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Beyond Buildings: A Systems-Theoretical Phenomenological Aesthetics of "Impossible" Architectural Structures for Computer Games

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ABSTRACT. This work draws on Ingarden's systems theory to develop a phenomenological aesthetic account of the kinds of reason-defying buildings that cannot exist as physical structures in the real world but which are frequently encountered within the virtual gameworlds of computer games. Such "impossible" buildings might, for example, take the form of colossal biological entities or violate established principles of physics or geometry. First, the evolution of Ingarden's systems theory is traced, and an account of his mature systems theory is presented: pivotal is his concept of the "relatively isolated system" whose contents are partially engaged with and partially sheltered from the external environment via the system's complex array of semipermeable boundaries. By applying Ingarden's thought in a novel way, a systems-theoretical phenomenological architectural aesthetics is then formulated that conceptualizes the "building" as a set of overlapping physical, informational, and psychosocial boundaries that generate interior spaces that possess rich structures and dynamics and mediate their occupants' relationships with the world. Using this conceptual framework, it is shown how the systems-theoretical properties of real-world buildings and virtual gameworld buildings can (and often do) radically differ. Three types of "impossible" gameworld buildings are analyzed: (1) the floating castle that is a recurring element of fantasy games; (2) the shapeshifting haunted mansion

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that appears not infrequently in horror games; and (3) the high-tech facility that functions as the gigantic "body" of an AI, which is common in science-fiction-themed games. This aesthetic framework may be of value to game developers seeking to employ techniques of "hyperdeconstruction," "hyperfolding," or architectural posthumanization to design more memorable and meaningful gameworlds.

1. Introduction

The types of buildings that may be mentally experienced within the virtual gameworlds of contemporary computer games share many similarities with – but may also differ radically from – the types of buildings that can be physically constructed in the "real world." Within a gameworld, it is possible for entities to exist that are recognizably "buildings" but which display structures and dynamics of a sort that would be theoretically or practically impossible for real-world buildings to possess. Such gameworld buildings might, for example, be experienced as gargantuan biological entities that are sentient or sapient, as possessing irrationally alien geometries, or as defying the laws of physics or technological, economic, or cultural plausibility.[2]

In this text, we develop one approach to analyzing the unique

[2] An influential account of the extent to which the virtual worlds accessed through computer games and other software may present structures that defy the natural laws of the real world is found in Novak (1991).

properties of "impossible" gameworld buildings by drawing on the later systems theory of Polish phenomenologist Roman Ingarden, which is well-suited to support such aesthetic inquiry but which has not been previously applied in this context. More particularly, we build on Ingarden's thought to conceptualize the "building" as a complex, dynamic array of nested physical, informational, and psychosocial boundaries that create interior spaces that are partially secluded from and partially engaged with the external environment. We then employ this conceptual framework to analyze three types of "impossible" gameworld buildings that cannot exist in our (contemporary) real world but which are a recurring element of computer games in particular genres: (1) the floating castle that hovers magically in the air, far above the countryside; (2) the shapeshifting haunted mansion whose rooms and corridors are continually rearranging themselves to create a sort of "living labyrinth," and (3) the high-tech facility that essentially serves as the gigantic "body" of an artificial intelligence that employs the building's ubiquitous networked sensors and actuators as its eyes, ears, and limbs.

The idea of employing Ingarden's concepts to analyze objects found in virtual gameworlds is arguably in keeping with the spirit of the philosopher's own thought: while Ingarden is sometimes perceived as an eminently "classical" phenomenologist who had little interest in emerging media technologies, in reality he keenly followed ongoing developments in

science and technology and strove to understand (and anticipate) their implications. Indeed, in a text composed in 1928 (Ingarden, 1966), he envisioned the kinds of futuristic virtual reality technologies that are only today becoming feasible and discussed the novel types of architectural works that they might make possible (Maluga, 2006).

2. A Review of Ingarden's Systems Theory

Before we can formulate an Ingardenian analysis of impossible gameworld buildings, it is necessary to begin with an account of Ingarden's mature systems theory.

