' highlights the way that the configuration of a built environment invariably speaks to humanity's place in nature, and here we can say that the atmospheres of built environments will likely communicate at-home-ness, indifference, or alienation at being-in-the-world. This is clear in *Knytt Stories:* the old trope of technology destroying the beauty of nature is central in *The Machine*, and *A Strange Dream* contrasts the mechanical atmospheres of underground labs with beautiful ones on the surface and dream-like ones floating in the sky. Yet all in all, it seems better to say that 'communication' is not really the right question, since atmosphere is a phenomenon that is appreciated as pleasurable in its own right, like a particular flavour of food or a musical style. It may have communicative potential, but that is often secondary to the enjoyment of the thing itself. This seems the truest in works such as *Knytt Stories* that invite the player to explore many contrasting places, and it is

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perhaps less true in works such as *The Night Journey* where a single atmosphere enshrouds the work, or *NaissanceE*, where differing atmospheres are used to reinforce the themes of each area.

3.2.4 STRUCTURING A WORLD

Having looked at the affordances for direct interaction with the world and the strong atmospheres of various regions, we can move on to the macro scale of entire stories themselves. Worlds in *Knytt Stories* are composed of regions and framed by minimal narratives that are displayed before the gameplay begins. Norberg-Schulz's (1980) discussion of 'place' revealed how places are fundamentally CENTRES within the PERIPHERY of the landscape they exist within, and places such as towns can concretize this by building a wall that creates a sharp CONTAINMENT boundary between place and outside-place. This relationship becomes slightly confused in the context of virtual environments: here there is no background landscape on which to build foreground places, simply the void of unsimulated space, which, lacking its own materiality, cannot serve as a background. One solution here is to simulate a virtual landscape, then create places within it much as one would within nature: *The Legend of Zelda: Breath of the Wild* (Nintendo 2017) is a clear precedent. Another common approach is to create distinct places that butt into each other, with players regularly crossing thresholds from unique-district to unique-district. This is typically the case in *Knytt Stories*, and world designers are often careful to depict this line of transition within rooms (fig. 3.6); if they do not, players will find themselves in a new area simply by walking out of a room, and they are likely to be surprised at the new atmosphere enveloping them. These place-edge screens also become an important wayfinding device for players, helping them develop topologic cognitive maps that highlight the LINKS between districts and their placement relative to each other ('above' areas, 'below' areas, etc.), which can be meaningful in its own right. The worlds of *Knytt Stories* also feature memorable landmarks

Figure 3.6. A screen showing the transition between areas.

that aid in wayfinding, such as waterfalls, mountains (that span a few screens), and houses (both

The Machine and *A Strange Dream* start the player in front of a house).

As a 2D platformer, the worlds of *Knytt Stories* are presented with a horizontal axis and a

vertical one. While the horizontal space of left/right or east/west are perceived relatively

equivalently (a culture's reading order does appear to impact this), this is not the case for the

asymmetry of human vertical experience (Tversky 2011, 28). Gravity is as much an ever-present

force in *Knytt Stories* as it is in the real world, and the VERTICALITY image schema encourages

players to read meaning into the vertical arrangement of spaces: underground ones may feel

claustrophobic and threatening, while areas up in the clouds may feel airy and peaceful. Were a

player to journey deep underground then come across an open sky below them, they would

surely feel disoriented. Further, most of the challenging elements of traversing space are situated

in the vertical axis, such as not falling into pits and climbing up to higher areas. These concerns

highlight the importance of VERTICALITY in the worlds of all 2D platformers, and the major

semiotic constraints (and opportunities) that this structure places on coherent world design.

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Among Knytts and other creatures, many stories about Juni are being told. Although the stories often make very little sense – many of them often contradicting each other – a small number of them are known to be partially true.

This is one of those stories.

←   →
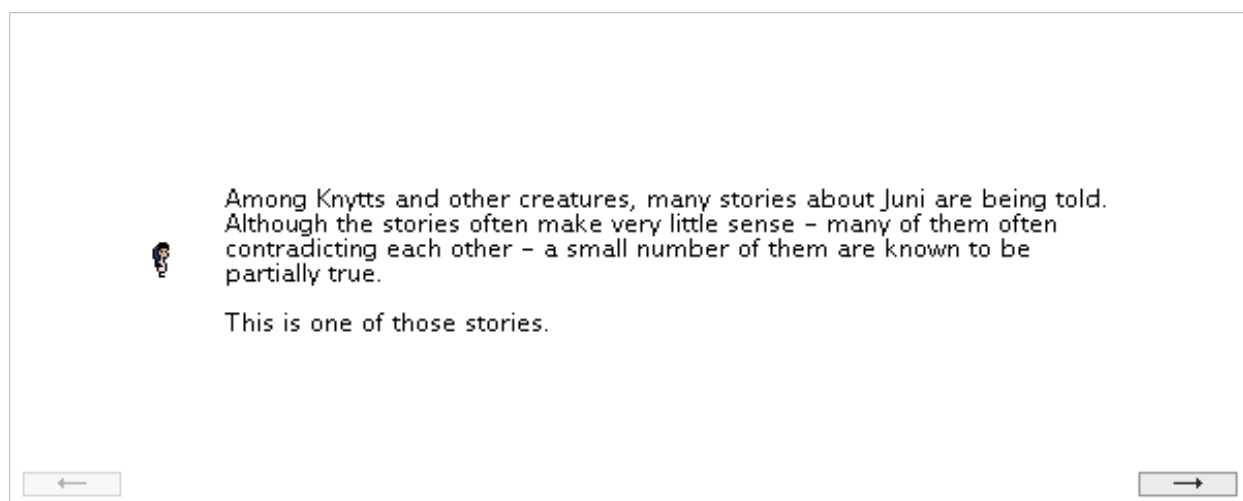
Figure 3.7: A narrative image at the start of the story 'The Machine'.

Moving up to the scale of overarching narratives, most *Knytt Stories* worlds have light narratives that provide an overall purpose for Juni's exploration (though some user-created levels do simply throw players into their worlds). The metaphor Purposes Are Destinations is often central, as it links narrative purposes to spatial locations that players can seek out. *The Machine* directs players to search for an underground machine polluting the landscape, while *A Strange Dream* begins with Juni's baby being abducted by a bird and leaves players to go rescue it. Narratives in *Knytt Stories* are communicated through a set of static images (fig. 3.7) (essentially a slideshow) before the gameplay begins, at key points in a story, and at the end; narratives here serve as schematic framing devices for their rich worlds, often lacking plot and characterization. This primary emphasis on setting is appropriate for a videogame where the main activity is exploration, and the rhythm of movement through the world can take on narrative meaning as players augment the minimal narratives they are given with their own play experience (see Calleja 2011). This speaks to both the order in which players pass through different regions (and their atmospheres), and the freedom or constraint they experience in their navigation. *The Machine* can be described as labyrinthine: powerups must be discovered in a particular order,

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and players must backtrack through areas to find newly accessible ones. The order of completing *The Machine* is linear due to the order of pickups, but players' routes are winding with many dead-ends. In contrast, *A Strange Dream* is a far more open experience, and players can complete it without seeing large parts of the world. Here the same powerups exist at multiple locations in the world, making it easier to find one and keep exploring new areas instead of backtracking. A third story structure would be pure linearity, where players simply move along a path of screens, and Nygren's story *An Underwater Adventure* is closer to this model. In all of these cases, the structure of the virtual environment and Juni's changing affordances across her journey will create a particular rhythm and sense of a world unfolding for players, which may reinforce or contrast the minimal narrative structuring a story.

3.2.5 SUMMARY

Knytt Stories was chosen as the first analysis for this study because it exemplifies some core aspects of spatial communication in its pared-down worlds, ones that are present in all of the analyses that will follow. First, affordances are the central dimension of the player's (avatar-mediated) embodied interactions with a virtual environment: the avatar is their surrogate, and its action-possibilities become their own. Changes to its abilities—either empowering it to explore deeper into the world, or taking away abilities, creating a feeling of weakness—are acutely experienced by the player. Traversing space is the central action of *Knytt Stories,* and when this task is challenging the world is framed as somewhat adversarial. Without obstacles, a space can simply become an interesting place to be. Second, for a virtual space to be engaging and enticing *as a place,* it must create a strong atmosphere through colour, sound, and spatial composition, something that *Knytt Stories* regularly excels at. While places are enjoyed in their own right, their atmospheres serve to powerfully frame the activities taking place within them, colouring the

affect of a situation. Third, the metaphor PURPOSES ARE DESTINATIONS lets narrative purposes be

mapped onto particular locations in the world, giving a goal to players' explorations. Finally, the

structure of the world can itself be meaningful through its topologic spatial organization: distinct

places manifest a CENTRE-PERIPHERY image schema, BLOCKAGE becomes a dynamic force in a

world of changing affordances, and VERTICALITY adds important asymmetrical meaning to the

ups-and-downs of a world. These structures shape players' paths through the virtual worlds of

Knytt Stories, allowing for branching, linear, and labyrinthine explorations. The range of forms

in different stories—and the added complexity of Juni's changing affordances—make these

paths harder to discuss here. For that, we will turn to two videogames that exemplify two poles

on a spatial-layout continuum: *The Night Journey*, where the virtual space is open and garden-

like, and *NaissanceE*, where it is structured as a linear procession through the world. While

players can be said to 'journey' through either type of space, the procession permits a far higher

degree of authorial control in orchestrating the experience.

3.3 THE NIGHT JOURNEY: AN EVOCATIVE LANDSCAPE

3.3.1 OVERVIEW

The Night Journey invites players to slowly wander a natural landscape at night, pausing to

'reflect' and view video clips super-imposed upon evocative places in the environment (fig. 3.8).

It was developed as a collaboration between the University of Southern California Game

Innovation Lab and video artist Bill Viola, and the videogame seeks to evoke "a sense of the

archetypal journey of enlightenment" by combining an openly explorable virtual environment

with pieces of Viola's video art (Viola and USC Game Innovation Lab, n.d.). The work provides

players with no goals, instead leaving them to explore the environment and piece together their

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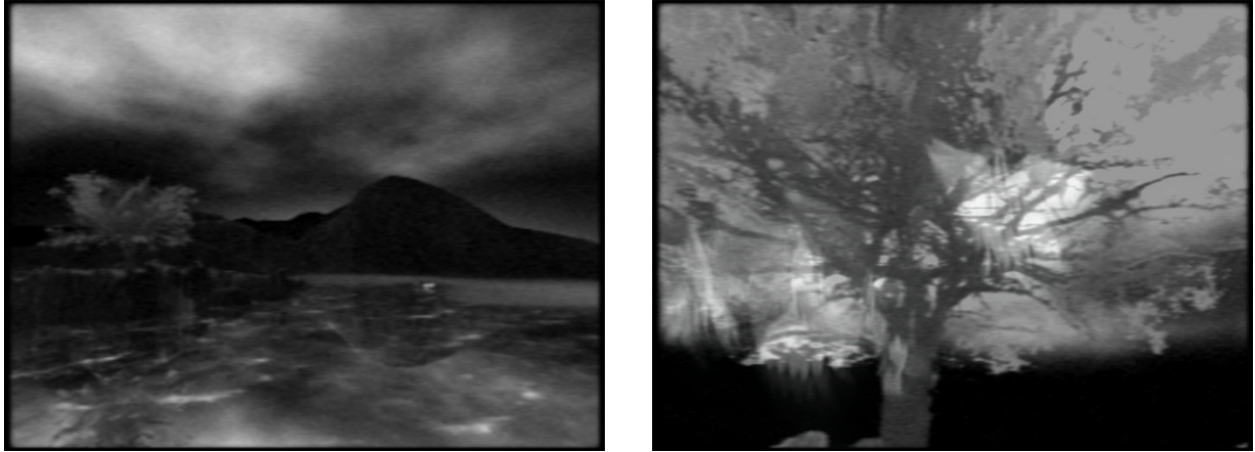
Figure 3.8: *The Night Journey.*

own meanings from the landscape, video clips, and occasional whispery voiceovers that they encounter. Its virtual environment perfectly exemplifies the 'garden' end of a spatial continuum, where: (1) it exists first and foremost as a place to wander and inhabit; (2) its landforms and elements are imagistic and evocative; (3) there may be narratives to uncover, or elements which encourage players to formulate narratives; (4) there is not a strong beginning and end to the wandering, simply the decision to enter or leave the world; and (5) players may experience a paradoxical sense of involvement-with and distance-from the landscape, since their interactions with the world are entirely limited to wandering it and looking around ('look, don't touch'). This particular gestalt of features allows for a distinctive sort of spatial communication, one that has been most thoroughly developed in the world's various garden traditions (Clifford 1966; Walker 2018). Here, the elements of a garden—its landscape, flora, and objects—are shaped into evocative primes which visitors encounter as they wander the space, contemplating the meaning of the frames that are evoked. Each new walk through a garden invites visitors to take a different route, giving a new sequence to previously-experienced primes and inviting new thoughts and a new experience of the same landscape. Nitsche notes a general parallel with videogame worlds: "[t]wo elements of gardens are the completeness of their microcosms within given boundaries—

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which parallels the restrictions of a gameworld; and the gradual revelation of their specific

quality through exploration—which resembles the exploration of a game level" (2008, 172).

In heavy contrast with most videogames, *The Night Journey* was created in collaboration

with an established artist, and was exhibited in galleries for a decade before being made available

on PC and PS4 in 2018. Sharp notes that "the things that artists, curators, critics, and the art-

going public value about games are not the same as those valued by game developers, the game

press, and game players. Yet *The Night Journey* equally embodies values important to both

communities" (2015, 4), making it a uniquely hybrid work. Key elements of Viola's artistic

practice such as "themes of spirituality and contemplation, the manipulation of the video image,

slow, meditative pacing" are paired with elements from videogames to create a work that

"metaphorically models a spiritual journey" (Sharp 2015, 5) and invites players to reflect on it:

> Visual inspiration is derived from the prior works of Bill Viola, which provide reference for the
> game world, while source material for the in-game "reflections" is drawn from the vast archive of
> his video footage. Textual inspiration comes from the lives and writings of great historical figures
> including: Rumi, the 13th century Islamic poet and mystic; Ryōkan, the 18th century Zen Buddhist
> poet; St. John of the Cross, the 16th century Spanish mystic and poet; and Plotinus, the 3rd century
> philosopher. (Viola and USC Game Innovation Lab, n.d.)

Quotes from St. John of the Cross are shown on the main menu of the work and help to frame it,

and players can view quotes from the other figures by selecting a page called 'Sources' in the

main menu (fig. 3.9). The project team wanted *The Night Journey* to "expand the boundaries of

what game experiences may communicate through their game mechanics and world design"

(Viola and USC Game Innovation Lab, n.d.), making it an ideal work to analyze in this study.

Yet given the team's intent, and the polysemous nature of any good artwork, it is vital to

experience the work on its own terms before becoming too influenced by the intentions of the

creators. As such, I played *The Night Journey* before reading lead designer Tracy Fullerton's

(2009) reflections on the project, and have left most discussion of it until the end of this analysis.

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Figure 3.9: The main menu and Sources area.

The world of *The Night Journey* is extremely distinctive, even among the growing crop of

first-person 'walking simulator' videogames that have similar designs. It has an atmosphere like

the murky black-and-white footage recorded by CCTV cameras at night, and it achieves the

feeling of "explorable video" that its post-processing techniques were created to evoke (Viola

and USC Game Innovation Lab, n.d.). This hazy black-and-white aesthetic allows Viola's video

clips to be seamlessly superimposed on the virtual environment without breaking its overall

atmosphere, an ethereal one that feels very appropriate for a meandering spiritual sojourn in a

moonlit landscape of archetypal mountains, forest, sea, and desert (fig. 3.10). Schrank argues

that *The Night Journey* emphasizes 'video' over 'game' in contrast to most videogames, showing

a different yet still appropriate way forward for the medium (2014, 10-2). True to its atmosphere,

the experience of engaging with *The Night Journey* is far better described as 'wandering' than

'playing', since the world offers no goals or obstacles and simply leaves visitors to explore it,

making meaning out of what they encounter. This analysis will begin by looking at players'

affordances for movement and the typical structure of a play session, and will proceed to unpack

the structure of the world and the primes within it, as well as a deeper layer to the work that I—

and I suspect many other players—missed on a first encounter with it. The analysis will conclude

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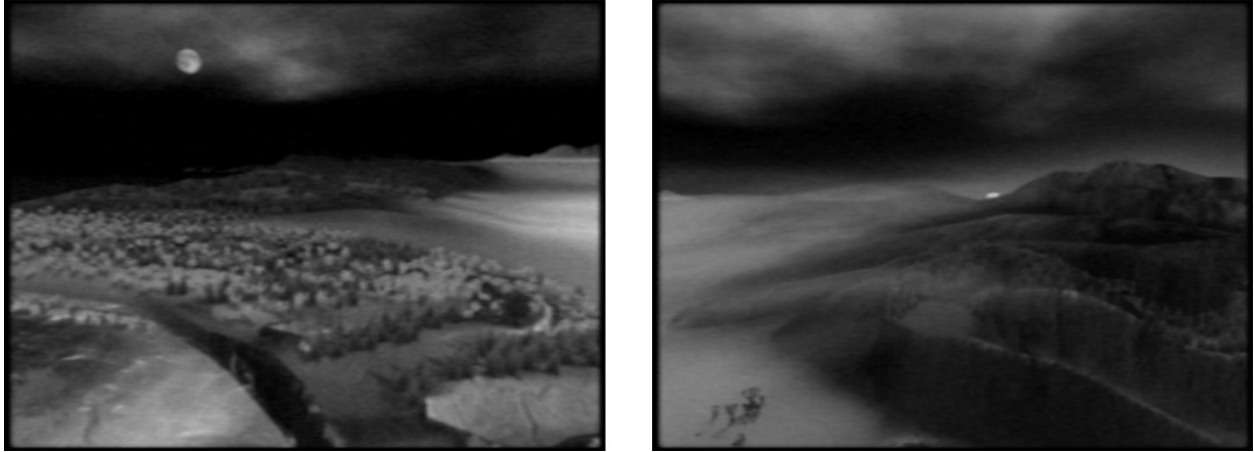
Figure 3.10: Views while falling into the landscape at the start of *The Night Journey*.

with a discussion of Fullerton's (2009) post-mortem of the project, relating the project's stated

goals to the preceding embodied spatial analysis.

3.3.2 EMBARKING ON A NIGHT JOURNEY

Players enter the world from above, starting their journey high in the sky above its center point,

slowly falling and able to look around at their surroundings (but unable to change the trajectory

of their descent). This vignette is quite ethereal, and it lets players get a sense of the landscape

and where they may want to explore (fig. 3.10). By engaging the VERTICALITY schema like this,

The Night Journey encourages the view that the player arrives from a different 'plane' of

existence instead of simply entering this mysterious landscape from some other part of the world

(via the very old metaphor VERTICAL SPATIAL STRATA ARE PLANES OF EXISTENCE, present in

any belief system with different existential realms above and below the plane of life on earth).

Near the end of their fall players move through the branches of a huge tree, and it serves as a

central landmark to journey outwards from, while also evoking ideas of a mythical 'tree of life'.

Upon touching the ground, a prompt is shown on the screen telling players how to move:

they can walk using the WASD keys and look around using the mouse (the game can also be

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played using a dual-analog controller, walking with one stick and looking with the other). Vision here is slow and fuzzy: moving one's gaze too quickly results in a slight blur, and the speed with which you can look around is painfully slow compared to most first-person videogames. Walking is also quite slow, and together these limited affordances for movement invite players to adopt a reflective, meandering stance in their engagement with the virtual environment, one that has been termed 'slow gaming' for giving players more "breathing space … forc[ing] their attention to elements of the gameworld they would normally ignore and therefore fail to appreciate" (Ensslin 2014, 142). While this may frustrate some, "[b]y jamming at the joystick you only become more aware of the rupture between your own physical exertions and the constraints of your virtual body … you are obliged to move slowly, or not at all" (Chan 2018, 72). Players are then shown another prompt that instructs them to press SPACE to 'reflect', and upon doing this their gaze automatically turns towards the tree and their vision becomes multilayered, with a videoclip superimposed upon their view as ambient music begins to play (fig. 3.8, right image). This affordance for reflecting is a defining aspect of the experience, and one that gives *The Night Journey* a very strong resonance with my own experiences wandering gardens. If players continue to hold space, the video clip will eventually fade out, and pressing SPACE again will now result in a quiet drum sound communicating that there is no longer a clip to view in this area. As they explore and press SPACE, players will discover new clips and have their view automatically directed towards landscape elements in an area. After being told how to reflect, players are prompted with a final movement affordance: press SHIFT to move faster. At first this appears to be a normal 'run' button, slightly increasing players' speed, yet after moving this way for a few metres, players begin to slowly rise up and levitate over the environment as they move; releasing the 'walk forward' key results in them slowly falling back to the ground,

but holding it lets them continue to hover as they move. This ability heightens and communicates the dreamlike, ephemeral quality of this world: the landscape presents no obstacles to traversing it, and players can literally glide over it as they seek out places to reflect. I was confused on a few occasions when pressing this button did nothing, and Fullerton's (2009) post-mortem reveals that the ability to move in this way is linked to how much time the player has spent reflecting.

Each play session begins with the player falling into the world from above. The PC version allows players to save their game when they quit, and if they load a game instead of beginning a new one, they will fall into the world at the position they saved, and from a lower height than if they were beginning from scratch. Players are then left to explore the world and reflect on elements within it, and after a period of time darkness begins to slowly advance across the landscape toward the player, eventually engulfing them. I had not made the connection, but Fullerton (2009) reveals that spending more time reflecting can forestall the darkness and allow players to explore for longer (while also increasing their movement speed and reducing the strength of gravity). In hindsight I did experience these changes, but was too caught up in my wandering to take proper stock of them; for those that notice, this loosening of gravity may prime the metaphor ENLIGHTENMENT IS A REDUCED ATTACHMENT TO THE WORLD as intended by the developers (Fullerton 2009). When darkness falls, a sequence of video clips is shown accompanied with relaxing ambient music, often including clips that the player has witnessed while reflecting. The clips are now shown in full colour instead of black and white, and when the sequence ends the player 'wakes up' floating above some part of the world and falls back into it, allowing them to explore further until darkness falls once again. Upon first playing *The Night Journey* I had assumed that this was the entire experience, and that players would simply quit when they were satisfied with seeing enough, but exploring deeper revealed that the work does

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have an 'end' that results in the credits being shown; this is discussed in a later section below.

Finally, while the landscape is fully open to exploration and has no BLOCKAGES to movement (players can even walk underwater), walking to the edge of the explorable world results in being automatically teleported back into it from the edge (this invisible boundary must be set far back from the end of the 3D models, since I was never able to see an 'edge of the world'). While this teleportation feels extra-diegetic, many players will never experience this 'edge case'.

