Perfecting Imperfection

An Investigation of How Believable Spaces are Created in Videogames

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University of Florida Herbert Wertheim College of Engineering

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Undergraduate Honors Thesis

Advised by Joshua Fox

Abstract

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Videogames can place their audience in an environment in a way no other artistic medium can. Without a director's framing of a camera, or an author's colorful, poetic description, or a painter's choice of stroke weight, players can experience a space with all their senses largely unobscured. In smaller, detail-focused environments especially, players have more time to perceive less.

As a result, creating and capturing a believable sense of life in limited space is a uniquely complex process that raises questions related but not limited to aesthetics, architecture, psychology, and philosophy.

Taking a game developer and player's perspective on these questions, we provide answers by analyzing specific games and experiences though various perspectives.

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Introduction | Spaces in Games

When we think of modern videogames, our mind might visualize navigating through a set of winding corridors and hallways, or jumping left to right, platform to platform, or maybe riding some form of transportation, admiring an open world. At the core of modern games are levels. Players move through and interact with spaces crafted for them by developers and artists. As opposed to other artistic mediums, games arguably give their audience the most direct interactivity, exploration, and freedom.

As new technologies and techniques are developed over time, the limits of what game developers can do are pushed further and further away. One might immediately think towards games like *Red Dead Redemption 2, Ghost of Tsushima,* or *Cyberpunk 2077*. Each of these possess worlds to be traversed and explored almost endlessly on top of their narrative and gameplay elements. The environments are massive, presented with unmatched graphical fidelity, filled with living elements and natural features, and accompanied by various systems handling everything from weather to spatial audio. "Immersive" is a term commonly used to describe the believable, rich experience players enjoy in games with worlds like these.

However, this believability does not solely exist in games with boundless landscapes or cityscapes. On the contrary, this feeling can also be expressed in very limited spaces. Games like *Life is Strange, Tell Me Why, and The Room* series use small, detailed environments to transport their players into their worlds. Bedrooms, diners, and dorm hallways are made to express as much, if not more depth than vast mountain ranges or bustling city streets.

When we contemplate what makes these limited spaces feel believable, we realize how complex both the questions and answers are. We realize that the lack of scale causes us to consider every minute detail in every part of our level in a way that we don't in larger spaces. We realize that we are examining spaces that are defined by miniscule human activities – places where people simply sleep, work, or eat. And we realize that as opposed to landscapes defined by naturally occurring trees, rocks, and rivers, every component of an interior is influenced by humanity – the placement of a cup, the chair slid under the desk, and so on.

By applying various perspectives to some of these games, we can begin to understand how, why, and what game developers knowingly and unknowingly do and avoid to create atmosphere in a few hundred square feet.

Perspective: Design Philosophy

Not all games that make use of limited space have the same development budget, gameplay, or intended audiences, and not all developers have the same level of awareness of what exactly they do. For those reasons, we start with a generalized, high-level frame of reference allowing us to explain why things work before we know what those things even are. Philosophy enables us to answer questions about the natural order of things – fundamental truths about ourselves, the world, and the relationships between and within the two. Design philosophy, specifically architectural philosophy also does that, and additionally establishes ways of thinking about the space around us (or our character), and the accompanying relationships.

The Nameless Quality

Dr. Christopher Alexander is an architect, author, and design theorist who is currently an Emeritus Professor at the University of California, Berkeley [1]. A seminal work of his, *The Timeless Way of Building*, originally published in 1979 put forth a new way of thinking about architecture, and generally perceiving space. He establishes the "nameless quality," an "unerringly precise" characteristic of things that for our purposes, belongs to spaces that feel immersive and believable [2]. The "timeless way" is a method by which things with the nameless quality are constructed, and thus also provides us with a way to evaluate to what extent things have the nameless quality.

The foundation of the nameless quality is the "subtle kind of freedom from inner contradictions" that a person, place, or thing can have [2]. First, according to Alexander, this quality is inherent to all natural things – the way tree roots form to hold together a hill, how a river flows and carves out the rock beneath it, or simply how wind blows in a field. What may seem trivial in an egoless nature becomes complex when applied to human creations. The "precision" Alexander refers to is the ability for people to recognize the quality, but not necessarily replicate it. And as follows, there is no single word that describes the quality, but we can use a combination of terms to approximate it.