2.1. Stages in the Theory's Development

Ingarden's thought regarding systems and systems theory evolved greatly over the course of more than 30 years, ultimately leading to his being recognized as one of the most influential figures in systems theory in Poland (Sienkiewicz and Wojtala, 1991). A pivotal moment occurred in 1943, when Ingarden (1960, p. 261) encountered Bertalanffy's *Theoretische Biologie* (1932) and its account of "open systems," which provided Ingarden with a new vocabulary for use in further developing his own thought –

which agreed with Bertalanffy's in some respects but differed in others.[3]

Readers interested in tracing the development of Ingarden's systems theory may follow it through stages including: (1) Ingarden's concept of the organism as a hierarchical functional-structural system, presented in *O poznawaniu dzieła literackiego*, published in 1937; (2) his model of the human person as a stable core with transient outer layers, written in 1941 as part of the *Spór o istnienie świata*, vol. I; (3) his account of the "relatively closed system," composed between 1941 and 1945 as part of the *Spór*, vol. I; (4) Ingarden's distinction between objects possessing and lacking a "core," as well as his differentiation of the soul, subject, and stream of conscious experiences from the human person and his discussion of Bertalanffy's notion of the living individual, all presented in the *Spór*, vol. II, which was written no later than January 1945; (5) Ingarden's concept of the "relatively closed system" from his paper "Quelques remarques sur la

[3] Ingarden's careful study of Bertalanffy is well known, having been emphasized by Ingarden himself. Not so widely known is the fact that also in 1943, Ingarden carried out a similarly detailed analysis of the *Theoretische Biologie* of Von Uexküll (1928), as evidenced by Ingarden's (1943a, 1943b) extensive handwritten notes, which are preserved in the Archive of Science of the Polish Academy of Sciences (PAN) and Polish Academy of the Arts and Sciences (PAU) in Kraków. Despite then displaying interest in Uexküll's concept of the *Umwelt* or environment as the union of the (perceived) *Merkwelt* and (effected or affected) *Wirkwelt*, Ingarden ultimately chose not to build explicitly on Uexküll's thought when developing his own systems theory. One can thus trace (at least) two major branches of theoretical biology's influence in phenomenological circles, with Ingarden's systems theory drawing more heavily on Bertalanffy's concept of the open system and Heidegger's understanding of the environment being more deeply influenced by Uexküll's concept of the *Umwelt*.

relation de causalité," presented in 1946 and published in longer form in 1948; (6) Ingarden's references to "partially isolated systems" and the partially closed and partially open nature of real-world objects found in the preliminary table of contents for the *Spór*, vol. III, drafted in 1945-46;[4] (7) the detailed account of the "relatively closed system" formulated in the preparatory notes for the *Spór*, vol. III, composed in 1950-54; (8) the modified language used to describe the "relatively isolated" system in the revised edition of the *Spór*, vol. I, published in 1960; (9) the discussion in Ingarden's 1968 talk on "Die ontischen Fundamente der Verantwortung" of systems that are simultaneously relatively isolated and partially open; and (10) Ingarden's account of the human being as a relatively isolated system, presented in *Über die Verantwortung: Ihre ontischen Fundamente* (1970).

The most complete presentation of Ingarden's generalized systems theory is found in the unfinished notes for the *Spór*, vol. III, which were published after his death as *Über die kausale Struktur der realen Welt: Der Streit um die Existenz der Welt III* (1974). The account presented in *Über die Verantwortung* is arguably more mature and sophisticated, but it is also narrower in scope, insofar as it focuses on the human being as a particular type of relatively isolated system. We draw primarily on these two texts in articulating the systems-theoretical phenomenological aesthetic approach

[4] The draft table of contents is presented and discussed in Gierulanka (1981, pp. 5-6).

presented below.

2.2. Key Elements of Ingarden's Mature Generalized Systems Theory

In Ingarden's account, the universe is full of countless "relatively isolated systems." There are no completely closed systems to be found within the world, as demonstrating absolute causal separation from the rest of the world would mean that such a system is not "within" our world (Ingarden, 1974, pp. 101-03). Conversely, there are no absolutely open systems to be found, as any such "system" would rapidly dissolve into its environment and cease to exist *as* a system (Ingarden, 1970).

At a minimum, a relatively isolated system comprises: (1) a set of semipermeable nested boundaries (or membranes), each of which possesses "openings" that selectively allow certain types of causal influences or objects (but not others) to pass through the boundary in one or both directions, and (2) the partially (but not fully) sheltered set of interior spaces created by those boundaries, together with their contents (Ingarden, 1974, p. 104). Such isolating boundaries are often dynamic, modifying their behavior over time (Ingarden, 1970; 1974, pp. 107-08).