3.3.3 A LANDSCAPE LITTERED WITH PRIMES

The world of *The Night Journey* is a vast expanse with four archetypal regions located in the cardinal directions: forest, desert, mountains, and sea. The central area is a rocky plateau with the giant tree in the middle, providing a slightly elevated vantage point over the four areas that players can embark towards, and providing a CENTRE to the PERIPHERY of the landscape. There are no boundaries between regions and players can freely move between them, and the landscape is given life through the movement of clouds in the sky, the rivers snaking through it, and the occasional presence of animals such as birds and fish, and ominous ones such as a bright white owl and pitch black dog barking at the sky (that vanishes as you approach it). The ocean along one side of the world gives the landscape some meaningful directionality, since the dry desert is the furthest inland and the forest and mountains lie along the coastline. The landscape becomes a microcosm of the larger world by including these different regions, making it comparable to some Japanese gardens (Walker 2018). This is particularly fitting for a work shaped around spiritual enlightenment, since it frames the landscape as a place cut off from the world to withdraw to, one explicitly intended to evoke contemplation. These landscape elements, from the huge 'tree of life' at the start to the craggy mountains and vast desert, all carry strong poetic connotations in cultures worldwide. Chan notes somewhat critically that this "cross-culturally
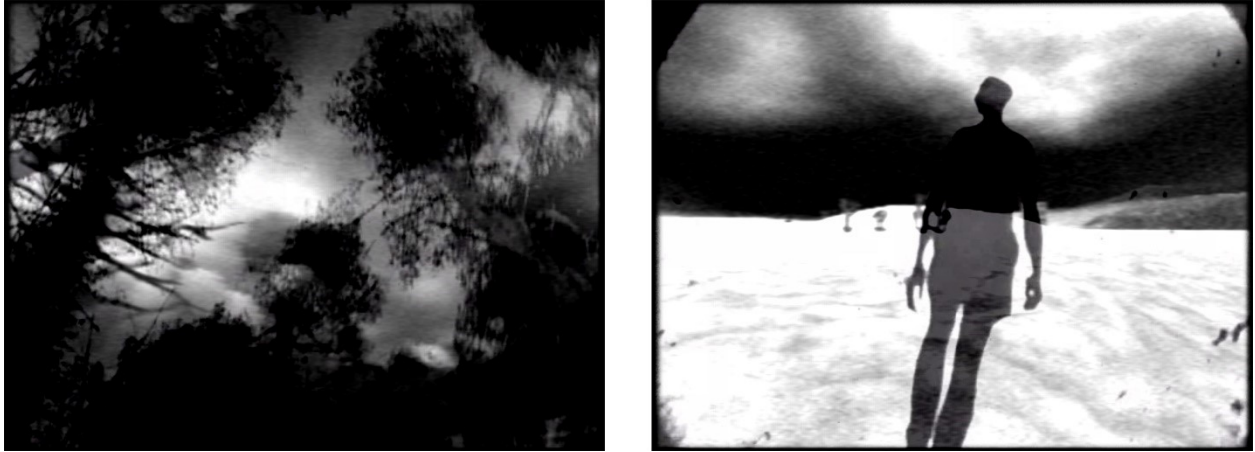
Figure 3.11: Visions while reflecting.

symbolic imagery—of trees, of birds taking flight, of rebirth via watery immersion … traffics in

a religious universalism that seems somewhat at odds with the deeply researched, laser-focused

specificity underscoring so many art practices of the moment. In fact, *The Night Journey's*

cultural omnivorousness perhaps puts it more in step with contemporary video games" such as

"*God of War['s]* (2018) … comic mash-up of mythological worlds" (2018, 72).

As they travel the landscape, players can press SPACE to see whether they can reflect and

view one of Viola's video clips superimposed on their view of the world. The imagery of these

clips is quite diverse (fig. 3.11), and includes scenes such as close-ups of owls, staring up at

treetops, discovering a ruined house in the woods, a couple walking on a beach, and many clips

of a figure walking across landscapes casting a heavy shadow in front. These clips are far too

numerous and diverse to catalogue here, but their subject matter generally concerns ambient

images of nature or people existing in the world (wandering it or discovering ruins), and they can

together be taken as primes for contemplating a wide range of frames based on the associations

they trigger in the viewer. These clips are most evocative when viewed superimposed upon the

world, and seeing them in full colour in the 'dream' segments after darkness falls takes away

some of their interest; this choice to display Viola's video art unmediated between periods of
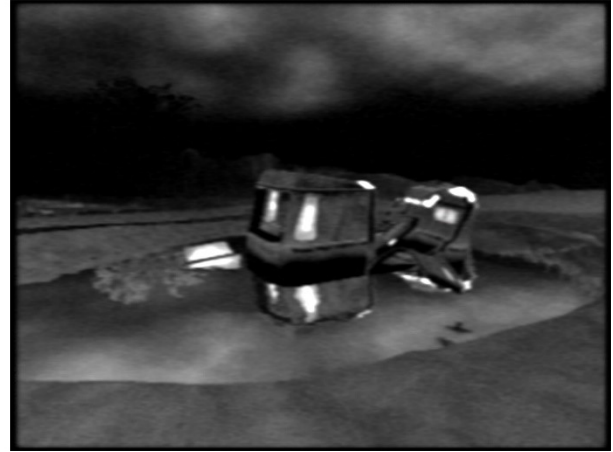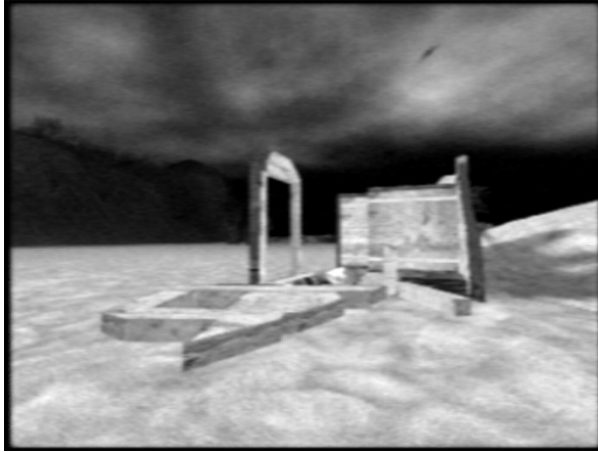
Figure 3.12: The store in the desert (left) and the trailer on the beach (right).

wandering the world is a conservative design decision in an otherwise bold work. While wandering, players can also encounter quiet, whispery voiceovers describing childhood experiences; I only came across one outside of the deeper layer of the work, discussed below. Finally, it must be noted that this structure of poetic video clips strewn across a landscape, tied to particular locations in it, has an interesting parallel with the historic mnemonic technique of creating memory palaces, where a person imagines a fictional space and associates things to remember with locations in the space (see Dade-Robertson 2011, 57-63). Here the videos are the things to be remembered, wandering the space allows for them to be retrieved and contemplated, and the structure of the landscape structures the arrangement of memories. In both cases, space communicates by providing a scaffold and structure for the task of remembering.

3.3.4 UNCOVERING ANOTHER LAYER

As players wander the world, they will encounter one manmade structure in each of the four regions: a house in the forest, a trailer by the seaside, an ancient ruin built into a mountain, and a small store in the desert (fig. 3.12). These structures are found in varying states of decay, and if players reflect near the structure, they will see it morph into a worsened state of decay and

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eventually back to being brand-new (instead of being shown a video clip). This affordance of viewing these structures at different points in time is never told to the player, but they are very likely to discover it given the constrained ways of interacting with the world. I discovered it in my first play session, and considered it a potent prime for contemplating the ephemerality of the built environment and the passing of all things, but did not think anything else of it. In a later session I noticed that one of the structures had a glowing white door, and I decided to try and enter it, which to my surprise suddenly took me into a fully white space with a black door far in the distance and a voiceover clip playing. I was now unable to look around, and could only move closer to the black door; when I stopped moving, audio of heavy breathing and a heartbeat got louder, framing this place as an anxious one to move through. Reaching the black door took me into a fully black room with a white door in the distance, and the voiceover continued playing. Entering the white door took me into another white space, but now one of Viola's clips of the figure wandering the landscape was superimposed upon the view, in colour, and entering the black door at the end of this space returned me to the landscape outside of the structure, with it now in a further state of decay than when I entered (and reflecting no longer allowing me to view it in other states of disrepair). These scenes hint at the metaphor of WALKING INTO THE LIGHT IS ENLIGHTENMENT, and its mystic inverse, WALKING INTO THE DARKNESS IS ENLIGHTENMENT, present in St. John of the Cross's thinking among others.

After this first experience, I returned to the other three structures to try and enter them, and was able to experience similar 'hallway' scenes of alternating black and white rooms that end with a room where one of Viola's clips is overlaid. The voiceovers in the four structures consist of a man and a woman relating experiences in parallel, making it challenging to listen to what they are saying. The voiceovers often relate childhood experiences, with one describing

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childhood nightmares and another bizarrely describing embryos being taken across a border. The female narrator's grandmother is a recurring figure, and these voiceovers may prime narratively-charged contemplations about life. Upon exiting the fourth structure, I noticed a bright light in the distance of the landscape, and as I walked closer to it, I realized it was a white door. No matter where I looked it was centered in my view, and walking in any direction took me closer to the door, forcing me to eventually enter it. This ended *The Night Journey* and showed me the credits, returning me to the main menu afterwards.

3.3.5 AUTHORIAL INTENT

This study is more concerned with how videogame spaces *can* communicate than with the goals of their creators, yet *The Night Journey* is far more oblique and experimental in its design than other works in this thesis, warranting a brief look at Tracy Fullerton's (2009) reflections on its development. Early in the piece she identifies three core design goals:

> 1) The desire to evoke in the player's mind a sense of the archetypal journey of enlightenment through the 'game mechanics' of the experience – i.e. what the player is doing in the game. 2) The desire to create a world of 'explorable video,' integrating the work and sensibility of Viola's prior art into the game world. 3) The importance of creating an experience that would appeal to (and be accessible to) both art patrons who might play it in a gallery setting, and also game players, who might access it through another from [sic] of distribution. (Fullerton 2009)

These goals were used to structure *The Night Journey's* landscape and to define the affordances for engaging with it.

My analysis of the world's design by-and-large echoes the goals of the developer, and referring back to Lynch we can say that its landscape is 'imageable' and legible. Four regions stretch out into the horizon, and each of these has a "thematic core … tied to the traditions of the spiritual quest" such as the "discovery through withdrawal" of the mountains, "epitomized by mystics including St. Anthony and St. John of the Cross" (Fullerton 2009). The vertical pole in

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the center of the world—most directly experienced as players first fall along it—was also a key

element in its design. The central rocky area near the large tree had struck me as oddly patterned,

and Fullerton reveals that it is a mandala when viewed from above. The world was designed with

landmarks such as the "Great Tree" in the middle, the mountains in one direction, and the moon

in the sky to aid allocentric navigation (since players are never given a map), and the four

structures, "St. John's Hut[s] … representing the tradition of spiritual recluse" also serve as

landmarks and are visible as faint patches of light or dark from above (Fullerton 2009). In

describing their design for the evocative landscape, Fullerton terms it "expressive geography":

> [W]e imagined the geography as an expressive element, rather than a practical one, changing with the player's perceptions, actions, with time, movement, perspective and overall offering the potential for a different interpretive experience each time the player accesses the game. We wanted to build what Bill has referred to as a 'poetic landscape.' (2009)

This speaks directly to the paradigm of spatial communication in gardens, and the term 'poetic

landscape' is just as appropriate for describing them. Finally, while attempting to capture the

aesthetic of Viola's video footage, the atmosphere also seeks to evoke "a singular point of day,

which is not day or night, but a mysterious mixture of lightness and darkness. The sun, sinking

below the horizon, still lights the sky, as does the moon, already rising" (Fullerton 2009). Having

taken many contemplative hikes at this time of day, *The Night Journey's* unique murkiness

resonated with my own experiences of landscapes falling into night.

The design of players' affordances speaks directly to the deeper themes of the work, both

by inviting a contemplative stance and by encoding metaphors about enlightenment into the

modes of interaction. The slowed-down ability to look around and the realistic walking pace

invites players to meander, "looking deeply at each moment of the experience" (Fullerton 2009).

The most significant affordances in *The Night Journey* are the ones encoded into the act of

reflecting: this simulated act of contemplation "'fill[s] them' with light" to stave off the

encroaching darkness, and slowly increases their movement speed and loosens "their connection to the earth" until they "begin to glide over the landscape, barely touching the tips of the trees" (Fullerton 2009). These affordances are doubly metaphoric: the idea of 'enlightenment' is based on the primary metaphor that KNOWING IS SEEING (where light allows vision), while the ability to come untethered from the world reflects the metaphor that ENLIGHTENMENT IS A REDUCED ATTACHMENT TO THE WORLD. Here, "[r]eflection is an active experience, in which the player willingly gives up control of both moving and looking and by that release of control, gains a new perspective, and, in fact, transforms themselves in relationship to the 'natural' world of the game" (Fullerton 2009). This entails another metaphor, namely that ENLIGHTENMENT IS A GIVING UP OF CONTROL, and together, these metaphorically-charged affordances seek to foster "the sensibility of the spiritual journey within the player" (Fullerton 2009). This metaphor runs counter to common Western views like anthropocentrism or individualism, but it has a long presence in contemplative religious traditions across the world (e.g. Merton 1972).

3.3.6 SUMMARY

Fullerton's reflections on her project go a long way towards summarizing it. *The Night Journey* communicates spatially through the design of its 'poetic landscape', structured to aid both contemplation and navigation, through the frame set by its hazy black and white late-dusk atmosphere, through the priming imagery of Viola's videos, and through its metaphorically-charged affordances for wandering the world and reflecting. Players are left to undertake their own contemplative journey, freely wandering the landscape and reflecting upon what they encounter, having different experiences each time they return to the world. The meanings read into a work such as *The Night Journey* will vary wildly given the differing associations of different players, but this is a strength not a weakness. This diversity of experiences is true to a

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realm as hazy as spiritual enlightenment, but it stands in harsh contrast to another type of religious experience: rites of passage, where space is highly codified and the progression through it is narratively charged. The chapter will now turn to *NaissanceE* to explore this type of space.

3.4 NAISSANCEE: A RITE OF PASSAGE
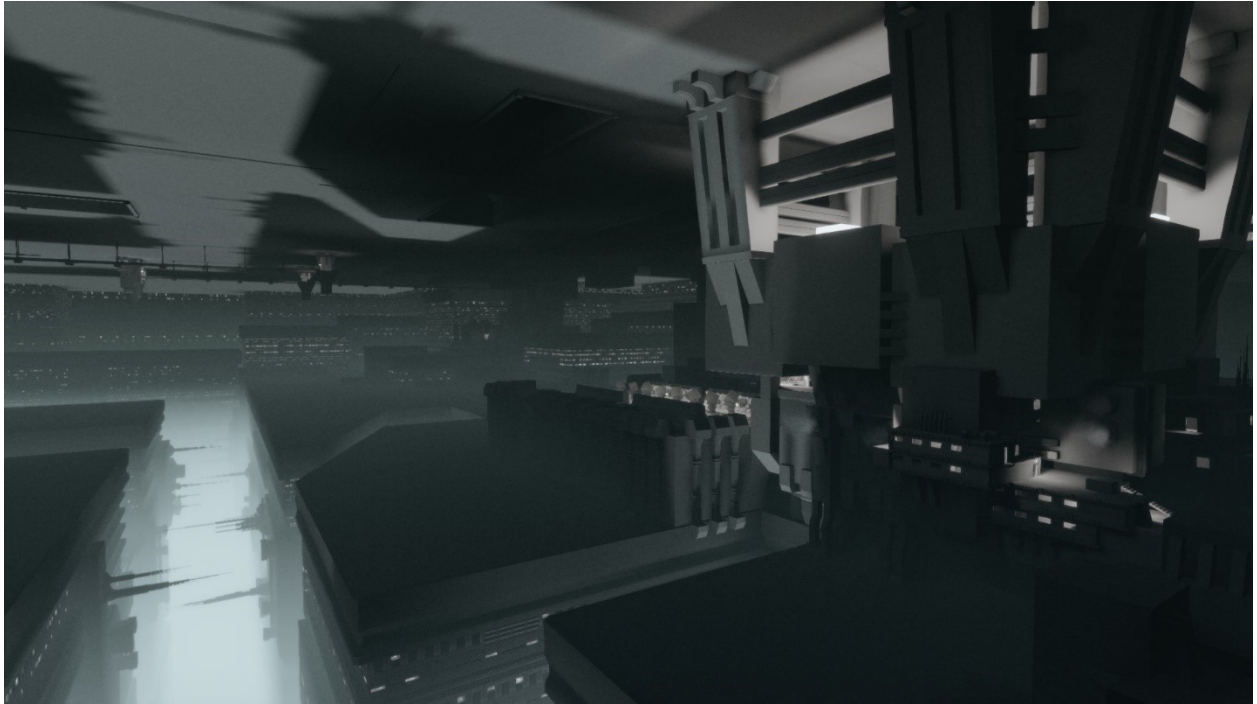
Figure 3.13. *NaissanceE.*

3.4.1 OVERVIEW

NaissanceE pushes players to traverse a hostile and sublime virtual environment, inviting them to feel the existential dread of being small and weak in an overwhelming manmade landscape. Its world is an endless urban complex that shifts between abstract masses and realistic forms, filled with maze-like corridors, precarious walkways, pitch-black spaces, and infinite vistas (fig. 3.13). There is only one path through this world, and in harsh contrast with other 'walking simulators' there are countless ways to die, from falling off thin ledges to being bludgeoned by giant air

intake fans. Through its anxiety-inducing architectural forms and the challenge of safely

navigating them, the environment of *NaissanceE* openly declares its disdain for the player

attempting to traverse it. Fittingly for its title that means 'birth' in French (with an extra 'E'

added to stylize it), the space of *NaissanceE* can be viewed as a rite of passage, a carefully

orchestrated ritual (in this case a journey) that is intended to change whoever undertakes it

(Stephenson 2015, 57-9). It exists at the opposite end of a spatial continuum from gardens: now

the wanderer follows a single path with a clear beginning and end. The path may have

labyrinthine sections, dead ends, and portions that open up into explorable pockets, but it is

fundamentally linear, allowing its creators to shape the experiential rhythm of progressing along

it. *NaissanceE* was developed independently by Mavros Sedeño, a former level designer at the

large videogame company Crytek, and it takes significant inspiration from the manga *BLAME!*

(Martin 2017). In this light, it can be viewed as a work created by someone who was well-versed

in conventional large videogame development but had his own ideas to explore.

    NaissanceE communicates almost entirely through the rhythm of its journey—through the

player's unfolding experience of space—and it is one of the most architectural works in this

study by virtue of relying so heavily on the semiotic resources of buildings. As Martin notes in

his brief summary: "The impact of space on the mind is played out expertly in *NaissanceE* and

remains un-subjugated to other concerns of narrative, character, or plot" (2017, 70). Discussing

the ways that movement underlies our experience of architecture, Walz notes that:

> Movement places the visitor into positions and involves him or her in processes, guides views,
> enforces velocity, and presents or conceals parts of the whole. The way we move through a
> designed environment is responsible for our expectations of that environment. Thanks to material
> and immaterial emphases and the ordering of interior and exterior space, movement affects, shocks,
> or surprises us, reveals secrets, and, most importantly, asks us to actively participate in a space
> intellectually, physically, and relationally. (2010, 30)

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The affective experience that arises from this movement-through-space provides rich fodder for generating a personal narrative of the experience, what Calleja has termed an 'alterbiography' in contrast to the pre-scripted narrative elements in a videogame (2011, 115). Since journeys and narratives both occur as sequences of events across time, it is natural for players to generate a meaningful story out of their journey through the virtual space (Ryan et. al. 2016). While this is true of *The Night Journey* above, it is a more important consideration in works like *NaissanceE* that have a single carefully-orchestrated path through the world, where all players will undergo a similar spatial procession, experiencing evocative elements in the same order.

The path through *NaissanceE's* endless structure begins with a threat: the player witnesses a first-person cutscene where they are chased through repetitious corridors by a flying worm-like creature, eventually falling into a pit while escaping. They then awaken in a bare room with a single door into a pitch-black hallway; the phrase "Lucy is lost" is briefly shown, providing the only hint they will receive as to the identity of their avatar. This initial encounter sets up the player's journey as an escape, not an exploration of a strange place. The first part of *NaissanceE* takes the player through claustrophobic maze-like spaces and ends with twin challenges: a spatial puzzle where they must move balls of light to create and destroy solids (and thus a path), and one where they must run through an obstacle course following a ball of light guiding the way. These light puzzles and running-and-jumping challenges are two occasionally recurring types of obstacles to progressing through the world. The second segment begins with the title "Going down" as the player enters a massive urban structure with an impressive view. Here, they are tasked with finding a safe way to climb down through this huge shaft, deeper into the world. Getting to the bottom of this shaft, the player enters an open plenum area with buildings above and below, and is presented with a sublime vista of infinite dwelling cubes stretching into the

murky teal horizon. The next area, "Breath compression" is defined by its physical challenge: the player must run along turbine shafts and avoid spinning blades and other obstacles. Surviving this, they dive into a huge shaft and are blown upwards into the darkness. Floating walls box them in, and the player now finds themselves in a room matching the one that the game began in as taunting accordion music beings to loop: this segment is aptly titled "Deeper into madness" and has them navigating through physically impossible, mentally taxing spaces. Upon finally getting through, there is a brief challenge-less "Interlude" segment, where the player crosses a massive bridge and ascends an exceedingly long staircase into pitch blackness. Arriving at the top, they enter a massive desert strewn with ruins and provocatively titled "Endless dive." This area has a 'poetic landscape' structure, and once the player has sated their curiosity and explored the ruins dotted around the plateau, they must dive off its edge to progress, taking them to a final segment, "Meet the host" where they re-encounter the worm creature. The world literally begins to fall apart as the player runs through swirling chunks of buildings to escape; surviving this ordeal is cold comfort, as the work ends with the phrase "The beginning" (perhaps implying a cyclical structure). The following sections will unpack how *NaissanceE* communicates through the player's experience of its nihilistic, overwhelming space.

3.4.2 FINDING A PATH

The basic abilities of the player character in *NaissanceE* overlap with *The Night Journey* and the conventions of first-person-shooter videogames: players can move with the WASD keys, look around with the mouse, jump with the SPACE bar, and crouch by pressing CTRL. These have become the conventionalized controls for a humanly-embodied first-person videogame avatar, and they communicate to the player that their affordances in the virtual environment will roughly match those of a human body. Unlike most first-person games, though, Lucy cannot fall very far

Figure 3.14: Descending the shaft.

Figure 3.15: A subtle staircase on the right wall.

without being injured (and forced to walk slowly for a short period) or dying (resetting the game to the last checkpoint). Finally, players can run by holding SHIFT, but with a clever bit of added realism they must tap the left mouse button to breathe rhythmically in order to keep running. The game uses a pulsing circle and the sound of Lucy's breathing in order to signal when to tap, and the screen begins to fade to white when she does not breathe regularly and loses her breath.

At its core, *NaissanceE* is about finding the path deeper into the world and then pushing through the obstacles along it; this places the PATH image schema at the heart of the experience, since progression along it directly maps to progression in the game. This path includes many small dead ends and a few explorable areas, but it is fundamentally linear, and players are regularly left searching an area for the right way ahead. In the second segment where they descend a huge shaft, this means finding a way to climb down without ever falling too far in one go (and dying) (fig. 3.14), while in a later one it involves noticing an odd pattern on an urban wall and approaching it, revealing a precarious staircase (fig. 3.15). This task of identifying a way forward speaks directly to enactive perception and the affective side of affordances: players are constantly evaluating the environment based on their ability to move through it. Spaces in *NaissanceE* are expertly tailored to invite mental simulations of traversing them, evoking meaningful force schemas for movement in the minds of players:

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> Physical structures forcefully shape the range of actions possible for us in our environment. You may enter here, but not there. You must walk up these steps, or down this stairway, to gain access. You may, or may not, open this door or window. You must move along this narrow corridor. You may or may not tarry here in this space. All of these experiences of restricted or free access involve structured forceful interactions. Even when we merely see a building, before ever entering it, we *feel* its affordances for how it will forcefully shape our engagement with it. (Johnson 2015, 44)

The world of *NaissanceE* uses forceful interactions to communicate its hostility to the player, through the death that comes from falling too far, the risk of being blown off a ledge by a gust of wind, and the frustration of finding paths that you *could* take, if only there were some element connecting them with the area that you are standing in. These little spots nearby or far off in the distance are highly evocative (e.g. the lower right area of fig. 3.13), and they give the world an expansive, endless feeling that it might otherwise lack. The architecture in *NaissanceE* swings between highly abstract forms and more realistic ones, and the world communicates its hostility through its lack of forms scaled to the human body. Only staircases, doorways, ladders, and the occasional architectural detail or vignette (e.g. a shrine) have any relation to the player's (implicitly) human avatar, denying any sense of the at-home-in-the-world-ness that comes from a tight fit between organism and environment. Instead, players are left to experience the sublime of a megastructure that exists beyond reason (O'Sullivan 2017).