Things with the nameless quality are:

"Alive" – influenced by livings things, for example the difference between a pile of burning logs and a fireplace

"Whole" – resisting inner forces, like trees planted to bend against the erosion of the terrain they belong to

"Comfortable" – convenient but not an obstruction, maybe a water bottle placed on one's desk in arms reach, but not directly in front of their computer

"Free" – a supplement to "whole" and "comfortable," without a forced, contrived arrangement, the way clothes hang in someone's closet, compared to a furniture showroom

"Exact" – a counter to "comfortable" and "free," precise in function, such as chairs at a library being at a height to complement the tables

"Egoless" – a lack of consciousness in exactness, for instance small ornaments carved into a wood chair as opposed to elaborate identifiable designs of an artist

and "Eternal" – a balance that makes something hard to disturb, like fence that follow the ridge of a hill instead of being at the bottom

Of course, all these terms have their weaknesses in describing the nameless quality but give us an idea of it through familiar vocabulary. Where *The Timeless Way of Building* is inductive in its definition, based in theory, Alexander's *A Pattern Language* uses real world examples throughout to deductively define the quality [3].

With some understanding of this nameless quality, one may not be surprised at the philosophical nature of the timeless way. It not only allows existing life to flourish but also gives rise to processes that create life. The timeless way, although precise in description and function cannot be mechanically used – in Alexander's words it "only shows us what we already know, and simply frees us from all method" [2].

We can start defining the timeless way by recognizing spaces are defined by what happens there – especially events that occur repeatedly, or patterns. The clearest examples of this are cycles that exist in nature. A forest exists in a constant life cycle referred to as "succession." Cones on trees produce seeds, seeds are carried by various means across the forest, some seeds germinate, growing, and competing for nutrients, until eventually the lack of sunlight in the understory is limited, where trees weaken and eventually die, restarting the cycle [4]. The insects, the animals, the plants, the dirt, everything that exists in the space is defined by the events that occur, thus the pattern of events is inseparable from the space.

We continue by stating that the timeless way necessitates patterns of events to happen through patterns of space. To continue our example, the natural scattering of trees around an area and the different forms of life that thrive at every elevation level in a forest depict clear patterns of space. Ultimately, we arrive at patterns of relationships – between space and events, between events and other events, and between space and itself. Each pattern is simply defined by a morphological law

$$X \rightarrow r(A, B, \ldots)$$

"Within a context of type X, the parts A, B, … are related by relationship R" [2].

For example, within a classroom, the desks exist in aisles with empty rows running parallel. And within a class, the teacher can clearly see and individually help each student with the space created between desks and the empty rows to walk up and down.

This resolution of space and events is what makes individual patterns feel "alive." And when enough of these patterns exist together, facilitated through the timeless way, we create a space that embodies the nameless quality.

Application: The Elder Scrolls V: Skyrim

To understand our various perspectives in application, we initially use Breezehome from *The Elder Scrolls V: Skyrim* as a control. Originally released in 2011 by Bethesda Game studios, *Skyrim* has dominated the gaming space for over a decade. *Skyrim* has a balance in its intentions, from narrative to role-playing to action, and Breezehome is the first area that the player can permanently own.

Figure 1 Wide view of Breezehome (The Elder Scrolls V: Skyrim, Bethesda 2011).

This is Breezehome after it has been furnished. We can immediately identify patterns of relationships:

Figure 2 Back wall of Breezehome (TES V: Skyrim, Bethesda 2011).

Within the character's daily routine, utility items such as the broom or firewood are stored under stairs, or in corners. This resolves the contradiction of wanting to store large, useful items somewhere accessible, without impeding the walkable space.

Similarly, within the player character's meal preparation, bowls, cups, and food items are stored along the wall and off the floor. This resolves wanting to store food items somewhere convenient, while keeping them clean, and not taking up floor space.

Within a house located in Tamriel, the cooking spit is centralized with a sitting area facing it. This resolves the desire to be warm and recover from outside elements, while sitting down and resting.

The patterns of events that happen in this space are cooking, eating, resting, cleaning, and storing belongings. A pattern may be broken down into smaller events: plants must be dried out, a bowl is grabbed, ingredients are added to cook over the fire, the firewood is replenished, and food is plated. Each of these events is tied to a space: the plants are hung from a wood bracket mounted on the ceiling, bowls are kept in reach on shelves, firewood is kept under the stairs, and so on.