An object like a stone or a star is a fairly simple type of relatively isolated system, while a living organism like a plant or human being is a

more complex example of a relatively isolated system that can maintain internal equilibrium amidst changing environmental conditions (Ingarden, 1970; 1974, pp. 104, 109, 427). The partially isolating boundaries possessed by such systems come in many forms: they might, for example, be *physical* (as in the case of a stone wall or piece of clothing that impedes the flow of heat, light, or moisture) or *cognitive* (as in the case of the human mind's memory mechanisms, which partially isolate us from our own past experiences by allowing us to relive selected earlier events, but only in a hazy and potentially inaccurate fashion).

As ones moves into the deeper interior spaces of a relatively isolated system, the interaction of those spaces' contents with the external environment becomes mediated by an increasingly elaborate set of selective semipermeable boundaries that successively reflect, weaken, amplify, absorb, or permit the transmission of arriving objects or causal influences (Ingarden, 1974, p. 105). A complex relatively isolated system may possess innumerable boundaries of diverse types, one inside the other; the interplay of such boundaries can give rise to intricate internal structures from which sophisticated features and rich dynamics emerge. While a relatively isolated system is partially engaged with its environment, it simultaneously acts in ways that are partially independent of that environment: the system's internal dynamics are influenced but not determined by activity in the outside world, just as those internal dynamics affect but do not determine

the course of events in the external environment (Ingarden, 1970; 1974, pp. 102, 105). In the case of a building, manifold semipermeable boundaries create partially secluded interior spaces (e.g., bedrooms or offices) within which it is possible to sleep or work without distraction or disruption, while still maintaining connections to the outside world – which itself is only incompletely affected by the activity occurring within those spaces.

3. Developing an Ingardenian Systems-Theoretical Phenomenological Aesthetics of the Building

Some of Ingarden's earliest forays into thinking about systems *per se* came within the context of his aesthetic analyses of literary works. However, when formulating the mature version of his systems theory decades later, he did not explicitly link it to aesthetics. Nevertheless, it is possible to employ Ingarden's mature account of relatively isolated systems as the basis for a systems-theoretical phenomenological aesthetics that – with its investigation of the unique value of (partial) isolation – might be understood as both a complement and challenge to, for example, Berleant's (2005) environmental aesthetics, which emphasizes the value of engagement (Gladden, 2018a).

An aesthetics built on Ingarden's concept of relatively isolated systems is especially well-suited for an analysis of buildings, given the fact that such a systems-theoretical phenomenological aesthetics is especially

sensitive to the existence of "boundaries" and "spaces" and the distinctions between an object's "interior" and "exterior" – which are of crucial significance in an architectural work but less central to the nature of, say, a musical or literary work. The perspective employed in such a systems-theoretical analysis of a building yields different insights than an analysis grounded, for example, in a classical Vitruvian (1999) framework that investigates a building's *firmitas*, *utilitas*, and *venustas*.