A defining aspect of *NaissanceE* is its bold use of chiaroscuro (a harsh contrast between light and dark) and many of its places fade into pitch blackness or strain players' ability to see through blinding white light. This heavy presence of a light-to-dark SPECTRUM image schema lets the videogame regularly toy with the metaphor UNDERSTANDING IS SEEING: one particularly cruel room is entirely white, with the blocks the player can walk on briefly flashing black every few second. Here, understanding a path forward is at the mercy of players' ability to see through this harsh perceptual condition. This metaphor is also present in the segments where players follow a small ball of light through otherwise pitch black spaces, relying on it to guide them

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Figure 3.16: A space with strong chiaroscuro.
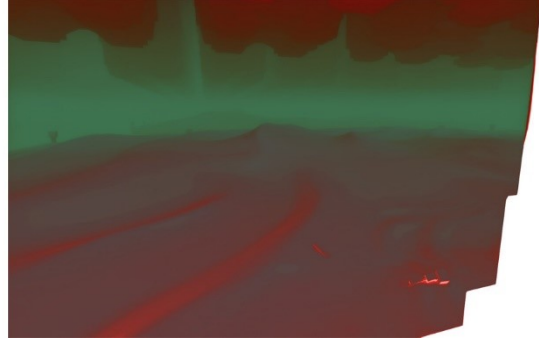
Figure 3.17: A view from one of the towers.

(fig. 3.16). In one instance they must run and jump along a path as the ball of light speeds on ahead of them, being forced to start from scratch if they fall along their way up. This play of light and dark may have been inspired by similar mechanics in *The Unfinished Swan* (Giant Sparrow 2012), a work released a couple years earlier, and it has an interesting resonance with a protagonist whose name Lucy means 'light'. A poignant vignette late in *NaissanceE* provides another meditation on UNDERSTANDING IS SEEING and the idea of perspectivism more broadly. While exploring the desert, players can find a collection of ruins with three distinctly designed towers; upon entering each tower, their vision starts to change, and they now see the world outside in a jarring scheme (fig. 3.17). The architectural styles of these towers evoke those of historically powerful institutions, and so viewing out of them can be understood as seeing from a place of power. From these perspectives, the already-hostile world appears even more dangerous.

3.4.3 A CLAUSTROPHIBIC MEGASTRUCTURE

Pulling up from these details of the experience to the macro-scale, the hermetic environment of *NaissanceE's* megastructure communicates by being shaped around the VERTICALITY schema, through denying allocentric orientation within it, and by transforming measurable topographic space into relational topologic patterns through its infinite spaces. The VERTICALITY image schema is ever-present in players' experience of this world: many segments have meaningful
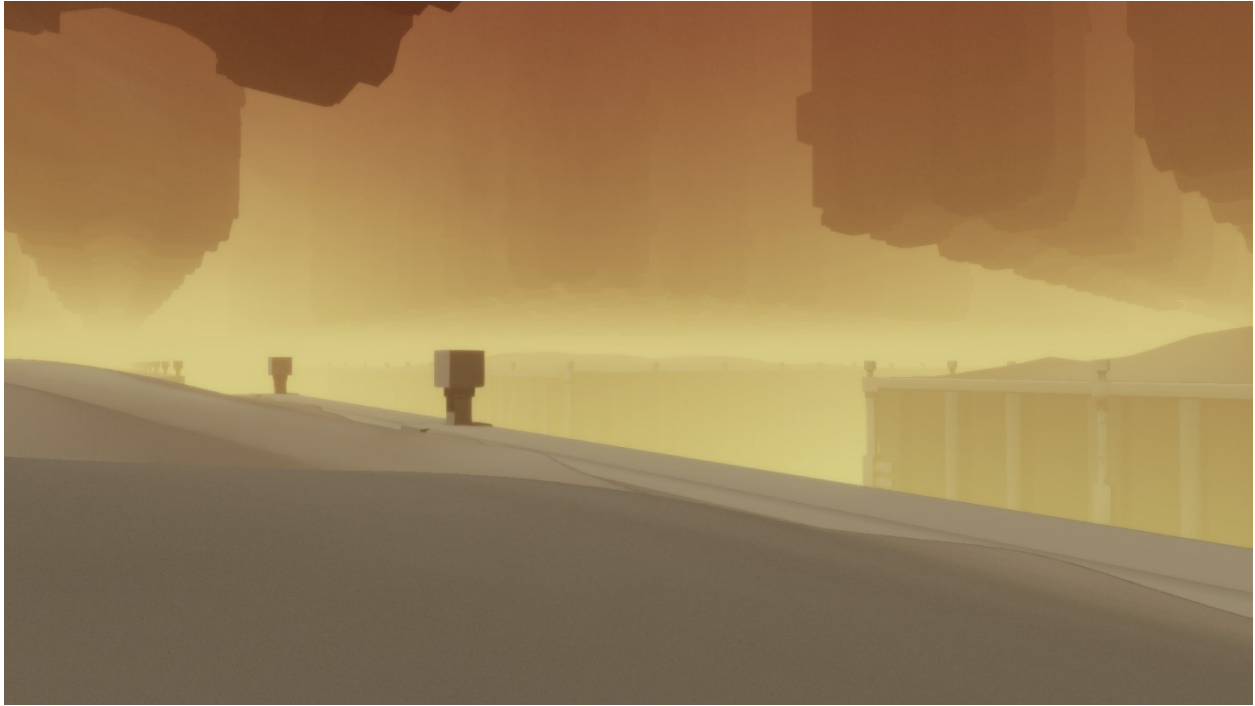
Figure 3.18: The infinite horizon stretching beyond the desert plateau.

vertical movement, such as walking up a seemingly-infinite staircase into pitch darkness, or free-falling into an abyss after jumping off the edge of the desert. The rare vistas out into the world show the megastructure they are inhabiting stretching into both the heavens and the depths (fig. 3.18). This suffocating sense of being always-inside speaks to the impossibility of forming an allocentric cognitive map of this world, and thus any sense of orientation within it. To position oneself within a space allocentrically, one requires clear reference frames: imagining oneself within a city, one knows that the city has an edge and that it is vertically bounded between earth and sky (Heidegger 2008). By stretching infinitely in all six directions and often sending the player along claustrophobic and twisting paths, *NaissanceE's* megastructure denies the player the reference points they would need to develop an allocentric sense of orientation within it.

Infinite spaces are an important part of establishing this sublime atmosphere: the infinite repetition of elements into the horizon and the experience of trying to escape an infinitely-

repeating space push players to read topological patterns out of measurable topographic spaces. This infinitude is most acutely communicated through a horrifying, optional vignette partway through *NaissanceE*. While exploring an apartment area, I noticed a door that was not fully closed, and that I could crawl under. This took me to a stairwell that appeared to be the correct way forward, but after a few minutes walking down it, panic struck, and I began to suspect that there was no end to the stairwell. The logical thing was to retrace my steps, yet after now walking up for the same length of time, I was unable to find the open door that I entered through. After some additional panicked running, I paused, and after waiting for a few seconds I was surprised and deeply relieved to find the closed door of the stairwell suddenly open and release me back into the world. The ability to represent an infinite interactive space is a unique property of virtual environments, and it speaks to the evocative new spatial semiotic resources that they offer. The infinitude of this stairwell, and the implied infinitude of the megastructure itself, is profoundly claustrophobic. It gives the CONTAINMENT schema a prominent place, and speaking to its important role in architectural experience, Johnson states that:

> Typically, we also desire to be enclosed in spaces that are not claustrophobic and oppressive. From infancy on we climb in and out of boxes, baskets, cribs, closets, cars, and other containers. We find what it feels like to be confined within tight containers, as compared to roaming more freely in open spaces. We know how bad it can feel to be "boxed in." There is a way it feels to be confined in a relatively closed, dark, damp space (e.g. a cave), which is experientially quite different from flat, open, sweeping expanses of the plains, or from standing high on some mountain with an elevated view of the world spread out below you. (2015, 42)

The core task in *NaissanceE* is framed as an escape, and rightly so when one inhabits a world that denies any meaningful sense of orientation and leaves one feeling existentially trapped.

3.4.4 THE RHYTHMS OF THE JOURNEY

As noted in the introduction to this analysis, a major way in which *NaissanceE* communicates is through the spatial rhythm of proceeding through it. This resonates with Le Corbusier's famous

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conception of the 'architectural promenade', where "prospects … are constantly changing, even astonishing" as the person moves through the space (Le Corbusier quoted in Nitsche 2008, 74-5). Architectural form in *NaissanceE* communicates through the differing rhythms of movement through it, the visual rhythm of elements, the careful contrast of detailed and bare spaces, and a clever use of polysemous forms that invite multiple readings. First, *NaissanceE's* varied areas are defined by distinctly different rhythms of exploring: (1) "Lucy is lost" is meandering with moments of challenge to get players acquainted with the world; (2) "Going down" is slow-paced and open, allowing players to explore; (3) "Breath compression" is defined by kinetically challenging segments of running through deadly machinery; (4) "Deeper into madness" disorients and alienates players through spaces that are mentally taxing to perceive and traverse; (5) "Interlude" gives them a rest as they reflectively wander a once-more sane world; (6) "Endless dive" is a wide open desert with landmarks to wander between; and (7) "Meet the host" is a frenzied conclusion where players run from the creature chasing them as the world crumbles into void. There is a clear rhythm here of periods of reflection, challenge, and rest, and the work has a mid-game climax with "Deeper into madness" and a concluding one with "Meet the host."

These different qualities of movement across *NaissanceE* are complemented by differing rhythms of architectural features and details: some areas feel like harsh chaotic clusters, while others have beautiful forms calmly repeating into the distance. As Johnson notes, a "series of connected Romanesque arches carry our perception along in a smooth, recurring pattern of curving visual motion" while the "jarring angles of certain Kandinsky paintings have a very different felt quality of perceptual motion" (2015, 45). The virtual architecture also uses detailing in a way comparable to physical buildings: more important parts of the structure have finer-grain details, while many walls are left bare. This convention directs spatial perception towards
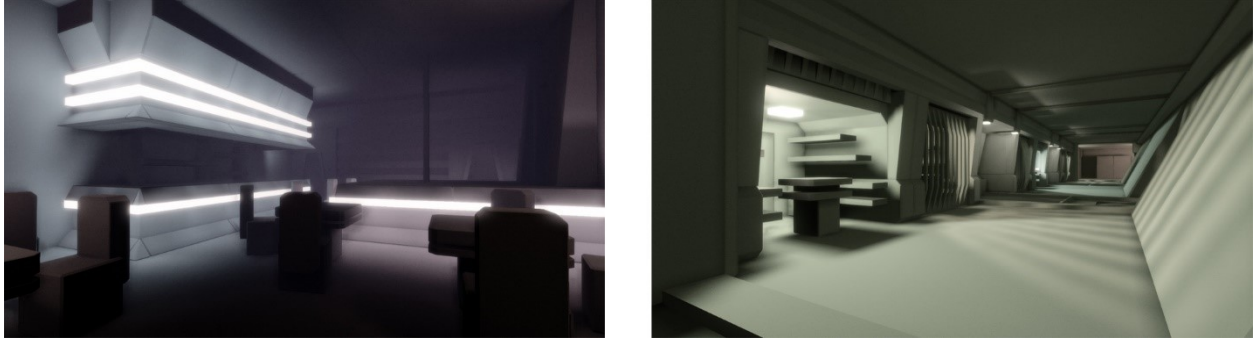
Figure 3.19: Spaces that suggest frames for understanding them.

important areas, and it arises from the metaphor that BUILDINGS ARE BODIES, where the most important areas of a body have a higher degree of formal complexity (think of a face as opposed to an arm). Finally, Sedeño crafted the built forms of *NaissanceE* "to be in-between symbolic spaces and more real spaces" in order "to play with the imagination of the player" (2017, 95) and allow them to read a range of meanings out of the spaces. These include niches that appear to contain sacred objects, a room with elements of a bar, and another with cage-like elements implying a cellblock (fig. 3.19). This hits on the discussion of polysemous architecture in the previous chapter, and the richness of meaning that arises from forms which do not allow themselves to be "interpret[ed] with assurance" (Sedeño 2017, 95) while still encouraging the use of some frames over others.

Beyond the differing qualities of the architecture itself, each area is framed by the titles that announce them, by different colours of light, and by ambient sounds and music. These title cards were listed above, and their sparse prose heavily frames the ways in which players may interpret their journey. The world of *NaissanceE* is entirely untextured, relying solely on light to give character to its stark grey forms. Many areas have faint colours washing over them, and the differing hues help frame the distinct areas, from the unease of a red corridor to the depth of a teal horizon and the heat of the orange desert. Colours are often associated with affect, and the

use of them here can help evoke different responses in the player. The soundtrack works in a similar way, using music in a filmic manner to set the tone of each area.

3.4.5 SUMMARY

As a processional space, *NaissanceE* communicates spatially through the rhythm of its journey and the elements that players experience along it. This world communicates its hostility to the player through its harsh affordances for traversing it, through its disorienting spaces that cruelly emphasize UNDERSTANDING IS SEEING, and through its sublime infinitude that prevents players from developing a meaningful sense of orientation within the megastructure. The work contains many charged vignettes, such as the infinite stairwell and perspective-changing structures in the desert, provoking players to reflect on this world and the ideas underlying it. Yet *NaissanceE* is fundamentally about the communicative power of architecture: the rhythms of moving through it, its careful use of detail, and the associations that its forms can evoke. While the genuinely challenging segments of the work "might seem at odds with a sense of wonder … *NaissanceE* shows a precise understanding of the difference [between][sic] wandering through architecture and engaging with it" (Martin 2017, 70). This speak to it as a rite of passage, a challenging, orchestrated journey charged with meaning, quite at odds with a contemplative walk in a garden.

3.5 CONCLUSION: SENSE OF PLACE, SENSE OF CHALLENGE

The three works analyzed above all highlight the foundational role of atmosphere in the spatial communication of videogames designed as worlds to explore and inhabit. In *Knytt Stories* the many atmospheres to be found are the main attraction, and the delight at finding a new one is a motivating factor for exploring deeper, while the atmospheres of *The Night Journey* and *NaissanceE* help frame the overarching quality of their respective contemplative and alienating

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experiences. The choice of these three works was intended to highlight a continuum of designed spaces with gardens at one end, processional spaces at the other, and most spaces somewhere in the middle (e.g. *Knytt Stories*). These different spatial structures reflect different degrees of authorial control over a wanderer's path through a world, allowing for different sorts of spatial communication and requiring players to orient themselves in different ways. All three works also underscore the importance of the VERTICALITY image schema in structuring space, and the kinds of meanings that its asymmetry in human experience encourages players to read out of the design of virtual environments. It was important to begin this study with these works, since *all* virtual environments are structured in the ways discussed here, even when they exist primarily as settings for players to complete tasks or undertake simulated conflicts.

These three works also highlight the importance of affordances as fundamental relations between agent and environment that shape exploration and inhabitation. *Knytt Stories* puts this front and centre by allowing them to change over the course of the experience, allowing for multi-dimensional experiences of the same space and a feeling of empowerment as Juni gains new abilities. I had initially selected *The Night Journey* wrongly believing that its affordances were static, and the discovery that they change based on the amount of time spent reflecting was a surprising one. This example underscores how a videogame can encode metaphors into its affordances (here, ones about the nature of enlightenment), and how it can reward certain behaviours and thus encourage them. *NaissanceE* sits outside of this; Lucy's affordances remain static as she moves through the world, yet that world changes vastly as she progresses along her journey. These consistent affordances—which regularly remind the player of their smallness and weakness in the face of the megastructure—help players determine the path forward as they survey their surroundings and mentally simulate moving through them.

Finally, the impact of challenge upon spatial communication in virtual environments is quite pronounced across these three works. Many videogames make the act of traversing the environment into a challenging one (and thus into a 'game'), but by doing this they unavoidably frame players' relationship with the space as an adversarial one. This is appropriate in works such as *NaissanceE*, yet *The Night Journey* makes an excellent case for removing all forms of kinetic (or perceptual, see chapter 5) challenge in order to foster contemplative experiences in a virtual environment, ones that may still be 'emotionally challenging' to make sense of (Cole et. al. 2015). User-created stories in *Knytt Stories* span a spectrum from lacking challenge entirely to pushing players to their breaking point, and they highlight the differing reasons for being that virtual environments can have. Are they places to be, or places to overcome? This discussion of challenge segues nicely into the next chapter, which explores videogames where players enact situated actions in environments crafted to support them. In most cases, the central actions that players must complete provide the central challenges of the videogames.

4. Enaction

The computer is providing us with a new stage for the creation of participatory theatre. We are gradually learning to do what actors do, to enact emotionally authentic experiences that we know are not "real." The more persuasive the sensory representation of the digital space, the more we feel that we are present in the virtual world and the wider range of actions we will seek to perform there. (Murray 1997, 125)

4.1 INTRODUCTION

Videogames have been widely lauded for their interactivity: *this* is the major quality that many believe definitively sets them apart from other media (Bogost 2007, 42; Laurel 2014, 29; Murray 1997, 71). What, then, does it mean for players to act within a virtual environment instead of simply viewing it? This chapter explores how videogame spaces can be designed for situated action, spatially communicating insights about a slice of the world by allowing players to interact with a bounded simulation of it. Two major aspects stand out: the affective experience of enacting particular motions, and the gestalt experience of enacting a (framed) role. In the first, the common motions of the experience carry meaning (Johnson 1987, 41-7), while in the second players are given license to play with frames themselves, testing their boundaries and exploring their structures. This chapter will explore these issues by analyzing *Shelter*, *Shadow of the Colossus*, and *Katamari Damacy*, three videogames that use the design of their spaces to shape and direct meaningful player action, communicating insights into real-world parallels. The term 'enaction' has been chosen over 'enactment' in this study, since it is used in embodied cognition to emphasize that action and perception are an inseparable, dynamic process between agent and environment (e.g. Stewart et. al. 2010).

Videogames excel at simulating situated action: the components of a situation can be digitally encoded and represented for players to interact with far easier than creating physical

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copies of spaces in the real world. As technology has advanced, this has been seized-upon by industry: flight simulators have been around for decades, there are now VR rigs for learning how to operate heavy machinery (Serious Labs, n.d.), and there are even VR environments being developed to teach situational life skills to prisoners to better prepare them for returning to regular life (Dormehl 2017). These examples speak to how a virtual environment can act as a 'surrogate situation' (Clark 2005), a "real-world structure that is used to stand in for, or take the place of, some aspect of some target situation … that is the ultimate object of my cognitive endeavor" (Clark 2005, 236). Examples span from the rough sketches used to design buildings all the way up to detailed simulations: Clark's key point is that humans routinely create these surrogates so that we can engage with situations where direct engagement is not possible (or may be undesirable). They have the same 'magic circle' quality as game spaces: interactors are free to explore the possibilities of a surrogate space, unencumbered by the constraints of a real one. Further, they aid our thought by how they selectively represent a real situation "allow[ing] us to engage specific, and often quite abstract, aspects of the … situation" (Clark 2005, 237) instead of being overwhelmed by its details. This notion of 'surrogate' is a refreshing counter to the charged expectations of fidelity that come with 'simulation,' and quickly hits on why these environments are created in the first place. It also begins to suggest how they differ from the ones created to be inhabited that were discussed in the preceding chapter: here, the focus is on acting-upon-the-world more than wandering-the-world.

Virtual environments shape the common motions within them through their affordances, with these motions, in turn, carrying associated affects. As noted in the discussion of image schemas in chapter 2, our forceful interactions with the world—such as feeling swept away by a strong wind—are primitively meaningful. One aspect of the fidelity of a surrogate environment,

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then, will be whether the player's motions resonate with those they have experienced in the real world. Citing Gadamer, Aarseth (2007) discusses how players are subjected to the rules of a game and are themselves 'played' by it, and this hits on how virtual environments constrain and direct players' motion. While the spaces designed for inhabitation discussed in the previous chapter clearly favour visual impressions and the kinetic impressions of traversing a space, these spaces of action place a far greater emphasis on the kinetic impressions of interacting with a virtual environment and the objects within it.

As videogaming hardware has advanced, the means for input have broadened considerably. Calleja has explored this aspect of kinetic involvement in games, defining a spectrum of input from "the *symbolic control* of keys, controller buttons, and thumb sticks," to "*symbiotic control*, [with a device such as the Kinect] in which the player's actions are mapped onto the avatar and have a close relationship with the actions of the avatar in the game environment" (2011, 63; emphasis in original). Between these poles is "*mimetic control*, a partial mapping of the player's movements onto the avatar" such as games where "the player swings the Wii remote in a simulation of an actual tennis stroke" or where "the controller itself replicates part of a machine, tool, or vehicle" such as "steering wheels for car-racing games and light guns in rail shooters, often found in arcades" (Calleja 2011, 64; emphasis in original). Games that use these mimetic schemes can require the player to make meaningful gestures or kinetically pleasurable motions: *Shadow of the Colossus* does this by having players grip onto the controller's trigger button to grip surfaces in the game, a physical action with the metaphoric dimension of 'holding-on' and 'letting-go' (Fortugno 2009). This metaphor ties into the larger discursive frames of the work, powerfully linking the meaning of players' small embodied actions with overall themes.

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Theatre is one of the oldest means by which humans have created surrogate situations to play with societal and cultural frames, and theorists such as Murray (1997) and Laurel (2014) have been quick to point out how virtual environments remediate many aspects of this ancient form. The fictional world of the stage affords the actors an opportunity to enact ways of behaving that they would not dare to otherwise, learning about others through mimesis (Aristotle 1996), while providing the audience with an entertaining and at-times critical commentary on the societal frames that shape their lives. Further, recent forms of interactive theatre where the audience is incorporated into the world present a very close parallel with virtual environments where all participants are actors (Laurel 2014, 27, 61; Murray 1997, 125). Like theatre, then, virtual environments empower individuals to act out and play with situational frames in a safe, surrogate environment. Their experience of these frames can then feed back into how they engage with them outside the fictional world, precisely the intent in situations where theatre is used therapeutically (e.g. Ali and Wolfert 2016).

The selection of videogames for this chapter is intended to capture the range of discourses that enactive environments can support and the variety of spatial semiotic strategies they use. *Shelter* invites players to enact a role of caretaker, *Shadow of the Colossus* has them desperately and self-destructively enact an evil ritual, while *Katamari Damacy* critiques consumption by rewarding an extreme enaction of it. As surrogate situations, these works give players a space to explore structures of caretaking, dominance, and consumption, respectively. There was particular care put towards selecting three unconventional videogames for this chapter: new players must enter them fresh and learn how to engage with their spaces through interactive inquiry. This contrasts with videogames in conventionalized genres (e.g. racing games, first-person shooters) where players can easily transfer skills from similar videogames. As a result of this additional

required learning, players are far more likely to experiences these videogames on their own terms, and as their designers intended. Spatial communication here is based on the virtual re-creation of structures in the physical environment, allowing players to virtually experiment with situated actions and behaviours in ways they normally could not.

4.2 SHELTER: ENACTING CARE

Figure 4.1: The mother and five cubs at the start of *Shelter*.