We may initially find these observations trivial because they are pointing out patterns that don't require much conscious effort to implement. The idea of putting cups in a cupboard is something many of us do automatically, and it seems insignificant to us. But this is precisely what the timeless way embodies, allowing the natural order of things to guide what we do, and by extension the spaces we inhabit.
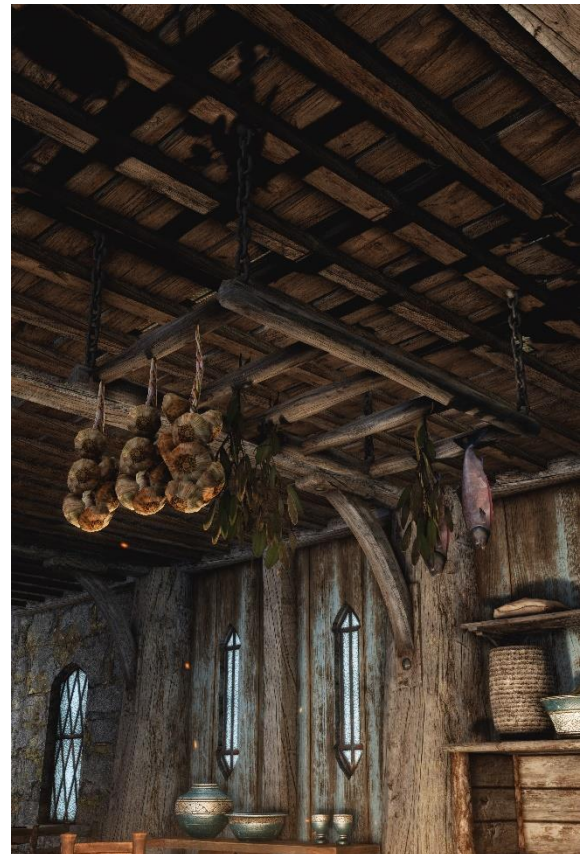

Figure 3 Ceiling fixture of Breezehome (TES V: Skyrim, Bethesda 2011).

Application: Tell Me Why

Tell Me Why is a narrative adventure game developed by Dontnod Entertainment, released in 2020. Known for their detailed environments, storytelling, and memorable characters, *Tell Me Why* opens on the main protagonist Alyson Ronan's loft bedroom as she prepares to leave to meet her brother.

Figure 4 Wide view of Alyson's Room (Tell Me Why, Dontnod 2020).

As opposed to Breezehome, the inhabitant here has lived in this room for years, forming numerous routines and patterns.

Figure 5 Music corner in Alyson's Room (Tell Me Why, Dontnod 2020).

Within Alyson's daily routine, she listens to records on her turntable. Her turntable and stereo system are placed in a corner with a lounge chair adjacent. This resolves wanting to be comfortable, with a wall behind one's back, while also engaging in an activity like listening to music. One might describe this arrangement as whole, as it exists as a complete unit that resolves a set of needs. Here the function of the turntable and chair are defined by each other, and the action that relates them.

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In addition, Alyson may enjoy listening to music while laying on her bed. Her headphones are hung across the top bar of her bedframe. This resolves wanting easy access to her headphones as she lies on her bed, while also not obstructing the space as she lies down. The placement of the headphones here feels free. The precise location of the headphones does not matter, as in the exact angle or location on the top bar. Yet it would undoubtedly not be same if it was placed on the top of the end table, or in one of the shelves. It is simply placed where the most sense is made without further consideration.

Figure 7 Headphones on bedframe (Tell Me Why, Dontnod 2020)

Again within her daily activities, Alyson might want to store objects she doesn't immediately need under her bed. This resolves wanting to keep these objects nearby, but out of vision and off the walkable space.

We observe the quality of these simple relationships. The placement of the headphones feels comfortable, the lounge chair in the corner of the room with the turntable feels whole and egoless. Storage boxes being placed under the bed feels exact, and almost obvious.

Figure 6 Underneath Alyson's Bed (Tell Me Why, Dontnod 2020)

The presence of these boxes under Alyson's bed epitomizes the precision of the timeless way, and what it means in practice. As we talk about how obvious all these things are to anyone who lives in a space, it is up to the designer or artist to bring this subconscious thought to their conscious. In normal gameplay, the player will never see under the bed. These elements are effectively nonexistent. But for the artist, these represent employing the timeless way in creating an environment – understanding the simple processes that give rise to life.

Perspective: Aesthetics

Narrowing our scope, we look to more grounded viewpoints, particularly those that bridge our theoretical understanding of interior and limited space to literal, observable concepts. We want to provide a shared vocabulary to communicate the uncommunicable. Merriam-Webster defines interior design as "the art or practice of planning and supervising the design and execution of architectural interiors and their furnishings" [5]. The International Interior Design Association extends this definition, referring to it as "the professional and comprehensive practice of creating an interior environment that addresses, protects, and responds to human need(s)" [6].

Interior Design

Interior design is a both a science and an artform that can be practiced by anyone ranging from a college student personalizing and arranging their half of a dorm room, to a contractor tasked with designing a meeting room for an executive office, to even a video game developer. In his 2015 Game Developer's Conference lecture, environment artist and educator Dan Cox draws an analogy: "anatomy is to character art as interior design is to environment art" [7]. This captures the uncanny adjacency between the two perfectly. Interior design simply gives us a method of close looking and assessment of inhabitable, interactive 3D space.

There are various schools of thought within interior design, some relevant to specific time periods, others for certain applications and building types, but there is a common set of elements and principles that consistently appears in textbooks, design blogs, and design entertainment. The elements are space, line, form, light, color, texture, and pattern; these elements are used according to the principles [8, 9]:

Unity – to what degree the elements in a space complement each other

Balance – how stable the elements in a space feel together

Rhythm – the consistency of pattern and repetition

Emphasis – how elements add or remove importance from something

Contrast – the variation of elements

Scale – justification of the size of certain elements

Details – minor decorative features that enhance the experience

And as opposed to interior design in a professional sense, our objective is not to craft a perfect, beautiful, functional interior space, but rather to use these principles to talk about space and the feelings and moods evoked in an objective sense.

In *Shaping Interior Space,* Dr. Roberto Rengel, an architectural educator and researcher currently sitting as the chair of the University of Florida interior design department defines an alternative approach to interior design that lends itself towards our needs as mentioned in Dan Cox' 2015 GDC talk. Rengel's principles of interior design are *order*, *enrichment*, and *expression* [10]. Within each principle, Rengel breaks down the elements that contribute to them.

Order refers to how design takes chaos away and inputs structure into a collection of disparate elements. Successfully ordering a space leads to accurate orientation – how inhabitants of a space create small mental images of it to understand it. Identity – the use of memorable elements, structure – patterns that occur, and meaning – personal memories or feelings about a space contribute to how inhabitants process it. Spatial definition is also a part of order, but less significant for us as it deals with elements of level design.

Enrichment is about elevating the core experience of being inside a space. Approachability is the balance of stimulation an inhabitant has. Sufficient complexity allows someone to break down the space, and coherence is the appreciation for the available patterns. Legibility is specifically how easily compartmentalized a space a can be, and mystery is the feeling of wanting to investigate or move into spaces. Manipulating enclosing space with things like angled ceilings and curved hallways, surface articulation – textual patterns on surfaces, novelty – elements that stand out, and tension and release are all ways of generating interest in a space.

Finally, *expression* is the suggestion of a mood, tone, or story. World expression, how history and culture influence a design is at the forefront of this effort. Depending on the space, inhabitant expression is also important. A bedroom's inhabitant has an attitude – how friendly or unfriendly someone is and a level of sophistication – how much they appreciate aesthetics. Their self-presentation is how much they want you to see their attitude and sophistication.

Application: The Elder Scrolls V: Skyrim

We return to Breezehome, this time with vocabulary and ideas that can classify things in physical space accurately.

Figure 1 Wide view of Breezehome (The Elder Scrolls V: Skyrim, Bethesda 2011).