4.2.1 OVERVIEW

In *Shelter*, the player enacts the role of a mother badger, guiding her cubs on a journey through an increasingly hazardous forest (fig. 4.1). Players must provide food for their cubs and protect them from lethal hazards such as predators and forest fires, and failures carry the emotional burden of losing one of the children they have been caring for. It was developed by Swedish

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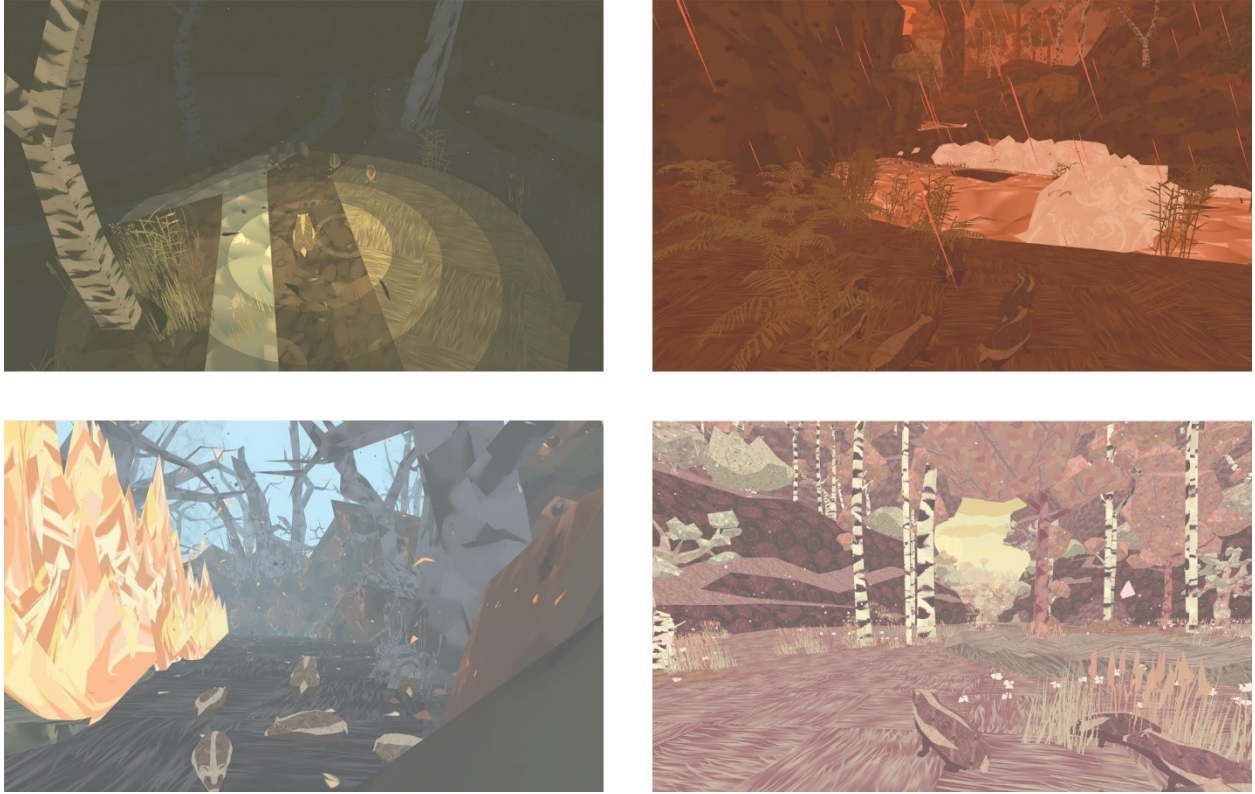
Figure 4.2: Areas 2-5 of the forest.

indie studio Might and Delight, and has been described by reviewers as "smart, simple, and deeply moving" (Walker 2013) and "a game about custody, about being the carer of things smaller and weaker than you" (Parkin 2013). *Shelter* allows players to experience certain frames and affects that arise when caring for others, communicating some aspects of what it means to be a parent. Instead of being a discourse *on* the structures of parenting, this videogame places players *in* a surrogate situation built around them, and sees how they fare. This has the potential to give it a poignancy for players who have little-to-no experience in this domain; as the critic Cara Ellison notes in resignation: "*Shelter*, you are turning me into a mother, and until now I have not had one maternal feeling in my body" (2013).

Shelter is a relatively short and linear experience, more of a proof-of-concept than an in-depth scenario. Unlike the other works in this chapter, it avoids oral and textual communication

entirely, solely relying on its processional space, imagery, and sound to convey a narrative. Players begin in a badger den with four healthy cubs and a sick one that they must revive before beginning their journey across five areas of the forest (fig. 4.2). These five cubs have different patterns of fur colouration, aiding the player in telling them apart and personifying them if they wish. The first area eases the player into navigating the forest while providing food for the cubs, the second takes place at night and requires the player to keep the cubs close, the third revolves around fording a swelling river, the fourth has a fire engulfing the forest, and the fifth concludes with a bittersweet end. Its structure strongly reflects the SOURCE-PATH-GOAL image schema and associated LIFE IS A JOURNEY metaphor employed by many videogames, where the narrative is identical with the player's progression through the world (Kromhout and Forceville 2013). *Shelter* has a unique and memorable visual style, and its roughly textured, shadowless aesthetic complements the environmental themes of the work by capturing the sense of overwhelming detail that one can experience while exploring nature. The analysis will begin by looking at the affordances for interaction and the core motions and image schemas that arise, and proceed to discuss the frames and metaphors that define this experience of badger motherhood.

4.2.2 LIFE AS A BADGER

Shelter's affordances can be broadly categorized as ones for safely navigating the environment and ones for gathering food. The player can walk around using the WASD keys, run by holding SHIFT, sneak by holding CTRL, rotate and zoom the camera by moving the mouse, pick up food with a mouse click, and make a grunt that the cubs will grunt back to (also with a mouse click, when no food is near one's mouth). The cubs will follow the player as they explore, only stopping to eat or to identify food the player could fetch them. Unlike many other videogames, there is no way to jump or climb, significantly limiting paths through the environment. A core

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Figure 4.3: A bird of prey segment in area 1.
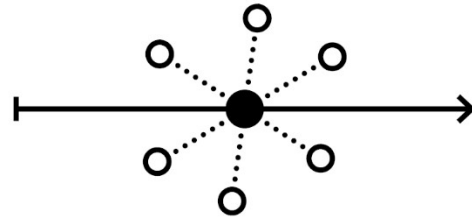
Figure 4.4: Overlaying the Center-Periphery and Source-Path-Goal image schemas.

affordance for navigation is the visibility of environmental features, and it is noteworthy that

Shelter's unique visual style impedes the player's ability to clearly perceive their surroundings

and determine optimal paths for traversing its hazards. While this hints at the weaker eyesight of

badgers themselves, players are not given anything analogous to badgers' superb sense of smell

(Neal 1986). Small predators such as foxes can be scared off or hunted by chasing them, and

areas of tall grass and hollow logs afford camouflage and protection from birds of prey; these

harrowing segments have the player quickly guiding their cubs from one patch of tall grass to

another while a bird circles above (its shadow projecting on the ground), creating sharp swings

between anxiety and a sense of protection (fig. 4.3). Finally, the night area requires players to

keep their cubs nearby within a patch of light surrounding the mother, and the swelling river area

offers patches of safe ground to stand on while fording it.

These navigational affordances create a tense, cautious movement through the world: there

is an ever-present desire to explore ahead, limited by the need to keep the cubs close and safe.

The Path image schema structures players' scanning for ways to move forward, but the most

acutely experienced structure is Center-Periphery: the mother is a constant center point in

relation to her cubs, and the distance can reflect the degree of safety or danger that the cubs are

in (and the player's anxiety). Overlaying these two schemas creates this tension, where a center point is in motion along a path and its peripheral elements must move with it (fig. 4.4). This is precisely the affective tension experienced by any parent guiding their children through an overcrowded festival or a busy parking lot, and it speaks to Dewey's claim "that the proper locus of the affective is the entire cycle of organism-environment interaction, and not just the internal states of the organism" (Johnson 2015, 43). The forest fire area increases this tension by having the fire spread behind the player as they try to avoid a bird of prey, pushing them onwards whether or not it feels safe to proceed; I found this segment particularly challenging to complete without loosing one of the cubs in the process. This underlines a harsh lesson that *Shelter* is quick to teach: the experience becomes easier with fewer cubs to care for, but players must live with the emotional burden of having lost one of their young and severely failing in their role.

The cubs slowly grow hungry as they traverse the forest; affordances for providing food include pulling up root vegetables, running into apple trees to knock down their fruit, and hunting frogs, mice, and foxes. These affordances are not self-evident, and they are taught via simple illustrations that appear the first time the player confronts one of these elements. Once they have food in their mouth, the player can drop it in front of one of the cubs; hungrier cubs are shown as more desaturated, and it can be challenging to drop the food in front of the cub that needs it the most without one of the others taking it first. Hunting involves sneaking up on an animal, then pressing the mouse button to lunge out and bite it. Frogs and mice are not especially hard to catch, however foxes present a challenge; they often serve as a wayfinding device, since chasing them propels them further along the path that the player will also take. On the whole food is very plentiful and feeding the cubs can become a casual afterthought instead of a demanding, meaningful task; while this surely is not the case in nature, it matches that of many

parents living in wealthy nations. I was unable to determine whether the amount of food I gave the cubs impacted their running speed (a key variable when avoiding birds of prey), and this ambiguity motivated me to continue feeding them regularly and equally.

Shelter is an experience marked by what you *are not* afforded: the player has no direct control over their cubs, or even the ability to issue a range of commands. This simulates one of the core qualities of caregiving: the thing you are looking after is separate from you, and can behave however it chooses, no matter your desires. Players thus have added anxiety that they may fail as a protector due to one of the cubs behaving erratically. This is particularly the case during the night area: at random moments the cubs will become scared at the sound of a twig breaking and go running into the darkness, and the player must quickly find them again before predators start to pick them off one by one (these predators are never visible, and their existence is solely primed through hostile noises). The cubs usually run back along the path; however, in one instance they ran forward, and I became disoriented and lost two cubs before finding the surviving three. In general, the means of traversing the environment are quite limited and the player and their cubs are often far too exposed for comfort, creating a tangible sense of weakness and vulnerability that are appropriate for the subject matter. This point is emphasized in the videogame's conclusion: after appearing to have safely navigated past a bird, it suddenly swoops down and attacks the mother with a loud thud. The cubs scatter, leaving the mother limping and unable to run for cover. These few seconds where she is incapacitated, yet still able to walk, are fearful and harrowing, as the player still retains agency but not enough to escape the situation. The bird swoops again, this time picking up the mother and carrying her away as the cubs walk off into the distance (fig. 4.5) (the number of surviving cubs does not change this ending).

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Figure 4.5: The mother being carried away.

Figure 4.6: The sick cub at the beginning.

Fortugno (2009) has termed this videogame trope of retaining agency in predetermined situations 'interactive futility,' and it features prominently in *Shadow of the Colossus* discussed later.

4.2.3 FRAMING CARE

The major frame of action in *Shelter* is 'caregiver', primed by the title itself; having to revive one of the cubs to begin the game emphasizes this further. In these first moments, the player will likely notice that one of their badger cubs is not moving and appears very desaturated compared to its siblings (fig. 4.6), priming a human health metaphor: PALENESS IS SICKNESS (or death). There is a radish visible in the next segment of tunnel, and by priming this sickness metaphor while providing a possible cure nearby, the game developers teach a core mechanic through the space: when any cubs grow pale, the player knows they need to be fed. Further, the limited affordances of the situation ensure that all players will quickly make this discovery; the mother badger automatically turns around if the player tries to leave without reviving the cub.

This early situation also highlights the importance of the design decision to forego having a typical videogame heads-up-display (HUD), perhaps one showing the number of cubs still alive, their hunger, and a map of the immediate vicinity. While HUDs are an effective way of showing key variables, they strongly prime players to frame the experience as a game first, and an

interactive narrative second. Thus, not including one allows players to make of the world what they will, instead of understanding the game through a lens of winning, losing, and optimization.

Finally, as noted above, *Shelter* makes strong use of the LIFE IS A JOURNEY metaphor and ties it to the literal journey the player takes through the forest. The cubs slowly grow throughout the game and are nearly the size of their mother by the end, and the mother's death provides the sharp closure that would be lacking if the whole family trundled off into the distance. Adding an ecological perspective to this, a short scene after the credits shows the bird carrying the dead mother badger towards a nest of its own hungry children, challenging players with a distinctly non-anthropocentric perspective.

4.2.4 SUMMARY

By inviting players to take on the role of caregiver and guide their cubs on a journey through a hazardous forest, *Shelter* gives players a small taste of the anxieties that come with watching over children. This is exemplified in the way its affordances are designed to overlap the SOURCE-PATH-GOAL and CENTER-PERIPHERY image schemas, mirroring the spatial dynamics of herding children, and in how the hazards and concluding sequence emphasize the player's weakness in the face of the environment and the predators that stalk it. *Shelter* constructs a compelling surrogate situation around the spatial structures of caregiving, inviting players to experience the emotions that arise from interacting with these spatial constraints. It boldly answers Murray's call for more breadth in interactive narratives, including ones that "teach ways of being in the world [such as] … how to be a nurturing parent" (1997, 172).

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4.3 SHADOW OF THE COLOSSUS: TAKING THE WRONG PATH

Figure 4.7: The world of Shadow of the Colossus.
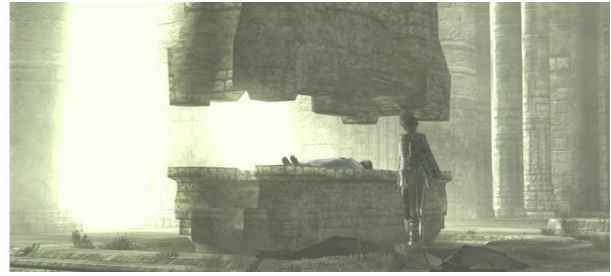
Figure 4.8: Wander standing next to Mono.

4.3.1 OVERVIEW

A young man rides through a desolate landscape awash in green light, crossing a massive bridge

and arriving at foreboding temple (fig. 4.7). Dismounting, he carries a large bundle to a stone

altar, placing it down and throwing off the blanket to reveal a dead woman (fig. 4.8). The screen

fades to a primitive mask floating in mist, with the noise of a crackling fire in the background. In

sparse, oblique prose, this figure reveals that you have trespassed into a forbidden land where

"one can bring back the souls of the dead" (Team ICO 2005). Returning to the temple, human-

shaped shadows begin to climb out of the floor and walk towards the young man, Wander (his

name is only revealed in the final credits), and he points a sword at the figures as it pulses with

light then vaporizes the shadows. At this, thunder cracks and a polyphonic voice booms out from

the ceiling, asking Wander if he possesses the ancient sword, and stating that he must be mortal.

Wander asks if the voice is Dormin, explaining that the woman "was sacrificed for she had a

cursed fate" and that he wants it to bring back her soul (Team ICO 2005). Dormin chuckles at

this, stating that, "Souls that are once lost cannot be reclaimed. Is that not the law of mortals?"

(Team ICO 2005). But it quickly assents, telling Wander that his wish can be granted if he uses

the sword to slay the sixteen colossi that inhabit this land, incarnations of the sixteen idols within

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Figure 4.9: Encountering the third (left) and fifth (right) colossi.

the temple. Providing one final caution, Dormin states: "But heed this, the price you pay may be heavy indeed", to which Wander callously replies "It doesn't matter." (Team ICO 2005).

This introduction sets up the mythic narrative of the work: a reckless young man challenges the law of mortals, trespassing upon a forbidden land and obeying the instructions of a dark force that promises to fulfill his desire. This structure, paired with the world's atmosphere of sombre music and eerie green light, already presents the player with the moral ambiguity—if not downright immorality—of their role. And any ambiguity is short-lived: the colossi are beautiful, often gentle beasts whose bodies combine elements of nature and architecture (fig 4.9). The battles cast you as the aggressor, tricking the colossi through a range of means so that you can mount them, undertake a harrowing climb where their bodies become the terrain to be traversed, then viciously stab their weak spots as black blood sprays out. With each victory, Wander's appearance grows pale and cursed even as his stamina increases. By asserting domination over the colossi (and metaphorically over nature (Thomas 2007)), Wander secures his own foolish demise. The work subverts the power fantasies so common in videogames, since here the kinetic and strategic enjoyment of slaying a colossus is met with a mournful song and a quick demise, as black tendrils shoot from its corpse and violently pierce Wander (Cole 2015).

Of the works included in this chapter, *Shadow of the Colossus* is by far the most theatrical, inviting players to enact an evil narrative role that they may not wish to identify with. By asking players to take on this foolish-yet-enjoyable challenge, and to witness the deterioration and eventual demise of their avatar, *Shadow* pushes them to consider the nature of evil and the awful consequences of grasping for powers that are not theirs to have. Using the design of its virtual environment to scaffold meaningful action, it embodies this discourse into its central action of desperately grasping and climbing elements of the colossi's bodies, engaging the primary metaphor of 'holding on' and 'letting go' of the things one is attached to in life (Fortugno 2009). Further, it reinforces this through the ritualistic repetition common to videogames: the player enacts the ritual of killing a colossus sixteen times, building the skill of knowing when to hold on and let go in order to dominate and slay each colossus. As symbols of nature that are engaged with *as terrain*, as well as living beings, the work also invites players to reflect upon their own relations with nature (Thomas 2007).

Shadow is a rich work that has earned a 'classic' status in videogames as a medium, inviting analyses from many different angles (Ciccoricco 2007b; Cole 2015; Fortugno 2009; Sicart 2008; Suttner 2015; Thomas 2007). This study's will foreground the spatial experience of players new to the work, since *Shadow* is much stronger for those with little background knowledge of it: the colossi are unnamed, and Wander and the woman (Mono) are only provided names in the credits. This lack of naming is one of the ways that *Shadow* takes on a mythic character, forcing players to engage with the imagery of the work more directly. *Shadow of the Colossus* unfolds as a ritual repeated sixteen times: Wander awakes in the central temple, journeys across the silent landscape, slays a colossus and is pierced by dark tendrils emanating

from it, and falls unconscious, only to awaken in the temple to repeat the process. After defeating the sixteenth colossus, a final tragic sequence concludes the work.

4.3.2 A DESPERATE CLIMB

Shadow teaches the player the central affordances during their short trip from the central temple (the Shrine of Resurrection) to their first battle with a colossus. Prompts are shown on-screen for actions that are required to traverse the terrain, such as climbing a wall of vines. Controlling Wander, players have the affordances of running (PlayStation controller analog stick), jumping (△ button), dodging (Right Trigger 1 + △), gripping and climbing certain surfaces (holding Right Trigger 1), saving at shrines (○ button), using a bow and sword (□ button), viewing the world map (which only gives faint outlines of the landscape), and riding their horse, Agro (× button to call her, or spur while riding) (a PlayStation controller is visible in fig. 4.18). Wander's jump is a full-bodied lunge, and is mainly used to jump between climbable surfaces. The ability to grip elements such as ledges and the colossi's fur—central to the experience—is defined by a stamina meter: Wander will eventually run out of strength to hold on, so players must reach a safe place to stand and regain their stamina before climbing once more. This meter recharges quickly, but finding anywhere safe to stand is challenging since the ground under the player is a living colossus, often trying to shake itself free of them. Wander's quickness at climbing is also impacted by whether he is holding his sword or bow, or using both hands to climb. Importantly, this action of gripping is mimetic: players grip the trigger button on the controller to grip surfaces in the game, and may themselves feel fatigue after long periods of intensely holding on as the colossus tries to shake them off and send them hurtling back to the ground (Suttner 2015, 33). This central action, like other elements in the work, manifests a Link image schema: by clinging to the colossi, Wander ties his fate to theirs.

The bow and sword shape interaction in a range of situations. The bow has infinite arrows and is mainly used to irritate the colossi and open paths to climb them. In the environment, it can also be used to shoot fruit from certain trees that can be eaten to increase Wander's total health, and to shoot the white tails of certain lizards which can be eaten to increase Wander's grip stamina. These two edible affordances of the world are never presented to the player, and I was entirely unaware of them until reading Suttner's (2015) short book on *Shadow* and the lore surrounding it. I suspect that only the most curious players discover them. As implied by the opening, the ancient sword is centrally important: it is used as both the primary wayfinding tool in this vast landscape, and as the only means for slaying the colossi. Each battle begins with a quiet journey across the sublime landscape from the central Shrine of Resurrection, providing an important time for reflection between the battles themselves (Suttner 2015, 3). To find the next colossus in this vast expanse, Wander can hold the sword above him and rays of light will reflect from it and converge in its direction. Once the colossus has been found, these rays converge on its weak spot, which Wander must stab to defeat it. As with gripping above, the sword manifests a LINK image schema by drawing a straight line from itself to the colossi and to their weak spots. Wayfinding in the world is also grounded in the CENTER-PERIPHERY image schema: the Shrine of Resurrection sits in the center of the map, and tall columns of light pierce the sky at the places where the player has defeated colossi. In this way, the Shrine, light columns, and hazy world map provide allocentric means of navigation, while the sword provides an egocentric one.

Using the sword for combat, it can be swung in the air by tapping the attack button, or used to stab the colossi while Wander is gripping onto their fur. The strength of the stab is tied to how long the player can charge up their strike, and the controller provides tactile feedback by vibrating as the player charges their attack. Yet in sharp contrast with most videogames, the

Figure 4.10: Stabbing the third colossus.

Figure 4.11: Fighting the tenth colossus.

close link between player and avatar is slightly distanced: Wander will only try to stab a colossus

when he has gained his footing, and it is typical for a colossus to shake him out of his prone

stance while he charges a strike. This forces the player to execute their attacks with careful

timing, experiencing the schema of building up a force and releasing it (Johnson 1987; Sicart

2008), heightening their awareness of each strike they violently deal (fig 4.10).

4.3.3 A SOLE COMPANION

In *Shadow's* barren landscape your horse Agro becomes a valued companion. This world is far

too large to traverse on foot, and the experience of riding her defines the quiet segments between

battles. Players can give her directions with the control stick and press a button to spur her on (or

to call her when not riding), but Agro is not controlled like a vehicle and has independence from

the player. She will automatically steer, galloping through bends in a path and turning instead of

running into walls, and will explore the area around the player when they are not riding her.

Further, the occasional horseback battles with colossi force players to trust her judgement and

build a bond through cooperation. The battle with the tenth colossus, a sand worm, is one such

example: the player must trust Agro to gallop across the dunes as the worm chases them, while

themselves turning around in the saddle to shoot the colossus in the eye (fig. 4.11). Cole

highlights the importance of the player's relationship with Agro in a world lacking other friendly

beings, noting that it is "Agro alone that the player can communicate with, interact with in a positive way and work with to progress … this extra focus on the relationship, without competition from anything or anyone else, encourages a closer bond between player and partner" (2015, 4); another LINK schema encoded into players' actions in this virtual environment.

Befitting a tragic work, *Shadow* does not leave Agro unscathed for aiding Wander in his foolish quest. The two encounter a precarious bridge on their way to the sixteenth colossus, and it begins to crumble as they cross it; in a final moment of selfless care, Agro bucks Wander safely to the other side, herself falling into a river far below. While Wander is briefly saddened, this moment gives the player a clear view of how corrupted his appearance has become, and in that sense, how responsible he is for Agro's (apparent) death.

4.3.4 ENCOUNTERING THE COLOSSI

Shadow complicates the typical human perspective by the extraordinary difference in SCALE between Wander and (most of) his foes. Here the regular human experiential separation between organism and environment is broken, and players experience the harrowing reality of the mouse riding an elephant, where the ground itself is another living being. This, combined with the colossi's gentle demeanor and the natural elements integrated into their bodies (fig. 4.12), encourages a metaphoric reading of them as nature itself, and the act of killing them as one of asserting domination over nature (Thomas 2007). Further, the experience of climbing a colossus and looking out over the world from its head parallels that of climbing a mountain, and the first US release of the game plays up this metaphor with the advertising tagline "Some mountains are scaled. Others are slain." (Team ICO 2005). Yet in contrast to typical videogame heroism, the punchline here is that desecrating nature only results in the corruption and demise of the human undertaking it, a theme that surely resonates with Japan's native Shinto religion.

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Figure 4.12: The twelfth colossus has grass and plants as part of its body.

Another important aspect of the colossi is their presence as living individuals. Discussing

this, Suttner quotes an interview with the game's director Fumito Ueda, where he reveals his

intent of giving the colossi ambiguous-yet-realistic forms, integrating the imagery of buildings

and even cars into their designs (2015, 29). Further, great care was spent on animating the

colossi as believable beings, with particular "attention to the colossi's perceived weight and

energy levels" (Suttner 2015, 99); the player experiences each one as a memorable individual as

they learn its behaviours, and this heightens the cruelty of exploiting these patterns in order to

slay them (Cole 2015, 4). The colossi's personhood takes on additional force when battling the

humanoid colossi, as players' mirror neurons may empathize with the colossus's body instead of

Wander's: the battle with the fifteenth colossus requires stabbing the palm of its hand, and it is

hard not to wince in empathy while accomplishing this (Gallese and Gattara 2015, 166). This

person-to-person encounter with the colossi sharply contrasts with the "waves of near identical

Figure 2.13: Wander before and after his quest.

Figure 2.14: Dormin addressing Emon.

(and often dehumanized) enemies seen in other combat-oriented games" (Cole 2015, 4) and it helps frame the violence of killing them in an unglorified light.

4.3.5 HOLDING ON AND LETTING GO

Empathy for the colossi—and the understanding that killing them is immoral—is driven home in the work's tragic conclusion. Upon defeating the twelfth colossus, the player is shown a brief cutscene of a group pursuing Wander into the forbidden land, led by the masked figure in the introduction, now identified as Lord Emon. After defeating the sixteenth colossus, this party arrives at the Shrine of Resurrection just in time to witness its idol shatter and realize that they were too late to stop Wander from completing his task. Dormin teleports Wander into the room (implying that this had been happening after each battle), and he now bears small horns, pale corrupted skin, and the glowing blue eyes of the colossi (fig. 2.13). As he arises and stumbles towards Mono, Emon scolds him for his actions, tells him that he has been used, and orders the guards to kill him as he would be better dead than alive in his now-cursed state. One fires an arrow into his leg, forcing him to fall over, and as he writhes in agony on the ground another soldier stands above him, holds his sword up, and stabs vertically, unmistakably paralleling the way that Wander felled the colossi. Wander's desperation is enough to keep him alive, and he struggles once more to stand and approach Mono before collapsing and becoming enshrouded in darkness. The shadow begins to grow into a huge demonic form, and Dormin announces that

Wander has freed it by slaying the colossi, and that it has "borrowed the body of this warrior…" (fig. 2.14) (Team ICO 2005). The player now controls Dormin, and directly experiences the frustration and vulnerability of being a colossus as they attempt to attack Emon and his guards: movement is slow, and these tiny figures are fast and quick to retreat. This situation provides players with a different embodied perspective on their prior virtual actions, serving as a spatial scaffold to encourage empathy towards their sixteen victims. This brief sequence ends as the party reaches the spiral entry room of the Shrine, and once there, Emon throws the ancient sword (taken from Wander) into a pond, creating a sealing force to once more trap Dormin.

As the shadows are torn off his body, the player once again controls Wander and tries to push against the wind to get to Mono's altar; though this task is impossible, players are free to attempt it. Fortugno (2009) ties this final sequence—and the major theme of the work—to a conceptual metaphor primed by Wander's gripping mechanic: holding-on and letting-go of life attachments (where LIFE ATTACHMENTS ARE OBJECTS). To end Wander's story, players must allow him to finally let go of his desperate desire to see Mono resurrected by allowing himself to be sucked into the seal (Fortugno 2009, 185). At this, the massive bridge to the Shrine begins to collapse as Emon and his men ride off, out of the forbidden land. Returning to the shrine, Mono awakens, and Agro—miraculously surviving her fall—limps in with a broken leg. They discover a baby with horns in the now-empty pond (implied to be Wander as players can make it squirm), and *Shadow* concludes with the group entering a lush garden on the roof teeming with life.

4.3.6 SUMMARY

Shadow is a surrogate space designed to provoke internal moral conflict. The experiential arc of battling a colossus has much the same triumph-over-challenge enjoyment that is common in videogames, yet here the 'heroic' power fantasy of slaying giants is experientially framed as

immoral and unwise through the empathy the work sows towards the colossi, and the trepidation and unease in the music and environmental atmosphere. By still eliciting, yet negatively framing the triumph-over-challenge affect common to videogames (Cole 2015), *Shadow* critiques its medium and any players who are accustomed to unproblematically enjoying this power fantasy affect. By emphasizing the animal/environmental otherness of the colossi, the work also invites reflection on how one should ethically relate to nature. Finally, the LINK image schema is heavily imprinted upon the experience of this space, from the sword's rays that converge on their target, to the mechanic of gripping the colossi, and the bond that players often develop with Agro. This structure resonates with a tragic protagonist whose fatal, immoral flaw is an intense attachment to a woman that has passed on (Fortugno 2009, 185), and who literally and metaphorically clings to the colossi as a means to her resurrection, whatever the personal cost.

4.4 KATAMARI DAMACY: PARODYING CONSUMPTION

4.4.1 OVERVIEW

A little man with an oblong head pushes a brightly coloured ball across the surface of a messy table (fig. 4.15). This ball must contain some extraordinary force, you think, as each object that it touches is miraculously adhered to it; soon, all you see is a dada-esque assemblage of objects shaped in a rough sphere. It flies off the table, swallowing a pile of discarded beer bottles, VHS tapes, and—oh no—a little dog. In only a few minutes the ball has collected all of the small objects in the room, and is now swollen enough to consume the table it began on. The little man dances away as he pushes the ball, and you cannot help but join in, hearing the kitschy bubble-gum pop music pushing him onward. The ball rolls outside, growing alarmingly, beginning with

Figure 4.15: The first level of *Katamari Damacy*.

bushes and trashcans, then people, houses, trees. The ground beneath you begins to crack, and you know the ball is incorporating that, too, in its ever-growing mass…

The vignette above is not some strange excerpt from a dream diary: it is the premise of the cult-classic videogame *Katamari Damacy* (Namco 2004). In it the player takes the role of the Prince, sent to Earth to roll up its material objects into 'katamari' balls. The Prince's father, the King of All Cosmos, has accidentally smashed the stars in the sky in a drunken ecstasy, and wants to make new stars out of the katamari the player collects. This absurd narrative frames the player's sole activity: rolling up everything in sight. By creating a surrogate situation where *all* objects of daily life are reframed as things to be consumed—used to grow the katamari so that it can pick up even larger objects—*Katamari* parodies consumption by inviting players to enact it to the extreme, playfully subverting it in the process. The expert player will be able to collect all of the objects in a level, leaving a lamentably barren landscape until the timer runs out: an

Figure 4.16: Progressing through scales in *Katamari Damacy.*

emergent feature wryly noted by the creator himself (Welsh 2009). Paralleling this darker

discourse, players of *Katamari* take a miraculous trip from collecting thumbtacks and orange

peels to rolling up cities and islands, experiencing the world as a multi-scaled material ecology

(fig. 4.16) (Chang 2016, 219).

Alongside *Shadow of the Colossus, Katamari* is the other 'AAA' production created by a

large company for a mass audience that has been included in this thesis. Like *Shadow,* its

development was led by an 'auteur' creator, Keita Takahashi, yet in sharp contrast it has become

a popular franchise and spawned a raft of sequels (to Takahashi's chagrin (Yin-Poole 2010)).

Given the work's richness, this study's analysis cannot aim to be comprehensive; instead, it will

primarily explore how *Katamari's* spatial environment and game mechanics (Sicart 2008) are

designed to encourage a critical awareness of consumption and the interrelatedness of material

objects. At root, the work is an experience of rolling, growing, and collecting. These three verbs

encapsulate the core player interactions, and they encourage certain metaphoric readings. As a

surrogate space where players can subversively play with an extreme form of consumptive

behaviour, *Katamari* invites them to reflect on their own consumer habits and the nature of

ecology and objects more generally.

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Figure 4.17: The introductory video.   Figure 4.18: The tutorial level.
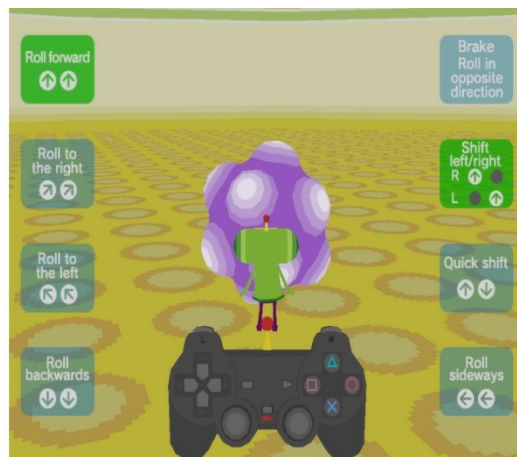
4.4.2 LEARNING TO ROLL

Katamari Damacy begins with a joyous introductory video that amounts to a series of non-sequiturs: a meteor crashing into grey fields turning them green; the Prince dancing on the knee of the King playing a guitar; and pandas dancing on Mount Fuji, which is quickly being covered in mushrooms (fig. 4.17). This short intro frames the world the player has entered as colourful, whimsical, and peculiar, reminiscent of the Beatles' *Yellow Submarine* (Jones 2008, 48).

Players are then taken through two tutorial levels: the first one introduces the affordances for moving their body (the rolling katamari) and the second one lets them see how these exist in relation to the world. In the first, eight tiles show possible movements, and they light up once players have completed them (fig. 4.18). The two analog joysticks control the dynamics of rolling, and players can also flick them to do a speed boost or simultaneously click them to quickly turn around 180 degrees. Additional buttons let players pause the game, make selections in menu areas, and stop rolling and look around, either from a first-person view or from one looking straight down (both are rarely used). The tutorial requires players to complete these motions to progress, ensuring that they have a grasp of the possible interactions.

Figure 4.19: The affordances of rolling a katamari.
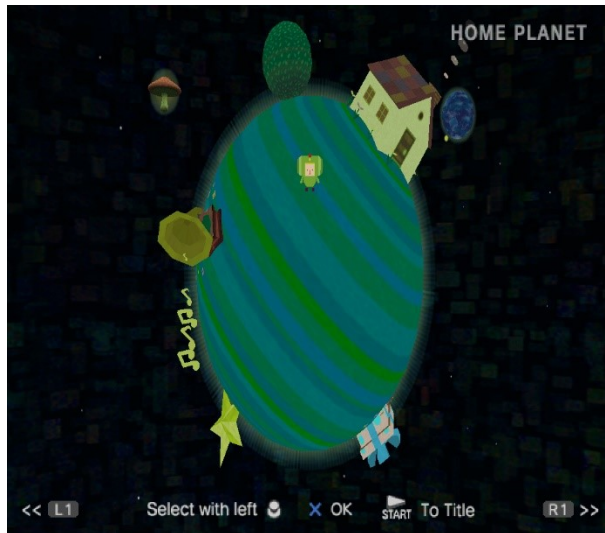
Figure 4.20: The Home Planet.

Figure 4.21: Selecting a level on Earth.

The second tutorial places players in *Katamari*'s first environment: a caricatured Japanese livingroom (fig. 4.15). Unlike most levels, they are given no time limit and are simply asked to grow the katamari from 5 to 10cm. This encourages them to test the affordances of interacting with the world, and it is easy to get started since the room is strewn with countless small objects like strawberries, dice, and push pins. Upon completing this, players are shown a number of illustrations highlighting the katamari's affordances (fig. 4.19), and are taken to the videogame's hub area called the Home Planet (fig. 4.20). Hitting objects too large to pick up can break off bits of the katamari, reducing its size; picking up long thin objects like poles can make the katamari oddly shaped and off-balance; some moving objects need to be hit and stunned by the katamari before they can be picked up; and the katamari can roll up small vertical steps or over walls

(relative to its size). By placing these illustrations at the end of the level, players may have already discovered a number of them via interactive inquiry.

The Home Planet exists as a hub area between individual levels, allowing the player to explore *Katamari's* peripheral features. Players can save their progress, listen to the songs in the soundtrack, switch their character with one of the Prince's cousins (a purely visual change), add clothing to the Prince after finding 'royal presents' in the levels (also purely visual), and view the objects they have rolled up in a multi-view database. They can also press a button to fly over to Earth, where they can select one of the game's levels, unlocking new ones as they complete them (fig. 4.21). Players can explore as many or as few of these areas as they wish, and some may opt to solely play the levels and save their progress in-between.

4.4.3 ROLLING, GROWING, AND COLLECTING

Levels in *Katamari* come in two types, "Make a Star [#]" levels, where the player is given a limited time to grow the katamari to a specified minimum size, and "Make [a Constellation]" levels, where the player is typically tasked with collecting as many objects of a certain type as possible, such as crabs for the constellation Cancer. The interface displays the katamari's current and desired sizes in the top left, a timer in the top right, brief displays of objects when they are collected in the lower left, and a view of the Prince in the lower right (fig. 4.22). This extra view of the Prince lets players see him (and his costume) even when he is a barely visible on screen.

The Make a Star levels are quite pure: the player's task is to roll up everything in sight, optimizing which objects they seek in order to do this as fast as possible. Early levels take place in small areas, and the final one has the player rolling up cities, islands, and clouds (fig. 4.22). The play experience underscores Noë's (2004) argument that perception is an active engagement with the world, not a passive reception of information: the player is constantly scanning the

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Figure 4.22: Rolling up islands and clouds.

Figure 4.23: A line of toolboxes down a street.

objects in the environment to determine an optimal path for growth. They are also perpetually

evaluating whether objects that were previously too big can now be swallowed up, since the most

beneficial objects are the ones that the katamari is barely large enough to incorporate. While the

environments generally conform to reality, the objects are playfully strewn about in patterns that

can aid the player in graceful motion (e.g. a row of toolboxes going down a street (fig. 4.23)).

The player alternates between judging the affordances of individual objects to add to the

katamari, and the affordances that a cluster of objects might have for moving through in a path

(since it is preferable to maintain momentum). The main experience is one of rolling and

growing, and *Katamari's* sophisticated physics system makes this feel quite tactile: an

imbalanced katamari rolls more awkwardly and *feels* lopsided, and after the first videogame's

success Namco even chose to patent the system underlying it (Ogita, Yamabe, and Takahashi

2008). A notable approach to game design argues for starting from a single action verb, called a

'core mechanic', and Totten gives *Katamari* as an example for 'rolling' (2014, 77-8).

The Make [a Constellation] levels place their emphasis on collection rather than growth: if

the object type the player is collecting is small and hidden in nooks within the environment, it is

Figure 4.24: Different views into the object database.

better for them to limit growth, only picking up that type. The player's active perception is now seeking out certain types of objects, just as much as it is judging whether or not the object can be incorporated, and collection supersedes growth. Speed is still a factor in these levels, but it is far more tempered by the need to make strategic decisions. Each item is briefly shown with its name in the lower left when it is picked up, and being able to view items later in the Collection area further emphasizes collecting as an important dimension of the experience. This area offers different organized views of the objects, letting players browse them by size, type, or even by name for the humans the player rolls up (fig. 4.24). This interface aids obsessive players in collecting every object in the videogame, and Jones compares it to "tabular web-page collections on eBay" (2008, 56), suggesting ideas of shopping and consumption.

Thus, the primary spatial concepts that structure *Katamari* are rolling, growth (SCALE), and collection. These all reflect image-schematic structures ripe for meaningful metaphoric projection, and the experience of rolling is defined by the force schemas that Johnson identifies, such as COMPULSION, BLOCKAGE, and REMOVAL OF RESTRAINT (1987, 45-7). The metaphors and frames of the experience—its major themes—develop out of these spatial structures.

Figure 4.25: The King reinforcing that size matters.

Figure 4.26: The emptiness seen by skilled players.

4.4.4 METAPHORS: SNOWBALLS AND FOOD

How was an experience as strange as *Katamari* able to be understood so widely, attaining cult-classic status? While there is a debate regarding the importance of metaphor in creating intuitive human-computer interfaces (Blackwell 2006), *Katamari* very successfully uses this tactic: it relies on the iconic task of rolling up snowballs for snowmen to make its bizarre scenario quickly intelligible. In the world of *Katamari*, all Earth's objects are clumps of snow ready to be rolled up. The sequel, *We Love Katamari* (Namco 2005) makes this metaphor explicit with a level set at a ski resort where the player rolls up a katamari for a snowman. This KATAMARI AS SNOWBALL metaphor is arguably the most important one in the videogame, as the experience may have been too alienating for new players if this familiar concrete parallel did not exist.

At a lower level, the primary metaphor IMPORTANT IS BIG underlines all aspects of *Katamari*: the purpose of most levels is growth, and the narrative reinforces it when the gigantic King regularly mocks the player character's size and often the size of the katamari they have made (fig. 4.25). Becoming big means becoming important, a clearly desirable end. Objects exist

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as the way to gain size and importance, implying the metaphor that OBJECTS ARE FOOD (FOR GROWTH): the basic spatial logic of consumption.

To the player of *Katamari*, all of Earth's objects exist to be collected and used to grow: their telos is to be consumed. This logic of growth through consumption underlies capitalism, and by inviting the player to enact it to its furthest extreme, *Katamari* points out its inherent nihilism; as noted above, once the objects have been engulfed by the katamari there is just an empty environment (fig. 4.26). The videogame's designer, Keita Takahashi, has revealed his intent to communicate this cynical attitude towards consumer culture through *Katamari,* and he seems to have succeeded (Welsh 2009). Jones's scholarly reading of *Katamari* in his book *The Meaning of Video Games* (2008), revolves around collection and consumption, looking at them via the lenses of Walter Benjamin's *Arcades Project* and the culture of 'otaku' fan collectors. He notes that "[j]ust to play is to collect and, at the same time, is to perform collecting in a self-conscious arena of cartoonlike representation" enacting a parody of "collecting in today's culture" (Jones 2008, 63). Given Takahashi's intent, *Katamari* shows how videogame designers can invite players to learn their ways of thinking through carefully crafted surrogate situations.

4.4.5 FRAMING AN ABUNDANT WORLD

Katamari establishes a number of frames beyond these metaphoric ones. As noted above, its narrative justifies the greedy behaviour of the player, and its colourful art direction and upbeat music create a festive air to what could otherwise be a horrifying scene. In addition to these, *Katamari* establishes a frame of caricatured Japanese material culture, and its gameplay frames a radical equivalency between material entities while allowing players to experience its world as a multi-scaled ecology.

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Much of *Katamari's* appeal is tied into its caricatured portrayal of Japanese material culture and the frame this sets around the experience (Consalvo 2016, 197-8). Insofar as it celebrates the cornucopia of objects within the gameworld, Japanese objects (of both daily life and rare occasion) are given a special place; for example, the player begins the first level on top of a *kotatsu* (a Japanese table with a heat source below it, covered by a blanket). To non-Japanese players many of these items will seem foreign, and collecting them adds to the exotic appeal of the gameworld as somewhere different from daily life. Consalvo further notes that the 'weirdness' of *Katamari* and "other Japanese designs seems to imply freedom to explore the boundaries … of normal relations, to play with what might be considered frivolous or unusual" (2016, 198-9). These qualities fit *Katamari's* playfully subversive mood, and also speak to the wide popularity of Japanese videogames in the brief history of the medium.

By allowing the player to roll up anything and everything (and rewarding them for it) *Katamari* frames a radical environmental equivalency between objects of nature, humans, consumer goods, and material culture. All are entities in a larger material ecology, presented akin to the way Actor-Network-Theory frames material relations between human and non-human agents (Latour 2005, 70-4). Any player who has never considered these different categories as materially equal will be challenged to do so through their action in *Katamari*. Further, the progression of growth from rolling around on a small tabletop to rolling up houses, skyscrapers, and eventually clouds and rainbows experientially frames the Earth as a multi-scaled ecology (Chang 2016, 219). While the Eames' iconic short film *Powers of Ten* (1978) attempted to convey a similar frame, *Katamari* is more effective: the player *experiences* the frame instead of just witnessing it. This ecological view results from Takahashi's design decisions, and it occurs naturally in a system where a growing ball picks up ever-larger objects in an environment. It is

an emergent frame, one arising from the many systems that comprise the videogame independent of whether the designer intended it. In contrast to *Katamari's* negative view of consumption, this ecological frame is a hopeful view of an abundant world existing at many scales.

4.4.6 SUMMARY

Katamari Damacy uses its playful game mechanics of rolling, growing, and collecting to critique the nihilism of consumer society, framing an ecological understanding of the material world in the process. As a virtual environment, *Katamari* highlights how the particular spatial concepts that a player *plays with* can support the larger concepts that define a videogame's spatial discourse: growth and collecting are concepts that should underscore any meaningful critique of consumerism. It also demonstrates how a metaphor, delivered multimodally, can permeate a surrogate space: IMPORTANT IS BIG is delivered through the gameplay, the King's dialogue, and his image, serving to emphasize its importance as an idea. Yet throughout, *Katamari* satirizes this metaphor by presenting it as an absurdity, ideally robbing it of its persuasive power in the process. One must hope that players leave *Katamari* with a sense that the consumer system they are enmeshed in is itself an absurdity.

4.5 CONCLUSION: RESONANT STRUCTURES, TAINTED MASTERY

The three works presented above all serve as surrogate situations for real-world scenarios, inviting players to test the boundaries of behaviour within a space safely removed from the consequences of the real world. *Shelter* invites players to experience some of the anxieties of caregiving that may be foreign to them, *Shadow of the Colossus* asks them to undertake an evil task and empathize with their victims, and *Katamari Damacy* asks them to push consumptive behaviour to its limit, treating everything in existence as an object to be acquired. These works

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share some important characteristics: their spaces are designed to recreate experiential structures that players can encounter in the real world, they reinforce a central theme by having it resonate between the player's kinetic actions-in-space and the work's larger narrative, and they take a critical approach to the process of players mastering the game and completing it.

First, these works are meaningful because they simulate meaningful spatial structures from real experience. *Shelter* recreates anxieties of caregiving by building a digital space that overlays the PATH and CENTER-PERIPHERY image schemas, just as they are overlaid in the experience of a parent guiding their real children through a bustling crowd. The experience of gripping onto a colossus as one climbs it and triumphantly reaches the top resonates with mountain climbing, and with the charged relationship between humanity and nature at the heart of that pursuit. Feeling one's life drain away as a result of pushing oneself too far in pursuit of foolish ends is surely familiar to many, even if the circumstances lack the mythic grandeur of *Shadow's.* And the unsatisfying emptiness that confronts a *Katamari* player who has successfully consumed everything in sight evokes a sickly feeling, comparable to the one that arises from trying to find happiness through acts of overconsumption. By simulating the interactive spatial structures that afford these experiential gestalts, these videogames allow players to experience these gestalts of care, power, and consumption again or anew, and at a critical remove for the world itself.

Second, the narratives that frame these three works (presented multimodally through text, imagery, and the sequence of the play experience) reinforce the experiential gestalts that arise in player actions, weaving a strong thematic thread across modes. The many small acts of care in *Shelter*, from gathering food to cautiously advancing past dangers, ease players into caring for the cubs they're guiding, and give them a taste of care-based relationships. The sophistication of *Shadow's* discourse on power rests in its modal dissonance between the enjoyment of climbing

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and slaying the colossi (gameplay mode) and the clear framing of this task as unwise, evil, and ultimately self-destructive (all other modes). *Katamari* also uses dissonance, but here it occurs within the gameplay itself: consuming everything in sight is enjoyable, yet as players excel at this task, they begin to find themselves in an empty world that contrasts starkly with the abundant one teeming with life that they began in. This dissonance, combined with the absurdity of the King insisting that IMPORTANT IS BIG, frames consumption as an ultimately nihilistic task that only results in emptiness. In all three cases, the player's moment-to-moment actions in the world speaks to these works' larger themes, reinforcing them through resonance or juxtaposition.