Starting with our basic design principles, a sense of unity is found in the color of the carpets and the, albeit faded paint on the walls. The centralized cooking spit flanked by walking space gives us an immediate compositional balance upon entering, while the asymmetrical placement of the stairs and table keep the composition from feeling too balanced. The repeated floor tiles and support beam structure fulfill a peaceful rhythm one would expect from a home. Returning to color, the dark wood on the ceiling deemphasizes itself while the bright teal carpets contrasting with the muted stone floor emphasizes places of interaction, specifically where we can sit down. The size of furniture makes sense, able to serve their function and create interest, leaving a decent amount of open room to navigate around. The lack of, or small amount of ornament here is consistent with the idea that this is a commoner's home in its city of Whiterun.

Figure 8 Top view of Breezehome (TES V: Skyrim, Bethesda 2011)

Through our alternative approach, we first consider the order of the space. Upon entry, the centralized firepit provides a sense of identity, a memorable element. Structure is provided through the hierarchy of patterns – the tile floor is broken into 4 parts by the wood dividers on the floor following the major vertical supports, and within each part exists either a centralized element, or two flanking elements. The nearest two parts have the fireplace and the sitting area, while the back two elements have the stairway, dining table, and entrance to an alchemy room.
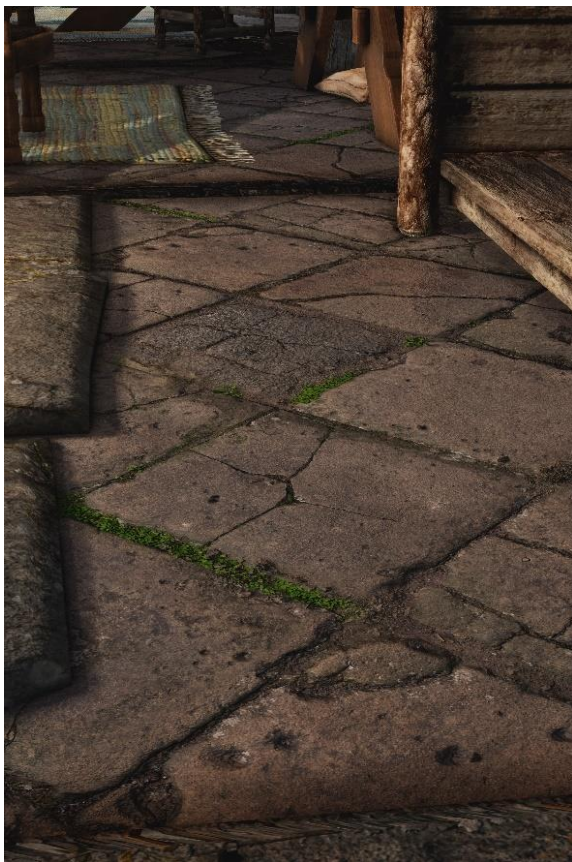

Figure 9 Mossy floors (TES V: Skyrim, Bethesda 2011)

Next, in terms of enrichment we note the approachability of the space. The number of distinct things such as the chairs, bowls, cups, shelves, cupboards, and side tables provide a decent level of complexity, and because of their placement hold a degree of coherence. Our mind can expect smaller items to be placed on top of our tables and shelves. The legibility of this space is found in how easy it is to identify different areas: the cooking area, the sitting area, the storage area, and the passage to a second floor.

We conclude with how this space expresses itself. Details such as the paint faded on the walls, the occasional cracks in the tile, and the moss growing in those cracks show the age of Breezehome. The muted colors lack of elaborate decoration speaks to the location of Breezehome within the Plains District of Whiterun – an expression of culture.

Application: Life is Strange

Released in 2015, *Life is Strange* is Dontnod Entertainment's most notable release, a narrative adventure game centering around photography student Max Caulfield's return to her hometown. An iconic location is the bedroom of Max's childhood friend whom she is reunited with early in the game, Chloe Price. Chloe's room is filled with her personality, and immediately impacts the player as they are getting to know her for the first time.

Figure 10 Wide view of Chloe's Room (Life is Strange, Dontnod 2015).

Our fundamental principles provide us with some vocabulary to quantify the space. The warm wooden tones on the floor and walls contrast with the lighter, plain drywall, creating clear spaces for individual elements around the room – the bed, the closet, the desk, and the stereo/TV area. The rhythm is messy and unorganized, but still strong. The posters and pictures covering the walls, the writing, the clothes and papers strewn across the floor have a shared energy and intensity. Further, the lack of symmetry and alignment of the larger furniture elements evoke an unbalanced, uncaring feeling. All these separate elements are brought together by the tone and the lighting. A warm sunlight comes through the front window, while an American flag diffuses additional ambient light, adding to the reddish orange hue.

Figure 11 Wide view of Stereo/TV Area (Life is Strange, Dontnod 2015).

Past this mechanical vocabulary, we see our space more experientially. In our space, order is at first found through the simple layout and geometry of the room. In other words, the spatial definition is clear both literally and metaphorically. The alcove containing the desk and window is a literal definition of space, with the surrounding color of the drywall, and lines created through the recessed area where the desk resides. The TV and stereo corner inhabit their own space, also divided by lines implied by the geometry of the alcove. Finally, the bed exists on the opposite side, completing the final third of the room and balancing it. Each of these areas has its identity – defining elements such as the desk, the TV, and the bed. And as the story progresses, we further order the space with meaning provided with conversations between Chloe and Max.

The core experience of being in the space, or enrichment is our second element. This space incorporates many objects – papers, CDs, books, posters, cups, bottles, pizza boxes, and more. Simply put, there are a lot of things. As the complexity of a space increases, it must be balanced with coherence. A simple way to create this coherence and legibility is arranging elements to exist in hierarchies.

Furniture exists on the top level, defining the layout of the space and where smaller elements can go. Large objects like storage boxes and this suitcase fill in space without changing the flow of the experience. Smaller objects like the boots, bottles, and cans fill those larger objects, enriching them, and finally complimentary objects like papers and writing, posters and decoration exist across the space, acting as ornament.

Figure 12 Cluttered suitcase in a corner (Life is Strange, Dontnod 2015).

Expression is arguably what defines this space. Everything in it stems from the extremely strong self-presentation of its inhabitant – Chloe Price, an angsty, easily angered teenager struggling with her situation. From the scribbled-out child height chart to the writing on the furniture and walls, to the neglected trash found around the room, we understand the unwelcoming attitude of Chloe, and the lack of sophistication. Cultural symbols such as the inverted American flag aren't subtle in their expression. Smoke and water-stained ceilings depict a very physical effect of the inhabitant's behaviors.

As a player entering Chloe's room through Max's eyes, we experience this expression so deeply, despite words hardly being exchanged by this point.
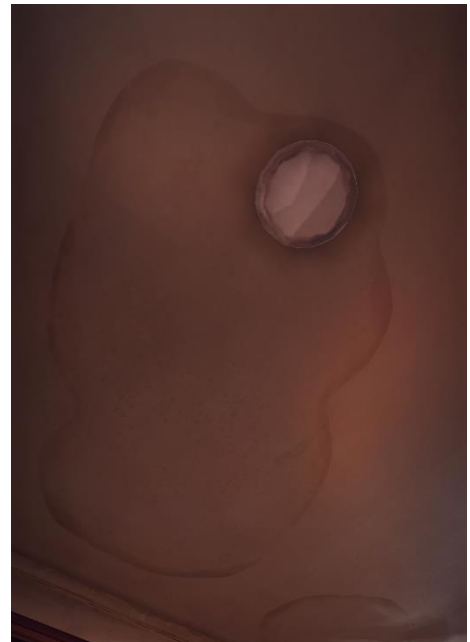

Figure 13 Ceiling water stain (Life is Strange, Dontnod 2015).

Perspective: Game Development

We conclude with the lowest-level, most game-specific approach to analyzing environments in games. For all the insight that philosophy and interior design provide us with into defining, classifying, and explaining space, we are in the end discussing videogames.

Gameplay Design

As mentioned before, videogames vary wildly in the amount of development resources they have available, the experience they want to create, and their intended player base. A believable and immersive space does not necessarily have to be photorealistic, adhere to interior design standards, or even be based on a real-world location for that for that matter. In *The Art of Game Design: A deck of lenses*, author, and game developer Jesse Schell writes about the parallel between architects and game designers [11]. Both seek to shape the experience of people through their surroundings, and when something is "well-designed," it succeeds in creating the intended experience.