Finally, as videogames that emphasize player action, there is a natural flow of players mastering the types of interactions required of them as they progress through the work (see Dreyfus and Dreyfus (1999) for an embodied account of mastery). That slow journey towards mastery is common across videogames, yet while most works celebrate the player's growing power against the forces of the gameworld, these works subvert that ascension. Concluding *Shelter* with all five children alive provides no explicit reward, and the final vignette of the mother's death can be read as an ultimate act of care: a self-sacrificial death that allows her children to escape. *Shadow* ties mastery to corruption: Wander's victories over the colossi increase his strength while rotting his soul. And mastering *Katamari* leaves the player with a nihilistically empty world. In all three cases, 'winning the game' brings with it a sense of lament, and a critical view of the actions the player has enacted to get to this point. Eventual mastery is an unavoidable aspect of players engaging with interactive systems, and these videogames show that a critical response to that process can be effectively incorporated into a work.

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5. Perception

Environments are not just containers, but are processes that change the content totally. New media are new environments. That is why the media are the message. One related consideration is that antienvironments, or counterenvironments created by the artist, are indispensable means of becoming aware of the environment in which we live and of the environments we create for ourselves technically. (McLuhan 1997, 225)

5.1 INTRODUCTION

This study has taken us from videogames designed as rich places to explore to ones that serve as

surrogate spaces for action. Both of these are common spatial conditions in both the real world

and in videogames, and they speak to the typical experiences offered by this new medium. This

chapter pushes beyond, into avant-garde fringes where creators test the boundaries of what they

can communicate with the new semiotic resources on-offer. While there have always been

experimental videogames (Polansky 2016), the growth of independent game development and

online distribution platforms for small creators (e.g. *itch.io*) has fostered an explosion of works

in the past decade. Schrank's (2014) study of avant-garde videogames makes a useful distinction

between those that are politically radical and those that are formally/aesthetically radical (works

can also be both, or neither), and the experimental ones that will be analyzed here fit into the

formal camp: videogames that force their players to learn new modes of perception in order to

advance through their worlds. Since this core task is a cognitive one, these works are often

considered 'puzzle games' of one kind or another, and they evidence the ways in which all

videogames push us to learn particular ways of perceiving their (virtual) worlds in order to

progress through them, enticing us with new areas to explore and secrets to uncover if we

internalize their logic. Yet these works often go much further, acting as scaffolds that guide

players into bizarre ways of perceiving that they would never otherwise develop in physical space, often using videogame conventions to appear much less experimental than they are.

Recalling our discussion of embodied cognition in chapter 2, enactive perception argues for understanding perception as a form of goal-directed action upon the world (Dreyfus and Dreyfus 1999; Noë 2004), and embedded cognition explores how the structures of an environment help shape cognition within it (Kirsh 1995). Pairing these areas with the core idea of the previous chapter, that videogames are spaces for situated action, reveals how virtual environments can be designed as scaffolds for training new modes of perception through (virtually) embodied action. The videogames discussed in this chapter resist straightforward comprehension, and severely limit players' affordances for action in order to help them discover new ways of perceiving their worlds. Once players have spent the requisite time experimenting within the virtual environment and 'learned to see', they can advance deeper into the world and eventually complete the work. This might mean discerning solids from voids with the barest information, as in *Thirteen Gates*, or learning to perceive movement linked to time, as in *SUPERHOT*. This has parallels with the process of developing perceptual abilities that we all undergo in childhood (Johnson 2007, 31-51) (e.g. object-permanence and the peek-a-boo game), and with the growth in affordances that we perceive after becoming skilled with a particular tool (e.g. skiers seeing possible paths down a mountain). As Kirsh notes, "[a] competent tool user may perceive the affordances brought into existence by her use of tools, even when those tools are not in her hands!" (2013, 9). Playing these experimental videogames teaches players new ways of seeing the world that they are free to bring back to their perception of the physical world, voluntarily and involuntarily. Spatial experience is here used to communicate and inculcate these new modes of perception.

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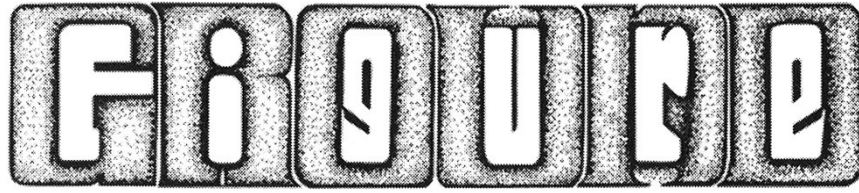
Figure 5.1: A polysemous drawing demonstrating figure/ground reversal.

By provoking players with unconventional, sometimes alienating perceptual experiences, these videogames belong to the tradition of defamiliarization in art. Taking an environmental angle towards this, McLuhan argues that all art provides a counter-environment to the world of daily life, helping viewers reflect on the structures and practices that define their lives (Allan 2014). He believes that "what we call art would seem to be specialist artefacts for enhancing human perception" (McLuhan and Parker 1969, 32) and that entering the space of an artwork can temporarily break us out of the nonconscious automaticity of regular (embodied) experience. This theory is built on an important cognitive structure that went undiscussed in chapter 2: figure/ground, the quality in perception where some element is the figure of one's attention while the rest of the situation recedes into the background, first observed by gestalt psychologists in the early twentieth century (Stockwell 2005, 15). McLuhan elaborates:

> All situations comprise an area of attention (figure) and a very much larger area of inattention (ground). The two continually coerce and play with each other across a common outline or boundary or interval that serves to define both simultaneously. The shape of one conforms exactly to the shape of the other. Figures rise out of, and recede back into, ground, which is configurational and comprises all other available figures at once. For example, at a lecture, attention will shift from the speaker's words to his gestures, to the hum of the lights or to street sounds, to the feel of the chair or to a memory or association or smell. Each new figure in turn displaces the others into ground. (McLuhan and McLuhan 1988, 5)

Figure/ground has been widely illustrated through polysemous drawings where viewers can only see one of the figures at once (fig 5.1), and this same principle can be used in the design of virtual environments and experiences, teaching players to perceive new figures within the frame

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provided by the ground. All three works analyzed in this chapter are counter-environmental figures set against the ground of regular perceptual life, while also being works that push players to separate meaningful figures from the ambient grounds of their virtual environments. *The Witness* relies heavily on this, pushing players to discover solutions to its puzzles and evocative images subtly woven into the fabric of its world.

The three works selected for this chapter challenge players' perceptions in quite distinct ways. *Thirteen Gates* reduces players' view of a navigable 3D world into nothing but coloured vertical strips of differing widths. Perceiving space becomes intensely challenging, but with time players can learn to navigate these otherwise-simple spaces and find the exit of each level. Later levels push players to cope with solid/void reversals, and changes to the level geometry that subtly occur as they explore. *SUPERHOT* links the progression of time to the movements of the player: stand still, and so does time. Players are thrown into violent scenarios where they must strategically determine a path of motion to overcome their attackers, learning to perceive the many paths of motion that will unfold as their own movement advances time. It is a 'death, reset' experience, where repeated failures eventually lead to a better understanding of each situation and the means for overcoming it. Finally, *The Witness* invites players to explore a picturesque island and learn to complete an idiosyncratic form of spatial puzzle found on boards across the world. After enough time spent obsessing over its patterns, players awaken to the fact that this puzzle's geometry is imprinted upon the environment of the island itself. Many puzzles in this world demand that players become aware of minutiae in their surroundings, such as the sound of their footsteps, bird calls, the shadow cast by their first-person avatar, and subtle scratches in surfaces only visible by seeing the sun reflect off of them at a particular angle. Far more than the other two works, *The Witness* hopes to send players back into the physical world with a greater

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appreciation for its details. True to the experimental nature of this chapter, both *Thirteen Gates* and the initial prototype for *SUPERHOT* were developed as entries in the annual 7 Day FPS game jam that challenges participants to create an innovative first-person shooter in seven days, and *The Witness* was developer Jonathan Blow's follow up to his experimental hit *Braid*. The analyses here will primarily explore how spaces can be shaped to communicate new modes of perception, instead of aiming for more comprehensive analyses like in the preceding chapters.

Before diving into the final three analyses, it is worth noting an interesting sub-category of works that ended up being omitted from this chapter (with the minor exception of a few scenes in the chosen works). These are videogames that feature impossible spaces, represented with 2D illusions or clever programming tricks, and examples include *Echochrome* (SCE Japan Studio 2008), *Monument Valley* (Ustwo 2014), *Antichamber* (Demruth 2013), and *The Catacombs of Solaris* (MacLarty 2016). Players traverse impossible paths through these works, experiencing spaces that fold back on themselves or seem to expand infinitely as they move, pushing them to learn new ways of understanding space itself. The 2D works are far more approachable due to the reduced complexity and players' likely familiarity with their illusion techniques, while the 3D ones in this category are often alienating and bring a heavy cognitive load. Since the modes of perception that these works teach are unlikely to reflect back upon the physical world, it seemed appropriate to forego including one of them among this chapter's selections.

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5.2 THIRTEEN GATES: HAPTIC SPACE

Figure 5.2: A typical view in *Thirteen Gates*.

5.2.1 OVERVIEW

The experience of engaging with *Thirteen Gates* (fig. 5.2) is utterly unique among videogames, both conventional and avant-garde. It abstracts players' view of the world into nothing but a barcode of vertical strips, and challenges them to make sense of what they are looking at by moving through the world and watching as these strips change in width. Its learning process is as satisfying as it is maddening, and the experience is often a haptic one of pushing up against walls and feeling one's way around them in order to determine which surfaces are solid and which ones are voids offering an imperceptible way forward. As its developer Ian Snyder states:

"Thirteen Gates is an attack on your sense of sight. In order to navigate through it successfully, you must abandon reliance on your regular way of seeing and learn to see the way *Thirteen Gates* wants you to"* (Snyder 2012a). It built on ideas in his earlier work, *Feign* (Snyder 2010), that challenged players to navigate impossible non-Euclidian spaces, and through it he wanted to

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Figure 5.3: Diagrams showing how Thirteen Gates turns the left 3D view into the right 2D one. It reduces the information even further than the right diagram by removing all depth shading on the surfaces.

see "how far I can push this visually before its no longer playable. I'm interested in what a person will do when presented with something so outside their experience" (Snyder 2012a). By limiting players' affordances to simple movements, *Thirteen Gates* places them in an interactive feedback loop that allows them to learn to see in spite of their severe perceptual limitation (fig. 5.3). This brief analysis will begin by discussing *Thirteen Gates's* minimal affordances and how its levels were designed to support some basic legibility, and it will move on to the progression of perceptual challenges across the levels and the work's atmosphere.

5.2.2 AFFORDANCES: UNDERSTANDING IS MOVING

Thirteen Gates begins with a sparse title screen providing players with the controls and a goal: "Arrow keys to move. A/D to move sideways (Use it! Very helpful!) M to mute sound. Navigate to the end of each level." (Snyder 2012b). This control scheme is related to the conventional one found in first-person works (such as *The Night Journey* and *NaissanceE*): the up and down arrow keys move forward and backward, the left and right arrow keys turn your gaze to the left and right, and 'A' and 'D' let you strafe, shifting to the left or right without turning your gaze. The inability to look up or down is an important limitation here, since it would not change the flattened representation of space and might add additional confusion for players. The initial experience of *Thirteen Gates* is one of interactive inquiry, of awkwardly moving to try and parse

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the link between movement and the representation of space one is seeing. Snyder notes the distance between this depth-less representation of space and the sense of spatiality that is regained as players learn to read the world through their motion; "If you are to understand the game, you must be the one playing it. That connection via control is vital" (Snyder 2012a). Players that persist through the initial alienation and frustration will begin to determine key perceptual affordances: the red pattern is the background, both the blue and yellow patterns can be solid walls, and the 'exit' of each level is a rotating pole. This rotation is a vital clue for players, since it shows up as motion in their view even when they are not moving. Further, patterns that players initially read as walls may in fact be voids, showing the back wall of a hallway that they could proceed down. These limited affordances for engagement create a powerful interactive feedback loop that lets players easily immerse themselves in the task of making sense of what they are seeing.

While these limited affordances can help players grasp the configuration of the world they are seeing, its own layout is the other key structure. During development, Snyder discovered that "setting up architectural repetitions in the levels" helped players get their bearings: "The very first level … is basically a hallway of columns in a straight line … meant to orient the player and show them what kind of game this will be" (Snyder 2012a). This was the case in my own experience of the work, where levels not having "enough of these iconic places in the level for the player to orient themselves" were easier to get lost in, while ones that had abundant repetition and symmetry made for overwhelming wandering (Snyder 2012a). Recalling the discussion of orientation and image schemas for navigation in chapter 3, the most navigable levels provide optimal stimuli for players to develop cognitive maps. At one point in the play experience I pressed the ESCAPE key, thinking this would return me to the main menu (where it is possible
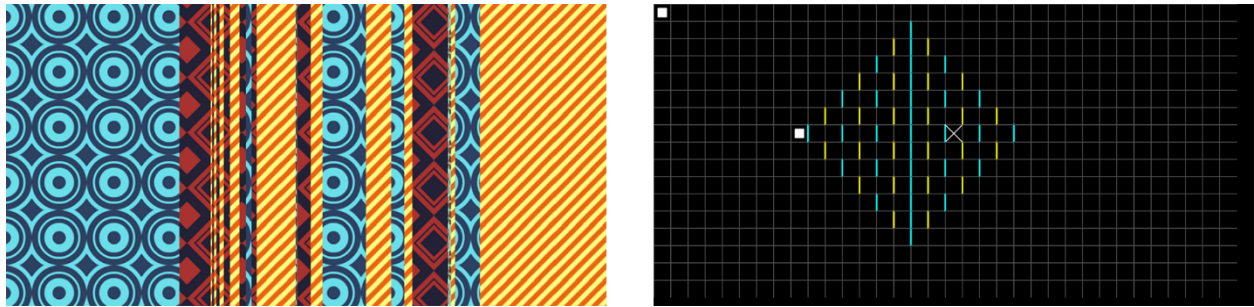
Figure 5.4: Level 4, Aisles (left), and a view of its map in the level editor (right).

to select any level), but instead it brought up a level editor displaying a map of the space I was lost in. This unintended moment of reveal is quite intense in *Thirteen Gates*, since it confronts players with the gulf between their cognitive map of a space and its actual geometry (fig. 5.4).

The progression through the thirteen levels scaffolds players' process of learning to see in this world by gradually confronting them with ever-greater perceptual challenges. A screen is shown before the start of each level, displaying its name and priming players for the sort of space they will face (e.g. "The Greenhouse"). As noted above, the first level, "Entry Way", is a simple corridor with the exit located behind the wall at the end. The second, "Thicket", is a grid of columns with the exit in the middle, while the third level's name, "Left Left Left Left", primes players to think of the spiral motion they will need to complete it, as they take repeated left turns while entering a rectangle. "Aisles" challenges players with a repetitious field of walls, and "A Known Body" pushes them to explore an object with many small alcoves, entering each one to see if it hides the exit (fig. 5.3 shows this level's geometry). "Panic Room" marks an escalation in the experience: players begin surrounded by blue and yellow walls with the red background nowhere in sight. Upon escaping the alcove they start in, players must re-enter the structure from the opposite side to find the exit. "The Purpose of Colour" is similar to the first level, but now figure and ground are reversed, and blue is the colour of void instead of red. "The Greenhouse" is a solid form on the outside, but an overwhelming maze within, and "Absurd Walls" is a

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carefully constructed solid form that is hard to find a way to enter. Marking another escalation, "Spatial Awareness" begins to subtly change the level's geometry as players walk through it: walking between two lone pillars, players turn around and now see patches of wall on either side of them. Walking into a blue void in "Reflection" reverses figure and ground, and the level's exit is at the player's starting position (but in the blue-ground zone, not the red-ground one they started in), and the following level, "Refraction", repeats this but with more complex geometry. The final level "Out of Nothing" pushes this further, having players repeatedly enter alcoves that change the background colour and the level geometry. Upon completing it, a screen thanks players, but pressing SPACE (the key that is typically pressed to start a level) takes them to one final location. After a few minutes of futile exploration, I decided to check the level editor, and discovered that this room had no exit and the walls were cheekily placed to spell "THE END". This progression of levels scaffolds players as they go from being unable to perceive space to having the potential to read a message written in the layout of the walls.

5.2.3 ATMOSPHERE: A PATTERNED VOID

Thirteen Gates builds a strong atmosphere through its sparse use of three coloured patterns that grew out of an initial desire to "evoke a finely detailed, colorful rug … Each pattern, taken on its own, is easy for the eye to follow because of its simplicity. However, when these patterns are taken together they fight for attention and the effect is dizzying" (Snyder 2012a). There is an interesting contrast in the experience between the unsettling confusion of reading and navigating space, and the beautiful and calming atmosphere of these patterns and the accompanying music. The three primary colours of the patterns create a sense of balance, and the single audio track that plays throughout the work layers ambient tones with peaceful guitar strumming and the sound of tuning a radio. Here the atmosphere comforts players and makes this space feel far less

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alienating than it otherwise should. Finally, by depicting space in such a stripped-down manner

and toying with figure and ground, the experience of navigating *Thirteen Gates* pushes players to

perceive and engage with negative space, ground itself. Elaborating, Snyder notes that:

> Games, by their nature, have a tendency to become cluttered and without aesthetic consideration. Visuals in a game are often purely information based, and one "reads" a game screen much in the way that one reads text. … So then, negative space is something that fascinates me inside games. It's, by definition, something that is nothing. It contains no information. It exists for purely aesthetic reasons. In *Feign* and *Thirteen Gates*, it becomes important because it denotes the edges of objects. (Snyder 2012a)

Determining the outlines of positive and negative space is a fundamental perceptual task, and

Thirteen Gates works as a counter-environment that invites players to become aware of this.

5.2.4 SUMMARY

By limiting players' affordances to basic movement, *Thirteen Gates* helps them learn to navigate

a world with the barest of visual feedback. As they begin to grasp its spatial logic and orient

themselves in its world, it pushes them further by reversing figure and ground and changing that

world around them. *Thirteen Gates* uses space to communicate *about* space, to remind players

that visually perceiving the world is not a passive process but an active one, even though this

usually occurs far below conscious awareness.

5.3 SUPERHOT: TIME IS MOTION

5.3.1 OVERVIEW

While *Thirteen Gates* pushes players to attend to spatial perception, *SUPERHOT* (fig. 5.5)

instead directs their attention towards temporality. Much like conventional first-person shooters,

it throws players into violent scenarios where they must overcome an onslaught of attackers, yet

in *SUPERHOT* time only progresses when the player moves, radically defamiliarizing typical

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Figure 5.5 *SUPERHOT*.

videogame violence into slow strategic moments of dodging bullets, grabbing guns out of

enemies' hands, and setting up one's next shot. This stark world of white environments, black

objects, and red enemies that shatter like glass provides players with ample time to reflect upon

their violent actions while they complete them, foregrounding their brutality. Further, death is

ever-present and often unexpected: a single bullet is lethal, and just as the player feels they have

a grip on the situation, a stray bullet often comes from behind, resetting the scenario and giving

them a better understanding of it for their next attempt. By placing the progression of time into

players' hands, *SUPERHOT* demands that they learn to perceive how these lethal scenarios will

unfold, tracing the motion paths of bullets and enemies while finding an optimal path for their

own actions, ensuring their survival and the deaths of their opponents. Victory brings a looping

replay of players' actions while a distorted voice chants "SUPER" and "HOT" (and these words

Figure 5.6: Views of the piOS computer interface. Home menu (left), chat room (right).

flash on screen), creating a defamiliarizing contrast between the smooth continuity of the actions

shown at full speed and their discrete character as just experienced by the player.

Spatial communication in *SUPERHOT* is built upon its temporal manipulation, and this

analysis will explore how the central affordance for progressing time reframes players' otherwise

conventional means for interaction, providing them with a counter-environment for reflecting on

virtual violence and their agency in committing it. For a work clearly developed out of its central

mechanic, *SUPERHOT's* cyberpunk narrative of "identity, control, and hierarchy" (Backe 2016,

2) takes on a surprisingly central role in the experience, one that this analysis of spatial

communication cannot adequately address. Booting up *SUPERHOT* brings players into a 1980s-

style computer file browser (fig. 5.6) wryly named 'piOS', where a friend of the protagonist

provides them with illegal access to a game called 'superhot.exe'. Running this file in piOS takes

players into the scenarios that comprise the videogame, and play sessions of a few levels are cut

short as the game begins to glitch, returning the player to their computer where they chat with

their friend about the experience. They eventually start receiving threatening messages from the

videogame's creator demanding that they stop playing it, but to continue the experience players

will have to boot up 'superhot.exe' in spite of these warnings. This narrative toys with nesting

worlds, and its moments of fourth-wall-breaking metalepsis resonate well with the already-

defamiliarizing gameplay. This analysis will begin with a discussion of the frames of this narrative and the piOS computer interface, before looking at the gameplay affordances, image schemas that arise from them, and the embodied metaphors that define the experience.

5.3.2 FRAMING THE ACTION

SUPERHOT is quite heavy-handed in its use of framing devices, and so this analysis will depart from the previous ones by beginning with a discussion of these elements. The first thing players see when they run the game is the boot up screen for the piOS interface, and its aesthetic of white ascii characters on a black background, flickering scanlines, and a 4:3 CRT resolution all place the player within an enveloping space reminiscent of stereotypical hacker workstations. Before they have any time to poke around, players receive an incoming chat message from a friend and are taken to a dialogue area. It cleverly involves players by having them pretend to type on their keyboard (hitting any keys they wish) to make the protagonist's message appear in the chat window, before eventually being prompted to hit ENTER to send the reply. The piOS interface and the chat segments within it serve as a significant narrative frame around the gameplay in superhot.exe, which is eventually revealed to be a VR game being played by the protagonist. This complicates and defamiliarizes typical avatar structure: the player is controlling a protagonist in this computer-space, but *that* protagonist is controlling the second-order avatar within superhot.exe. The space of this outer piOS frame is used to comment on superhot.exe and the protagonist's engagement with it: early chat segments show his initial curiosity at the game's lack of story and sole task of killing the "red guys" (SUPERHOT Team 2016), while later ones show the growing influence of a malevolent force that overwrites his messages whenever the player presses ENTER, and his threatening chats with the creators of superhot.exe (whose messages are displayed in red). Engaging with *SUPERHOT's* multi-layered world—which

Figure 5.7: The world of superhot.exe.

brings the player's own computer desktop into its frame by making players quit piOS and restart *SUPERHOT* at a key moment—forces them to "question when the game actually starts and what 'the game' is" (Backe 2016, 13).

Diving from piOS into the world of superhot.exe is disorienting, as one jumps across decades of technological development from a fuzzy text-based 80s file browser into a sparse and stylish high-resolution digital environment (Backe 2016, 14). Here all surfaces of the world are painted with an untextured white, all objects which can be grabbed are a glossy black, and all enemies are a glistening red with their polygonal geometry clearly visible (fig. 5.7). This minimal scheme makes the elements of the world highly legible—affordances are literally colour-coded—and it gives the environment a highly diagrammatic quality that makes it feel less like real space and more like an interactive representation of space (which, as a videogame, it technically is). Further, the settings for the levels in superhot.exe are quickly recognizable as conventional action film locations: back alleys, construction scaffolding, modern offices, and train station platforms are all here. These places have already been framed as 'fight scene locations' for players that watch action films (surely a majority of *SUPERHOT's* players), and so the violence is never juxtaposed with its surroundings. These locations remain a blank white ground for the black and red figure of the action to unfold against, even as their designs heavily

shape the trajectories of motion that unfold. Finally, the whiteness of its spaces gives superhot.exe a light, weightless feeling in comparison with the heavy darkness of the piOS interface, creating a meaningful contrast between these two planes of the videogame's world.

Fitting its defamiliarizing gameplay, the narrative of *SUPERHOT* follows the piOS protagonist being brainwashed and absorbed into a supercomputer, eventually killing himself from within a play session of superhot.exe. This narrative has modal consonance with gameplay that requires the player to submit to the logic of the game and learn new modes of perception, and the theme of brainwashing is present right from the start with each superhot.exe scenario beginning with words flashed on the screen as primes for action, such as "WRONG PLACE WRONG TIME" and "UNFINISHED BUSINESS" (SUPERHOT Team 2016). While watching their replay video, the player is prompted with "LEFT CLICK to hand over control" in order to proceed to the next scenario, and a disturbing scene midway through the experience puts them in a locked cage where instructions they must follow flash on the screen, and obedience results in being called a good dog. They are thrown into this cage again at a later point, with enemies standing above them on all sides, firing bullets that players must dodge with nowhere to hide, mocking their lack of agency in the situation. As players continue to boot up superhot.exe against the increasing warnings, their piOS system begins to glitch and show messages such as "Mind is Software" and "Bodies are Disposable" (SUPERHOT Team 2016), and it again places them in the cage room, but now rendered in ASCII characters and shown within the limitations of piOS, creating significant uncertainly about who and where exactly the avatar is. Within superhot.exe players are now given the ability to switch into the bodies of their enemies, and eventually they must try and upload themselves into a core, which takes them to a final scene where they must shoot themselves playing superhot.exe to be free of their body (fig. 5.8). As one

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Figure 5.8: The final scene.

Figure 5.9: Melee weapons in a cage fight.

might expect, the final text of the narrative now tells players to go and tell their friends about *SUPERHOT*, but not too much, so that they too can be sucked into the game and absorbed into the system. All of these narrative framing elements push players to reflect on what it means for them to enthusiastically play *SUPERHOT*, to submit to its logic and internalize it, even as the protagonist literally commits suicide because of their growing addiction to playing superhot.exe in spite of the many warnings they have received.

5.3.3 GETTING YOUR HANDS DIRTY

The gameplay of superhot.exe is as enjoyable as it is disorienting. In spite of the premise that the progression of time is linked to the player's movement, it does inch along at a snail's pace, visible as bullets move slowly even when the player is not moving. Looking around does not progress time, and so players can be fairly leisurely in reading the scenario and planning a course of action. The main affordances match those of first-person shooters: looking, walking, jumping, and shooting. Firing a gun progresses time a little, and guns have a reload time indicated by the crosshair's rotation, introducing a key strategic variable alongside their limited ammunition. When unarmed, players can punch enemies: a single punch makes them drop their weapon and let the player grab it, and it takes three punches to kill an opponent (the player will die upon receiving a single blow). There are also melee weapons such as a baseball bat and katana (fig.

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5.9), and objects such as bottles and ashtrays which can be thrown at enemies to stun them and make them drop their weapon. The gun currently being held can also be thrown in this manner, and a common strategy is to throw an empty gun at an enemy then grab theirs. Being hit by a single bullet or punch results in instant death, and it makes *SUPERHOT* a tense experience where the weakness of the player's avatar is acutely felt. That enemies shatter from a single shot reinforces the harshness of the violence, and the spatial metaphor that BODIES ARE GLASS primes their fragility. There is something profoundly unsettling about landing punches in *SUPERHOT's* slow motion haze, watching as an enemy shatters upon impact. By setting up constricting scenarios with only violent affordances for progression—ones that also require players to learn to perceive in a new way—*SUPERHOT* reinforces its narrative theme of a system brainwashing its user and stripping them of their agency.

A significant and thematic affordance is introduced late in the game, allowing players to 'hotswitch' into the body of an enemy, killing the avatar they are currently controlling. This comes after players have been primed that "Bodies are Disposable" in piOS, and this affordance significantly changes the gameplay while reinforcing this belief through the player's embodied actions in the environment. I had never experienced having an avatar in *SUPERHOT* as a restraint, but gaining this ability suddenly revealed it as one, and evoked a REMOVAL OF RESTRAINT force schema as I was suddenly, unexpectedly free to teleport around the scene into enemies, dispatching them in clever and inhuman ways. This ability requires a period of time to recharge, but it still gives the player an absurd advantage over their attackers and helps explain the protagonist's willingness to shoot his own body at the end of the work. Players have already learned to perceive scenes in *SUPERHOT* and devise courses of action before gaining the ability to switch bodies, and this new affordance decisively reframes their embodied existence within

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the virtual environment and demands that they learn a new dis-embodied logic of interaction and perception. This learning is done via rote repetition: players attempt some actions, die, and try again, ad infinitum, creating a cyclicality that is a defining feature of the experience.

5.3.4 CYCLIC SPEEDUP

The gameplay loop of trying to overcome obstacles, dying, and then trying again stretches back into early videogames series such as *Mega Man* and remains common in contemporary ones such as *Dark Souls*. Thus, its central presence in *SUPERHOT* would not be noteworthy were it not for how this cyclic gameplay loop interacts with the central temporal mechanic. With each repeated attempt players learn the layout of the space, the common patterns of enemies, the locations of useful objects and weapons, and the trajectories of bullets (using the SOURCE-PATH-GOAL image schema). As they build an increasingly complete mental model of the scenario, "drawing … on perception, memory, and reflection" they will find themselves playing the earlier part of it much faster, since "frequently repeated actions are easily identified, tested, and verified" (Backe 2016, 8) and they have found an optimal path through this segment of the scenario. This speedup starts to disconcertingly bridge the gap between the slow considered gameplay of learning a scenario and the fluid, superhuman combat players view in the real time replays at the end of each level. Here, skill translates directly into faster, nonconscious play, much as it can in arcade games like *Tetris* (via the ability to instantly drop blocks). This shift from conscious, intentional actions into fast nonconscious ones simulates the loss of agency that the protagonist experiences as he loses himself to the system, using the spatial experience of the work to reinforce the narrative one.

SUPERHOT radically decelerates time and gives its progression over to the player in order to demand new forms of spatial awareness. Players are not concerned with time itself, so much as with the strategic configuration of spatial elements: weapons, enemies, and bullets. Backe argues that this lets *SUPERHOT* transcend the traditional distinction between turn-based and real-time videogames (2016, 11), and while the above discussion of slow, deliberate actions morphing into smooth nonconscious motions certainly speaks to this, I never experienced the unique rhythm of turn-based games while playing it. Beyond this, *SUPERHOT* makes heavy use of framing devices to build an unsettling narrative that questions the boundaries of games and the actions committed within them. Not content to let players' own lives be the ground to the figure of playing *SUPERHOT*, the work instead creates a nesting set of figures and grounds, with the player's computer as the ground to the piOS system, which is itself a ground to the figure of playing superhot.exe. Without this obvious-yet-effective spatial conceit, players may have been able to enthusiastically play superhot.exe without any honest reflection on the nature of their actions or the fact that they are, in a very real sense, being taught how to see and act within the constraints of a system that does not have their wellbeing as its goal. *SUPERHOT's* narrative makes it hard not to see it as a criticism of violent videogames, and yet the shameless enthusiasm around the work and its sequels—a VR version that takes the metalepsis even further, and one being developed with Japanese locations such as onsen and shinkansen (GameTomo, n.d.)— positions it as yet another violent videogame, albeit a self-aware one. In any case, by making players "subject to temporal relations not encountered in reality" (Backe 2016, 2), *SUPERHOT's* virtual environment pushes them to perceive the world in hitherto impossible ways, providing a counter-environmental ground for the figure of their regular everyday perception.

Figure 5.10: *The Witness.*

5.4.1 OVERVIEW

Taking cues from the classic videogame *Myst* (Cyan Inc. 1993), *The Witness* (fig. 5.10) invites

players to explore a beautiful island filled with mysterious puzzles and evocative imagery. Other

inhabitants are nowhere to be found, and the geometry and logic of this world's puzzles jump

beyond the boards that players solve them on, expanding into every facet of its virtual world.

Fitting the theme of this chapter, *The Witness* pushes players to be highly attentive towards its

environment in order to solve the puzzles intertwined with it: to progress, they must learn to pay

attention to small details such as shadows cast by tree branches, bird calls, and scratches on

surfaces that are only revealed by the reflection of the sun. Wanting to develop a virtual

environment with the realism and experiential subtlety of physical ones, developer Jonathan

Blow wisely hired the landscape architect David Fletcher and the architect Deanna Van Buren to

guide the design of the island and the buildings scattered across it. Their professional input has resulted in a truly striking virtual world that contrasts with the idiosyncratic spaces of typical videogames, ensuring that players can directly translate the practice of perceiving environmental details within *The Witness* into a more perceptive engagement with the physical world itself.

Wandering the island of *The Witness* is a silent, contemplative experience punctured with moments of epiphany when one suddenly realizes the logic of a challenging puzzle or glimpses an evocative figure that had been hidden within the environmental ground all along. Many reviewers and writers (e.g. Bonner 2016) have emphasized this central epistemic aspect of the experience, and the impressive fact that its puzzles and virtual environment are presented entirely without the use of written language. Players learn the logic of each puzzle type by completing simple forms of each one, and they are left to their own devices when they must combine these different puzzle types to solve more complex ones. Given that this study is concerned with spatial communication, this analysis will primarily focus on the design of the virtual environment and the ways that *The Witness* pushes players to be attentive to it, at the expense of an analysis of the puzzles themselves (see Abel et. al. 2019 for a thorough mathematical analysis of them). This analysis will begin by looking at players' affordances for exploring the world and completing its puzzles, before unpacking how Fletcher and Van Buren's contributions allowed for a high degree of spatial realism in the virtual environment, and the many ways that *The Witness* pushes players to be attentive to its beautifully rendered details.

5.4.2 SOURCES, PATHS, GOALS

Alongside many earlier works in this study, *The Witness* uses conventional first-person controls (in this case the WASD keys to move, the mouse to look around, and SHIFT to run). Unlike most works that use these controls, players are unable to jump or fall off of ledges, creating an

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Figure 5.11: A puzzle board linked to hedge mazes.

Figure 5.12: A puzzle hidden in the environment.

acute sense of restraint in players' engagement with the space. Wandering this island thus takes

on the character of walking through a garden instead of the more open posture of hiking through

a landscape, where bodily engagement may involve jumping across streams and climbing trees.

Embodiment here is estranged: the player's avatar casts a (masculine) human shadow, yet no

surfaces will ever show them the reflection of this body. Further, interaction with this world is

limited to solving puzzles within it, both ones explicitly presented on boards (fig. 5.11) and

others woven into the geometry of the land itself (fig. 5.12). Players can press the left mouse

button once to freeze their view of the world in order to solve puzzles, and they can press the

right mouse button to quit this view and return to their wandering. The experience of playing *The

Witness* is deeply imprinted with the SOURCE-PATH-GOAL image schema: it structures both the

puzzles that permeate the world as well as players' wanderings across it. In puzzles, SOURCES are

depicted as circles larger than the PATHS that radiate out from them, and GOALS are rounded

terminals of these lines. In the puzzle solving view, players left click on a SOURCE to begin a

PATH, move their mouse to guide it along possible routes, and left click on a GOAL to end it. If

the drawn PATH meets the constraints of the puzzle and qualifies as a solution, the player will be

notified by the puzzle board activating and showing their path in a new colour, by a nearby

device activating in the world, or by dots of light appearing when they are drawing a PATH upon

Figure 5.13: A set of boards designed to teach a constraint symbolized by black and white squares.

the environment. The earliest puzzles in *The Witness* are boards that only afford drawing a single line, teaching players how to interact with puzzles before challenging elements are introduced.

A few more notes on these puzzles are in order before returning to an analysis of the environment they are located in. First, the progression of puzzles in the work teaches players different constraining factors, which are combined in later puzzles to increase their complexity. While some of these are tied to particular environmental features, many are communicated symbolically through elements such as black and white squares, coloured suns, and other symbols on the puzzle boards. Each of these is taught in one region of the world with a set of very simple puzzles, allowing players to guess and test a few possible solutions within this scaffolded learning process (fig. 5.13). Importantly, linking puzzle types with certain regions primes players to rely on that area's type of logic when they encounter a challenging puzzle. Second, these puzzles are the means by which *The Witness* trains environmental perception, and

blocks players' progress if they are unable to develop new ways of seeing and listening. While

players can explore many corners of the island early on, this world is full of locked doors and

machines that must be activated in order to explore it further, and solving puzzles is the only way

forward. Completing all of the puzzles in an area activates a laser pointing towards the summit of

the mountain, and over time more and more of these lasers pierce the sky and point towards the

videogame's conclusion. Further, some puzzles late in the work are randomized and must be

solved quickly, ensuring that players have truly internalized their logic by preventing cheating.

Finally, the puzzles allow for the regular moments of epiphany that players experience as they

solve them, or learn to see this world in a new way in order to do so. Without this tangible

system for giving players a taste of quiet confusion and frustration before the relief that comes

with discovery, *The Witness* would be a very different work. While the puzzles can be enjoyed

on their own terms, they felt strongest as a means for training environmental awareness.

Returning to SOURCE-PATH-GOAL, the structure of this island has been designed to be

legible and easy to explore. Recalling the discussion of Lynch (1960) in chapter 3, the world of

The Witness is defined by landmarks, districts, paths, and edges (this is unsurprising, since both

Fletcher and Van Buren would be familiar with Lynch's theory as design professionals). Each

region of the island has a distinct type of flora, colour palette, and geography, and landmarks

such as the castle tower and the mountain provide reference points on the horizon and the allure

of a place to look out over the world (and thus a GOAL for exploring). The districts are clearly

CONTAINED, and the landmarks define CENTER-PERIPHERY relationships with their surroundings,

ensuring that players always know where they are. The enjoyment of this landscape is deepened

by its many well-crafted vistas, where the world seems to open up before the player, giving them

enticing views of a GOAL in the distance and a PATH that stretches from the foreground into the

Figure 5.14: A vista with a goal in the distance.

background to get there (fig. 5.14) (Bonner 2016, 8-9). These were "[k]ey perspectival points …

at important symbolic moments … [that] needed to be carefully composed in order to clearly

show a symbolic subject, but also to mask or screen out parts of other puzzles, hidden paths,

etc." (Fletcher 2017). These vistas would sometimes include "anomalies and exceptions" to

"subtly influence behaviour … Near the entry, for example, a red bush was placed so that the

player would be drawn towards a knoll. From that view, framed with stone, the player sees the

Mountain, which represents the 'End'" (Fletcher 2017). Players are also aided in their navigation

by the wires that often run between puzzle boards in the landscape; solving a puzzle activates the

next one in a chain, lighting up the wire that connects the two and providing players with a PATH

to follow (fig. 5.10). There is also a boat which travels between spots around the edge of the

island, and it has a map with symbols of the puzzles in each region. Moving up to the scale of the

entire work itself, players' final GOAL is at the top of the mountain, confirmed by the lasers

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pointing at it that reinforce it as a CENTER. Thus, the SOURCE-PATH-GOAL image schema

structures all scales of the work, from the puzzles to the landscape and players' paths through it.

5.4.3 SPATIAL REALISM

The Witness seeks to "encourage users to become sensitive to their environment and to achieve a

sense of accomplishment and enlightenment" (Fletcher 2017). This necessitated a new approach

to the design of the virtual environment, since if players learned to be aware of it as an artificial,

unnatural space, they would be unlikely to translate their careful attention to its environment

towards that of the physical world itself. Here, the experiential ground of *The Witness* needed to

be close enough to the ground of typical physical spaces in order to be effective. The significant

involvement of Fletcher and Van Buren in the design of *The Witness* allowed it to meet this

requirement, and its world is a fascinating example of a virtual space that gets surprisingly close

to achieving the layered richness of physical ones. Fortunately, Fletcher (2017) and Van Buren

(2015) have been quite open about their work on the project, and insights from their reflections

can help unpack what elements of the design give this space its unique realism.

Van Buren was the first to join the design team, and it was her initial work on the project

that pushed Blow to find a landscape architect and bring Fletcher's office onboard:

> [L]andscapes and architecture are based in the temporal, physical, and institutional constraints of
> the real world. What is the topography of the land? What materials are available to us? What
> climate are we in? What are the zoning laws? Where is the sun coming from? Therefore, one of our
> first questions we asked Jonathan's team (Thekla) was 'What direction is north?' They replied,
> 'What difference does that make?' I knew then that we would need to recreate and reframe the real
> world constraints with which we had been working. (Van Buren 2015)

For Fletcher's office, this process began with "reverse engineer[ing] the Island, as it might have

existed before civilization", looking for precedents around the world until settling on the Azores

archipelago west of Portugal, which had "layers of different cultures, from ancient civilizations

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to the Portuguese monarchy, to present day fishing villages" that made it an ideal fit for Blow's conception of the island (Fletcher 2017). The landscape team began exploring designs for the island by collaging aerial imagery from the Azores and writing an environmental narrative:

> Through determination of solar orientation and dominant winds, the studio was able to establish the crucial gradients of wet and dry, windward and leeward. We then diagrammed the underlying geology, establishing assumptions regarding rock types, soils and substrates. The resultant mash-up of granite, basalt cinder cones, limestone and loose sandstones were located in specific zones and guided building materiality, soil types, and subsequent biomes. Using these fundamental climate and geological assumptions, we began to develop a set of simple ecological rules that established the make-up of the Island's ecologies, and their bordering ecotones. (Fletcher 2017)

This provided a geographic foundation for the virtual environment, allowing the team to begin to consider human habitation in this context (recalling the theories of Norberg-Schulz (1980) in chapter 3). They developed the island into a rich cultural geography that had been inhabited by three subsequent civilizations, each one using the materials and technologies at hand to create buildings in response to their needs, while also adapting the remnants of previous inhabitants. As Van Buren notes, while many videogames worlds "commit to one style/period" in order to "create a holistic identity or world", real built environments "have history, a story across time" (2015). As work on *The Witness* progressed, the design of this cultural landscape and the puzzles within it developed a sophisticated reciprocity: "the use of a given building material, lead [sic] to the creation of a logged forest, a rock quarry, a glass factory. Puzzles were added to support the resource extraction and manufacturing narrative" and a "shipping freighter was added to justify the use of steel on the island" since it could not be easily manufactured there (Fletcher 2017).

Moving into a discussion of buildings themselves, Van Buren (2015) raises a number of important points regarding their typical lack of realism in videogames. First, buildings are rarely designed for the "style, concept, and narrative of the game" and instead reflect "references to images of buildings the game developer or artist sees in magazines, their lives, or image

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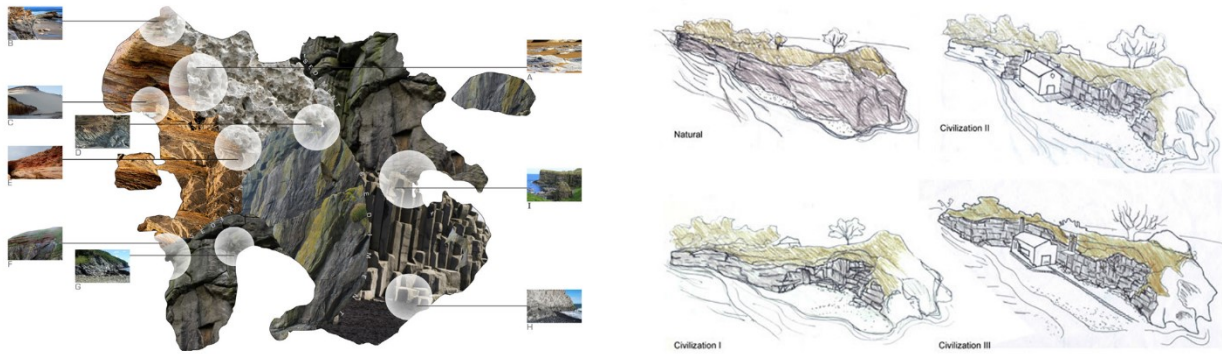
Figure 5.15: Design drawings by Fletcher (left) and Van Buren (right).

references" (Van Buren 2015). Real buildings reflect the contexts that generate them, and aesthetics is rarely the primary driver of their forms: by simulating the geographic and cultural conditions that generated *The Witness's* buildings, the team could craft far more realistic structures. Second, buildings within videogames are often poorly scaled, with rooms being strangely proportioned in comparison with their real-world counterparts. *The Witness* stands out quite noticeably in this regard, as many buildings and corridors feel far tighter than those in other videogames despite having real-world dimensionality. Finally, building materials in videogames are often poorly represented and lack appropriate transitions between them. The unique qualities, scale, and aging processes of materials are not respected, and building details—the places where two or more materials meet each other—are not represented at all, with textures butting up into each other in surreal ways that would be impossible in physical space. The buildings scattered across the island are particularly surprising for their realism in this regard: they are feasible designs that could be successfully constructed in the physical world if this were desired.

Summing up, the foundational contributions of Fletcher and Van Buren to the design of *The Witness* resulted in an environment far closer to the physical ones they were accustomed to designing (fig. 5.15), in sharp contrast to those created by 'environment artists' on typical videogame development teams. This job title betrays the conventional view that videogame

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Figure 5.16: A tree branch puzzle in the orchard.

Figure 5.17: The hedge mazes.

environments are the purview of artistic expression as opposed to careful design (which is left with level designers primarily aiming to optimize gameplay), and this sorry state results in the issues raised by Van Buren (2015) above. As it stands, the world of *The Witness* testifies that richly layered, realistic spaces can be designed to support compelling gameplay, resulting in a far more engrossing world. As Fletcher notes, "[f]rom the beginning, we perceived the island as a fundamental tourist experience", and his office sought "to create an engaging, beautiful, strange, and memorable experience for the player" even if they never solved a single puzzle (2017).

5.4.4 BECOMING A WITNESS

Players' journeys through *The Witness* take them from no exposure to its distinct puzzles into a near-obsessive state, where they scan the environment for hints of its presence and for features which may have some meaningful aspect. As noted above, they are eased into the puzzles through progressively more complex ones, ensuring that they understand the rules at play before proceeding. While these rules can be formal, they are often environmental: an early example requires players to notice which branch of a tree has fruit on it, and to draw a path to that branch on an adjacent puzzle board (fig. 5.16). Another set requires them to carefully position their view through a transparent puzzle board and draw the outline of islands in the distance, while yet another requires the player to listen to bird calls and draw the pitches of each note (*The Witness*

has no music, leaving players with just the soundscape of the world). In all of these cases, players are first presented with a simple version of the puzzle, and as they activate more puzzle boards they are pushed to perceive more complex patterns in the environment. A series of hedge mazes in the castle is a good example of this (fig. 5.17): the first maze only has one way through it, and after walking that route players must draw it on a puzzle board whose grid matches the maze's. The second has multiple paths, but some patches of ground have grass growing on them, and there is only one path where the player never steps on grass. The third maze requires players to listen to the noise of their footsteps, finding a path through the maze on dry ground and avoiding invisible—but audible—patches of mud. The final maze has a different shape than its puzzle panel, and the right path is the one that works for both mazes. Players are never given any hints about how to solve these mazes, and are left to their own devices to have these perceptual epiphanies. This connection between spatial details and progression through the puzzles underscores the central place of environmental awareness: while many videogames may have beautifully detailed spaces, here that beauty often serves a semiotic purpose.

There are many puzzles inscribed into the environment itself beyond those found on boards, however these do not need to be solved in order to advance through the game. Finding them is intrinsically rewarding, and these little victories are recorded on black obelisks in each area which slowly fill up with the discovered patterns. While players may be suspicious of world geometry that echoes the puzzles', it is possible that they will not make the jump to attempting to solve these puzzles; the design team foresaw this, and a hint at the top of the mountain removes any ambiguity. Here, a puzzle board shows the shape of the river visible directly below, priming players to try and activate it and immediately reframing their engagement with this world.

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Figure 5.18: A praying figure in the coastline.

Figure 5.19: A statue reaching for a goblet.