We can loosely group the elements of game design into four categories:

1. Gameplay – accounts for all the player interactions, and refers to the rules, challenges, and limitations of those interactions

2. Narrative – the story, or supporting lore and context about the game's setting

3. Art – the assets, textures, animations, and levels

4. Effects – supplementary features like graphical effects, environmental audio, music

Depending on the experience a developer wants to create some of these are more important than others. For instance, a puzzle game like *The Room* focuses heavily on gameplay and interacting with various intricate contraptions, while a story game like *Dear Esther* focuses on expressing its narrative, pacing it, and choosing how to reveal information to the player. Additionally, decisions made in one of these categories may affect others. In a game like *Twelve Minutes* where the player views and plays the game from a top-down camera, assets may simply incorporate more detail on the top of their geometry.

It is necessary to discuss elements other than environment art or level design in considering believable environments, because believability is referring to the experience, and the experience is only as strong as its weakest contributing element.

Application: The Elder Scrolls V: Skyrim

One final time, com to Breezehome. *Skyrim* is an action-adventure role-playing game, and for every player that fully embraces the lore and imagines themselves in the shoes of their character, there is another player that finds enjoyment in the maximizing of their stats, the combat, and the organization of their inventory.

Figure 1 Wide view of Breezehome (The Elder Scrolls V: Skyrim, Bethesda 2011).

First, we observe the unobstructed, wide walking lanes despite the presence of additional geometry. Loose, small things that the player could walk into like bowls, lanterns, and bags of flour are not only kept on shelves and tables but kept from hanging off those shelves and tables. A realistic appraisal of this situation could say that a basket or a bag on the floor would make sense, tossed down by a tired character, but our focus on gameplay says otherwise, prioritizing player movement. Further, the stairs are in plain view, in a straight line from the entrance point to this level. This initially lets the player know there is a second floor, and later allows players to easily sprint upstairs to use the sleep functionality or store their loot. Direct interaction points like the bookshelves and weapon racks are visually clear because of the lighting, lighter colors, and initial empty states as opposed to the pre-populated shelves.

Figure 14 Rear wide view of Breezehome (The Elder Scrolls V: Skyrim, Bethesda 2011).

The repetition of assets throughout the room such as the distinct bowls and cups affirms the sense of scale for the player, as do the furniture meshes with each other.

The warm lighting radiates from the central fireplace and flickers, causing shadows to dance along the walls and furniture. Accompanied by crackling sound effects and a relative silence compared to the street outside, a calming, homely mood is created. Companions to the player let their guard down and take a seat next to the fire, eating some bread, or tidy up the floor with a broom. The atmosphere of Breezehome is undeniable, and greater than the sum of its parts.

Application: The Room 4: Old Sins

The Room 4: Old Sins is a puzzle game released in 2018 developed by Fireproof Games. The player is Collector Hydrus, an investigator looking into the deaths of the owners of the estate they start in, Waldegrave Manor.

Figure 15 Foyer (The Room 4: Old Sins, Fireproof 2018)

In *Old Sins*, the player does not move freely, but can look around their surrounding space without restriction, and must inspect different elements around their space, zooming the camera in on different elements. Visually, *Old Sins* is stunning in its consistency, mood, and feeling. Fully committing to the Gothic aesthetic, lighting is dark, warm, and moody. Textures for wallpapers, trims, flooring, and carpets are elaborate and visually appealing, while occurring in patterns as to not be overly distracting. Architecture is interesting and varied, as would be expected in a historical manor in central London. The presence of candlelight and fireplaces create a hazy effect, which contributes to the mystery.

Of course, visuals are only a part of a space, and *Old Sins* defines itself is in its gameplay which, in isolation, is relatively simple. The player must solve a series of puzzles to unravel more of the mystery and ultimately solve it. Believability, in this case, is found in how drawn in to play the player feels, how information is told to the player, and how the puzzles feel when they are interacted with.

Starting simply, immersion and believability cannot exist if the player does not play or progress. If a player closes their game out of frustration, there is no space to believe in. The puzzles in *Old Sins* exist on a fine line of trusting the player to figure out the logic of puzzles, while giving them enough of a challenge to where figuring them out feels satisfying and rewarding. A direct approach, hints are given to the player upon request after a certain period where no progress is made. These hints increase in precision over time, as to maintain mystery for those who only need one, and to help spur progression for others who need more.

Additionally, the presentation of puzzles within such a visually impressive space contributes to solving this challenge.

Figure 16 Kitchen (The Room 4: Old Sins, Fireproof 2018)

As a player enters a new area, such as this, they must be told where to look for puzzles and points of interest in an indirect way, giving them agency as the investigator. Here, we initially see visual contrast of two circular contraptions on the oven. These happen to be locking mechanisms, and a puzzle that must be solved. This presentation not only adheres to the visual aesthetic of the space, maintaining its realism, but still clearly communicates where the player should look.

Figure 17 Lightswitch (The Room 4: Old Sins, Fireproof 2018)

Lastly, the feeling of interacting with these puzzles contributes to the player's immersion. In *Old Sins*, the player must physically turn, hit, pull, and push objects in each puzzle. This simple light switch is operated not by a keypress, or a prompt, but rather physically having to click and hold the lever until it is in the desired position. This tries to emulate the physical sensation and immerse the player in their role as an investigator in the space. This occurs at the very beginning of the game, establishing itself as a core game mechanic.

This mechanic isn't solely aesthetic, or interaction based though; it can also deliver information.

In this example, pulling on this door is blocked due to the mechanism on the left, stopping the hinge from turning out. As the player physically pulls on the door, they can observe the hinge hitting the mechanism and realize they have to interact with and get rid of it to further progress.

Sound effects corresponding to the interactions, like wood scratching or metal sliding, as well as additional visual effects like sparks or burn marks contribute to this seamless flow of information.
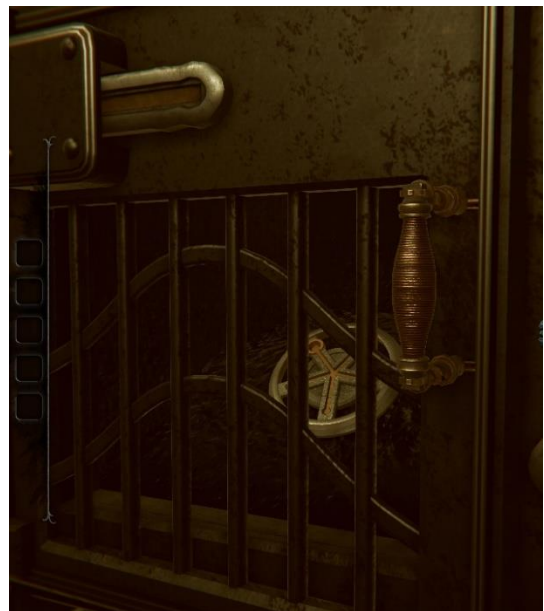

Figure 18 Heater door (The Room 4: Old Sins, Fireproof 2018)

Conclusion | Perfecting Imperfection

In considering the question of what makes a particular space in a videogame believable, we give ourselves a deceptively bottomless set of thoughts to wonder about. We use philosophy to tie spaces to some natural order of being. We use interior design to establish a concrete foundation for close looking and evaluation of physical elements. We use game design to rationalize choices made for specific stories, interactions, and experiences. Through understanding these various perspectives, we give ourselves tools in the forms of ideas, vocabulary, and examples to analyze game environments with.

And yet, we have not generated any definitive formula or checklist to create a believable space. Simply put, we prioritize a descriptive answer over a prescriptive answer. We describe how believable spaces are, and not how we think they should be, because "immersion," believability, and atmosphere are all subjective qualities that rely both on the thing being evaluated and the evaluator.

The question of how we make synthetic, manmade things feel less artificial is found in various creative fields. Musicians try to humanize sequenced notes playing pianos, drums, and guitars, struggling to capture the imperfection and nuances of real performances. Visual effects artists attempt to transform pristine cinema quality camera footage into faux shaky, unfocused phone videos to show a character's perspective on a fictional world changing event. Animators grapple with the impossible inconsistencies of human movement in production pipelines that favor repetition and cycles.

We try to grasp the nuances of humanity, not necessarily knowing what success looks like. As technology progresses, and general intelligence accumulates, it may appear on the surface that we are making progress towards knowing. But if our struggle has shown us anything, it may be that we are defined by taking upon futile challenges - challenges that offer a chance at better understanding ourselves regardless of if we fail or succeed.

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