Environmental awareness is also foundational for *The Witness's* sparse and obscure narrative. Beyond the layers of cultural geography noted above, four elements provide players with fragments for piecing together a narrative: images hidden in the world, stone statues frozen in a range of actions (some casting evocative shadows), hidden audio devices that allow players to listen to excerpts from philosophical and literary texts, and unlockable video clips. The images "require one to position oneself just so, and a figure or symbol is revealed" (Fletcher 2017) out of the ground of the environment, such as a praying figure revealed out of a coastline (fig. 5.18). The statues are engaged in a huge range of actions from painting to surveying and fighting each other, and they beg for interpretation while lacking obvious readings (fig. 5.19). The audio recordings are easy to miss at first, and I had made significant progress in the world before finding one. In contrast to the semiotic subtly of the rest of *The Witness*, these recordings come across as heavy-handed and slightly pretentious, and after listening to a few I chose to ignore them. Highly perceptive players will notice that the pond near the town is dotted with water lilies, and each one represents an audio recording and will bloom once players have listened to it. Finally, vaults scattered across the world (sealed by puzzles) contain codes to watch short video clips in an underground theatre; these clips include footage of a lecture and an iconic scene in a Tarkovsky film, and they exist as obtuse fragments alongside the audio clips. While these spatial,

Figure 5.20: A resort bar overlooking the island.
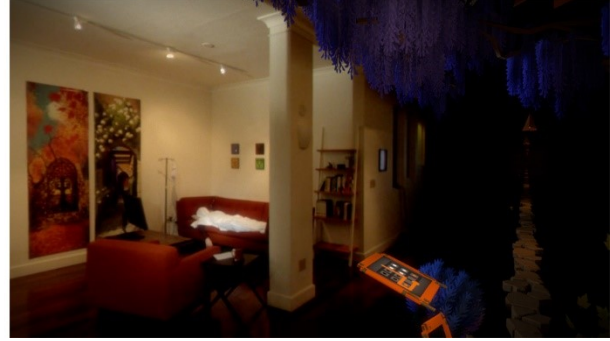
Figure 5.21: The surreal view into the office.

oral, and visual fragments hint at a narrative for this world, they never provide enough closure to confidently arrive at one. The two endings to the work, however, are more revealing.

On a first playthrough of *The Witness*, players will activate many of the lasers around the world, gaining the ability to open a path into the mountain after activating seven out of twelve possible ones. The final descent through the mountain challenges them with puzzles combining the elements they have learned, and it ends in a bright blue cave on the coastline that echoes the geometry of Barcelona's iconic Sagrada Familia. After solving more puzzles that wrap this space's columns, a delicate elevator rises out of the ocean and players can board it to finish the work. It flies them across the island as all of the puzzles they have completed reset themselves, eventually pulling backwards and taking players back into the tunnel they began in, closing the door, then automatically quitting the game. This jarring sequence is an unexpected and surprising end, and booting up *The Witness* again puts players right at the start of the work with all of their progress lost, yet far closer to its actual ending than they realize.

The gate to the first courtyard that players enter should now appear suspicious to players who have internalized the geometry of the puzzles: it is a puzzle they can solve by positioning their view so that the sun itself is the SOURCE circle. This transforms the gate into a corridor that takes them into a luxurious resort hotel (fig. 5.20), and as they explore its rooms they will get

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different vistas out over the island, ones that are geometrically impossible given their path through this hotel. The audio recordings here recite the credits to the game, and players will eventually enter a dark hallway where the world itself starts to fall apart into void. Solving a puzzle in this space gives them a view into the office that *The Witness* was developed in, with a figure asleep on a couch under a white sheet with an IV drip next to them (fig. 5.21). Following the path into the void eventually leads to a stone doorway, and entering it cuts to a first-person video of the person on the couch waking up, removing a cable and some electrodes, trying to get their bearings in the physical world, and eventually laying on a bench in their garden. Here, as in *SUPERHOT*, you are playing as someone who is themselves playing a VR videogame, yet one that helps them relax and contemplate the physical world instead of denying it.

5.4.5 SUMMARY

The Witness uses its impressively crafted virtual environment to guide players into a more attentive mode of experiencing the world. It "requires and inspires heightened perception" (Fletcher 2017) by using its distinctive puzzles built around the SOURCE-PATH-GOAL image schema to demand new ways of seeing, rewarding players with satisfying epiphanies. The spatial realism of its virtual counter-environment minimizes the gap between perceiving details within it and perceiving them within the physical world, and players' time spent wandering this island and contemplating its puzzles will hopefully bring with it the renewed awareness of their physical environment that Blow sought to foster. Fletcher and Van Buren's contributions point towards the huge impact that design professionals can have on the development of videogame worlds, and Fletcher humbly reflects that "during the first week of sales … more individuals and groups explored landscapes and spaces (legally or illegally) that we designed, than will ever explore our built landscapes in my lifetime" (2017).

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5.5. CONCLUSION: FIGURES AND GROUNDS

The three works analyzed above use the spatiality of virtual environments to communicate new modes of perception, ones which defamiliarize players' basic perceptions of space and time and invite them to reflect upon their mostly nonconscious engagement with the physical world. All three rely on the reward of exploring deeper into the world to entice players to learn idiosyncratic modes of perceiving, and this motivated, goal-directed action gives players the patience to experiment with perplexing situations until they learn how to make sense of them. *Thirteen Gates* is the most alienating by making space itself challenging to perceive, while *SUPERHOT* uses a compelling narrative, stylized graphics, and conventional first-person shooter gameplay to make its surreal temporal experience far more accessible than it should be. *The Witness* contrasts these two with its self-effacing virtual environment, designed to foster an appreciation for the beauty that lies in the details of the physical world. All three are counter-environments par excellence, scaffolding players' spatial interactions so that they develop new ways of seeing and receive the enticing rewards of new places to explore and new challenges to overcome.

Figure/ground relationships are prominent in all three of the works, unsurprising given this cognitive structure's foundational place in perception and action. *Thirteen Gates* ties the basic perception of solid and void to figure/ground relationships, helping players become aware of negative space (ground) by forcing them to determine its outlines. *SUPERHOT's* nested worlds are figures framed by the outer grounds that contextualize them, and within superhot.exe the subtleties of motions and the trajectories of their paths become perceivable figures against its temporally-distorted ground. *The Witness* fills the ground of its realistic environment with countless hidden figures, both solutions to its puzzles and images for contemplation, seeking to remind players that the real world is itself filled with figures waiting to be apprehended. After

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all, for any element of reality to be consciously reflected upon, it must first be perceived as a definite figure, a 'thing' within the wider ground of existence. Building counter-environments with unique perceptual grounds is one way to make otherwise hidden figures jump out in clear perceptual relief (McLuhan and McLuhan 1988, 5).

An important subtext of this chapter is that videogames can be effectively developed for instrumental, educational ends. These three works evidence how virtual environments might be designed to shape players' perceptions, and how a particular design intent (upsetting spatial perception for Snyder, deepening awareness for Blow), can be translated into the design of a space. This carries a host of ethical implications that go far beyond the scope of this study, ones that *SUPERHOT* places at the center of its narrative: players' agency is limited by the structure of the designed environment, and thus engaging with it may mean being programmed by it against one's will, or submitting to that programming before one has a sense of the system they are engaging with. While this is a serious point, it must be emphasized that it applies to designed physical environments as much as to virtual ones, and much has already been written on that topic (e.g. Foucault 1977). One has to hope that the future of virtual environments for training perception tend towards *Thirteen Gates* and *The Witness* as opposed to *SUPERHOT*, spaces that help players mature and deepen their engagement with the world instead of escapes into violent superhuman fantasies (self-aware metanarratives notwithstanding).

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6. Conclusion

Change your brain, your body, or your environments in non-trivial ways, and you will change how you experience your world, what things are meaningful to you, and even who you are.
(Johnson 2007, 1-2).

6.1 EXPLORING, ENACTING, PERCEIVING

This thesis has sought to understand spatial communication in videogame environments by way of theories of embodied cognition: affordances, primes, frames, image schemas, and conceptual metaphor, among others. Its core aim was to uncover how built environments can communicate ideas, values, and affects to those that engage with them. The study began by introducing this question and defining 'space' itself, looking at theories of topologic and topographic space, egocentric and allocentric spatial frames, the body's personal, peripersonal, and extrapersonal space, and common distinctions between 'space' and 'place' (Norberg-Schulz 1980; Tuan 1977). Moving on to 'communication', this study argued for a multimodal approach that defines communication as a process where a creator puts a work out into the world and it is interpreted by those that experience it, one where different semiotic resources in different modes are combined together to craft a meaningful whole (Kress and Van Leeuwen 2001). Different modes can reinforce each other in a consonant manner, or juxtapose each other in dissonance, impacting the meaning of the whole ensemble (Hawreliak 2018). Scholars of embodied cognition assert that meaning itself is multimodal and non-propositional (Barsalou 2008, 618; Johnson 2015, 36), arguing that the meanings we ascribe to things arise from our multimodal embodied engagement with them. Abstract concepts are built upon this concrete, sensorimotor foundation, allowing them to be primed by our interactions with the world. This section concluded with a look at different types of spatial communication, from the proximities encoded in a designed space to

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the qualities of building materials. The remainder of the introduction reviewed the existing literature on videogame spatiality, discussing key issues such as the representational nature of videogame spaces, the 'magic circle' of gameplay, the role of narrative in these worlds, and the qualities of virtual embodiment, concluding with an outline of the study and its selected works.

The second chapter presented theories of embodied cognition, arguing that they can reveal how spatial communication takes place in both physical and virtual environments. Given the internal diversity of this young field, the chapter presented five claims within embodied cognition—enactive perception, conceptualization, embedded cognition, the extended mind, and embodied simulation—looking at how they relate to each other and to spatial communication. The following sections presented the theories used to analyze space—affordances, priming, framing, image schemas, and conceptual metaphor—providing some of the evidence underlying them and examples of how they have been used in other studies of the built environment and various media. This chapter concluded with a demonstration of how these theories can be used in concert by briefly analyzing *Pac-Man*, showing that readings which emphasize consumption and claustrophobia are most likely to arise from the embodied experience of playing it.

The third chapter looked at spaces designed primarily to be explored and inhabited for their rich ambiance. It analyzed *Knytt Stories*, *The Night Journey*, and *NaissanceE* in order to explore how virtual environments can take on a sense of place (Norberg-Schulz 1980), and how they can be structured to shape players' experiences of navigating them (Lynch 1960; Tversky 2003). The spaces in these three works covered a spectrum from open-ended gardens where players can wander many paths and make of the world what they may, to linear processions where their path through the world is a carefully orchestrated sequence of primes and spatial rhythms. *Knytt Stories* and *The Night Journey* also change the abilities of the player avatar as they explore,

allowing for a multidimensional experience of the same virtual space. All three videogames show the importance of the VERTICALITY image schema in shaping meaningful videogame worlds, and the differing amounts of challenge in each work demonstrated how the presence of challenge can frame virtual environments as obstacles to overcome, while the lack of it allows them to simply exist as interesting places to be.

The fourth chapter analyzed virtual environments designed for meaningful situated action, beginning with a look at Clark's (2005) concept of surrogate situations, artificial spaces which stand in for a target situation where direct interaction is not possible or desirable. Videogame spaces are surrogates when they model fragments of the real world, allowing players to safely experiment within them to better understand a real-world counterpart; this also reflects the theatricality of videogames as media where players enact narrative roles and behaviours in ways they would not outside of the virtual environment (Laurel 2014; Murray 1997). The analyses showed how discourses of care (*Shelter*), domination (*Shadow of the Colossus*) and consumption (*Katamari Damacy*) could be communicated through virtual spatial experiences. In all three works the embodied actions of players are structured to resonate with real-world counterparts, giving them a taste of the affective experiences that arise in care, domination, and consumption at a safe distance from reality. Further, the inevitable process of players mastering the game is handled critically in all three: true mastery is never possible in *Shelter* (as the mother will always die), while mastery in *Shadow of the Colossus* and *Katamari Damacy* brings nihilistic outcomes.

Finally, the fifth chapter explores the small subset of videogames designed to teach new modes of perception, limiting players' progression through the environment until they are able to perceive the space in new ways. These works exist as artistic counter-environments to the world of daily life, providing a defamiliarizing vantage point from which to become aware of the

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nonconscious automaticity of regular embodied experience (McLuhan 1997, 225). The dynamic interplay between figure and ground in perception plays a central role (Stockwell 2005), since the spatial awareness that these videogames train is one of grasping new figures in a perceptual ground, be it solids and voids in *Thirteen Gates*, motion paths in *SUPERHOT*, or puzzles and images woven into the environment in *The Witness*. As virtual spaces that demonstrate how to effectively teach their players new modes of perceiving and engaging with the world, these videogames raise ethical issues around how they mold their players for good or ill, ones raised by the dystopian narrative of *SUPERHOT* itself.

6.2 COMPARING THE SPATIAL TYPES

Arriving at the end of this study, we can now compare the three types of space and all of the nine videogames to reach some additional conclusions. First, *all* spaces share the concerns of those designed for exploration and inhabitation: no matter its purpose, an environment can allow or deny identification with it, and can aid or hinder orientation and navigation through it. In spaces designed for meaningful action, questions of identification speak to how a designed environment frames the tasks going on within it, and questions of orientation speak to the kind of scaffolding that is, or is not, being provided for the task at hand. If the actions in a videogame are tightly scaffolded, players will be provided with a strong sense of direction (often through interface elements such as mini-maps or large arrows showing where to go); if this is not the case, the videogame may value itself as a world to explore even when players have tasks within it, as is the case in open-world games like *The Legend of Zelda: Breath of the Wild* (see Calleja 2011, 8).

Second, the spaces designed to train perception are a special case of environments designed for action, one where the action is linked to uncommon acts of perception and the space scaffolds

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players' interactions to help them learn to see in a new way. Spaces that scaffold tasks are the most populous category of designed environment both physically and virtually, and they can be broken down into smaller categories for closer study (e.g. Bogost 2007). For videogames, this categorization could be completed based on the types of real-world spaces being represented—battlefields, urban areas, and stores are all common—or instead on the central type of action that frames multiple built spaces, such as a racing game that reframes an urban area as a racetrack, or a commercial one that reframes apartment buildings as units for wealth extraction. In this study, the three action games cut across many possible categorizations, but share the central conceit of having a single embodied avatar that the player controls from a third-person vantage point, an anchoring element for their presence in the virtual world. This is not the case in strategy games where the player controls many small 'miniatures' from high above (Calleja 2011), and the approach to analysis used here would need to be modified in order to engage with works played from such a seemingly disembodied perspective.

Finally, the nine analyses demonstrate the huge breadth of experiences within videogames and the spatially expressive potential of this new medium. These works also serve to support its legitimacy: the vast majority of them deal with serious themes in subtle and creative ways, using the unique semiotic resources of interactive environments in order to do so. Players can now wander the landscape of *The Night Journey* as part of their own contemplative practice, reflect on the nature of evil by enacting it in *Shadow of the Colossu*s, or gain a heightened awareness of the world's beauty by playing *The Witness*. While older media like literature, painting, theatre, and film are capable of provoking these transformative experiences in their viewers, videogames bring players into their environments in ways historically limited to architecture and other built spaces, using the semiotic resources of spatial experience itself. Virtual environments can thus

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scaffold embodied action in meaningful ways, guiding players towards new perspectives on the world or simply letting them wander a peaceful space. These are very new affordances for any contemporary mass media to possess, and Fletcher's (2017) reflection that more players have wandered *The Witness* than will visit the physical landscapes he has designed (in his lifetime) is quite a surreal one. This status as a mass medium, whose works are distributed online, has also allowed videogames to become a truly global medium with popular works developed across the world; including *Pac-Man*, this study analyzed three Japanese works, four from Europe (France, Poland, and Sweden), and three from the US. As a result, culturally-specific conceptions of space are now being encoded in videogames and experienced by a global audience, much in the way that architects often travel the world to experience the buildings of other cultures.

6.3 A FOUNDATION FOR FURTHER STUDIES

This study was motivated by the early state of spatial theory in Game Studies: it is challenging to conduct empirical player studies without a stronger theoretical foundation from which to ask meaningful questions. Work in embodied cognition provides that foundation, and along with scholars such as Goldhagen (2017) and Mallgrave (2018) I believe that it provides an incisive way forward for fields such as architecture and videogames that deal with both the creation and interpretation of meaningful spaces. Much like Goldhagen (2017, xii-xiii), my experience of discovering theories of embodied cognition late in my architectural training was a cathartic moment where the disparate rules of thumb, folk theories, and academic perspectives I had been taught all took on a clearer relation to each other (with many receiving external validation). This initial foray directed my architectural master's thesis that sought to evolve the design of public libraries towards particular social ends (Whistance-Smith 2014), and the many questions raised

during that project led me to undertake this present study. Moving forward, the theoretical framework developed here suggests many possible directions for future research.

First, the analysis of spatial communication in each videogame was often lightly compared with the reflections of reviewers or the work's developers, but this was quite secondary to my own analysis and cannot be taken as a form of verification for it. The hypothesis put forward here—that spatial communication is taking place through definable, observable structures of embodied cognition—could receive important verification through empirical player studies. A strong approach would be to select a short videogame, analyze it in accordance with the approaches taken here, and develop a set of hypotheses to test against players (e.g. "[this spatial form] primes [this metaphor]"). A healthy sample size should be achieved to account for outliers (at least 20 players), preferably of diverse ages (e.g. 15 to 55), and key factors such as how much history the player has with videogames, and the genres they play most, should be recorded. After they have played the work, the researcher can conduct a semi-structured interview with each player using questions that are carefully worded to avoid priming particular responses (e.g. "What stood out in your experience of this videogame?"). Finally, the players' responses can be recorded and analyzed for any mention of the affordances, image schemas, frames, and metaphors that were hypothesized to shape their experience of the work. The results will reveal which environmental structures are most salient in a given videogame—as evidenced by the most players mentioning them—and which ones fade into the background. It is important to emphasize that this approach is not well suited to videogames with significant narrative content, as the spatial experience of the work is likely to be secondary for players to that of the story.

Second, it should be noted that cultural diversity is a problematic yet enticing factor in any player studies, since culture has some bearing on spatial cognition (e.g. directionality biases from

reading order (Tversky 2011, 28)). This is best accounted for by ensuring all study participants were raised in the same cultural milieu, and by seeking to eventually conduct the same study in different regions. Given the global reach of the videogame industry, studying how Japanese works such as *Shadow of the Colossus* and *Katamari Damacy* are received in Japan (in contrast to Canada) has the potential to reveal interesting differences in cultural perception.

Third, minimal experimental works such as *Thirteen Gates* lend themselves particularly well to psychological research on spatial cognition. How long does it take different players to make sense of its world of patterned strips, and what bearing does their prior spatial cognitive abilities have on this? Further, do they retain their learned ability to perceive *Thirteen Gates* months after engaging with it? I was personally surprised at not having to re-learn it while returning to it at a later point in the completion of this study. While *Thirteen Gates* was not designed for the purpose of conducing research, it is a good example of the scope and style of videogame that is ideal for these purposes.

Finally, a more involved study could use the framework developed here to guide the design of a few small videogames that seek to communicate particular discourses through their spatial experiences. Once created, these works could be tested with players to evaluate whether they communicate effectively, and the findings from this could be used to reflect on the design processes of the videogames. Are affordances, image schemas, primes, frames, and conceptual metaphors ideal structures for guiding the design of a work that has particular communicative ends? If the results suggest this, rules of thumb and techniques for virtual environmental design could be developed around these structures.

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6.4 THE FUTURE OF VIRTUAL SPATIALITY: INSIDE AND OUT

A world overflowing with interactive virtual environments is a very different thing from one that only contains a physical built environment and depictions of imagined places. We now live multi-environmental lives, regularly poking our heads into pockets of computer-supported space from virtual mailboxes to audio libraries and countless videogames representing every sort of imaginable world. Smartphones—and portable videogames before them—allow us to take these spaces with us, dividing our attention between physical and virtual even further. These trends are deeply entrenched, and while our interactions with virtual environments will continue to evolve alongside the technologies supporting them, they are clearly here to stay. The future of virtual spatiality pulls in two opposing directions: ever deeper into itself, and back out into the world.

The first direction reflects the eternal promise of all virtual spaces, both computer-supported interactive ones and those depicted in literature and art: that of escape into another world. While the videogames analyzed in this thesis do speak tangentially to this, most of them are not the kinds of expansive worlds that players spend hundreds of hours wandering while immersing themselves in detailed narratives and enjoyable activities. Creating huge videogame worlds for the players craving them presents development teams with a multitude of challenges, and strategies such as procedural generation (the automated creation of environmental elements based on pre-defined rules (Short and Adams 2017)) are increasingly making these ambitious goals possible while pioneering spatial design strategies that are on the cusp of being folded back into architecture itself (through areas such as parametric design (Woodbury 2010)). Diving deeper into virtual spaces also implies discovering their unique qualities and affordances, and the impossible non-Euclidean spaces briefly mentioned in chapter 5 are one example, challenging our perception of three-dimensional space itself. Finally, the rapid arrival of virtual reality (VR)

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headsets and videogames created for them is no doubt the strongest pull inwards. These technologies fully envelop their users in virtual environments, blocking out the physical world and humanly-embodying them in the virtual space, letting them turn their heads to look around and use their hands to pick up and manipulate objects using controllers that track their hands' location and rotation. My skepticism towards VR's claims of heightened immersion vanished upon first trying it, and I was most surprised to discover that an embodied sense of scale—rarely felt deeply in conventional videogames—was present here in full-force. While VR applications are being developed for a range of non-entertainment purposes, this technology is unabashedly driven by the desire to dive ever deeper into virtual space, and its particular opportunities and dangers represent one side of the future of virtual spatiality.

The second direction sees virtual environments as new tools for enhancing our physical world, and this is the side that underpins most computer software, be it email applications or the 3D modelling applications used in architecture and industrial design. Here, virtual environments are developed as surrogate spaces for countless contexts and as scaffolds for every type of work, from accounting to photo editing. 3D models can serve as replicas of real-world objects and spaces (topographic virtual geometry abstracted from real topographic data), and the growing number of videogame environments that are detailed reproductions of real spaces are already becoming accidental archives: the aftermath of the devastating fire at Notre Dame has led to a discussion of whether its virtual reproduction in the videogame *Assassin's Creed Unity* (Ubisoft 2014) can provide useful data for the cathedral's reconstruction (Beck 2019). In parallel with the sudden rise of virtual reality, this opposing pull has led to a rapid advance in augmented reality (AR) technologies which seamlessly overlay a virtual space upon a physical one. Smartphones can increasingly support this, allowing their users to view a hybrid world through their phone

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that uses the physical space as an anchor for virtual imagery, literalizing the cognitive process of projection (see Kirsh 2013). Use of AR is poised to quickly expand, especially as applications like *Ikea Place* (Ikea 2017), which lets users view furniture in their homes in AR before purchasing it, and videogames like *Pokémon Go* (Niantic 2016), which let players catch pokémon as though the real world were a virtual one, introduce this new technology and its representational affordances to a wide audience. A future world saturated with AR raises the worry that users may start to lose a distinction between real and virtual, however one can argue that our perception of the real world is already augmented through surrogate situations and our use of language itself. In any case, AR directs our attention back out towards the physical world as an anchor for virtual ones, and it will surely define this side of the future of virtual spatiality.

Finally, it must be emphasized that the future of virtual environments is anything but given. Like all other corners of the built environment, virtual spaces are designed by individuals and teams, and a space's resulting design reflects the team's knowledge of the domain they are working in, their motivations and intentions for creating the space, and the approaches and methods they use while designing it. This study hoped to contribute an embodied account of virtual spatial communication to inform the design of evocative and powerful videogame environments, ones which enrich the lives of those who experience them much as a visit to a beautiful building or an abundant garden can. This is far from guaranteed, however, and much like cheap condominiums optimized for the profit of their developers instead of the lives of their inhabitants, there are countless ways that virtual environments can be designed for exploitation. Educating players to be on guard for these tactics is an important approach, and a wider public discussion of the built environment—physical and virtual—and its impact on its inhabitants would go a long way to ensuring a future where virtual environments are used wisely.

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