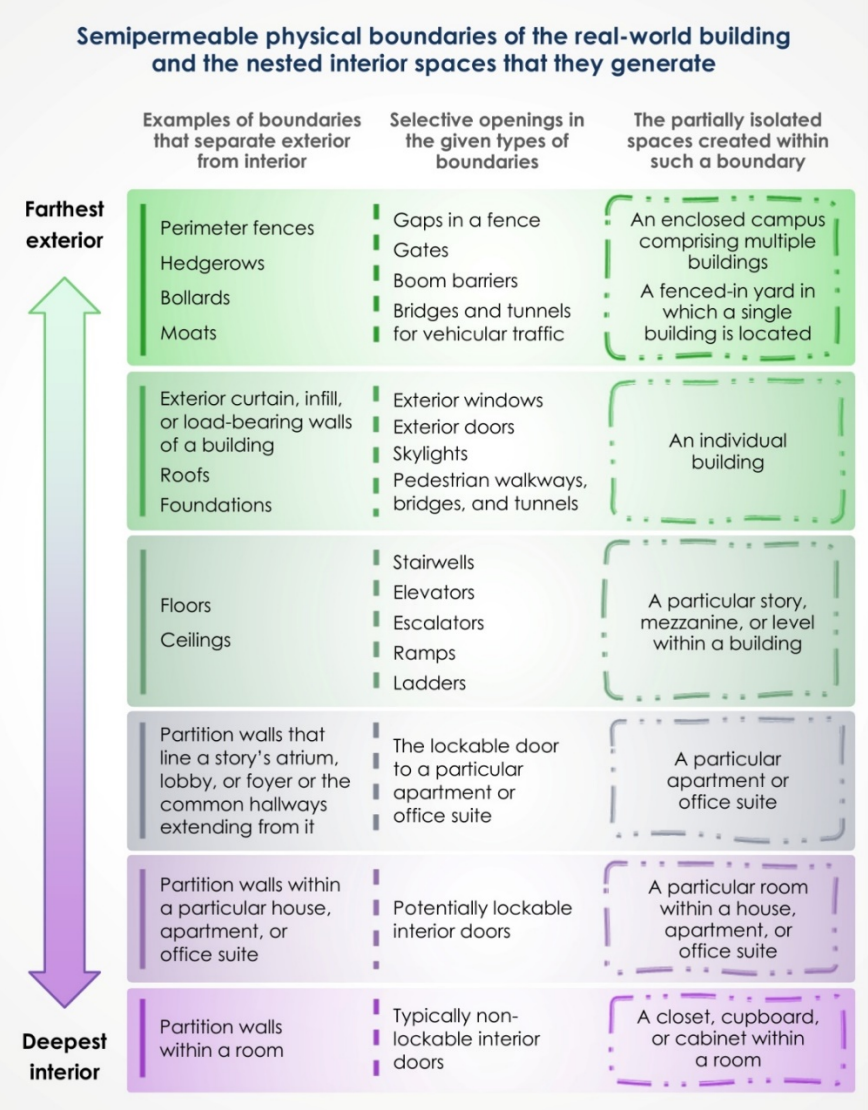

Figure 1: The semipermeable physical boundaries of a real-world building and the nested interior spaces that they generate. (Source: own design.)

3.1. The Semipermeable Boundaries of a Building and the Interior Spaces That They Create

As illustrated in Figure 1, a large, complex real-world building (like an office building, apartment building, school building, or shopping center) can be understood as incorporating a series of concentric semipermeable physical boundaries of diverse materials, strengths, and functionalities (1) that generate a set of nested interior spaces of differing sizes, purposes, and "feels" and (2) whose varying type and degree of permeability selectively allow certain objects and causal influences arriving from the external environment to reach the building's innermost spaces but repel, block, attenuate, or transform other objects and influences. Likewise, the boundaries allow some objects found in or causal influences generated in the building's innermost spaces to travel outward until they are eventually transmitted into the external environment, but the boundaries dampen or contain other elements, allowing them to be released into the environment only in altered or weakened form (if at all).

3.2. Physical Boundaries of a Real-world Building

For example, consider an apartment complex comprising several buildings. The group of buildings may occupy terrain surrounded by a single large wall

or fence that physically prevents the free movement of pedestrians and vehicles on and off the property and forces occupants or would-be visitors to pass through a particular designated opening (e.g., in the form of a gap, gate, or entrance tunnel).

Once on the property, a visitor is confronted by the formidable physical walls that constitute the exterior surface of each individual building. Such walls typically possess diverse openings that allow certain objects and influences to pass into the building while physically reflecting, absorbing, or blocking others. For example, an exterior wall itself allows neutrinos and radio transmissions to pass into the building, while visible light is absorbed or reflected back into the atmosphere. The exterior wall typically possesses transparent glass windows that allow visible light to pass through them but (when closed) block the flow of fresh air and weaken or block sound waves; when opened, the windows allow air and sound waves to travel in and out of the building, as well (Ingarden, 1970; 1974, p. 104). An individual apartment building likely also possesses a main pedestrian entrance on its ground floor that is large enough to allow human beings, small animals, and packages to travel in and out of the building but that physically prevents the passage of larger objects like automobiles. The building may also have emergency exit doors whose design allows the egress of human beings but physically blocks persons from entering. If the apartment building possesses an integrated underground parking garage, it

will likely also possess a garage entrance that physically enables the passage of small or medium-sized vehicles in and out of the structure.

Once inside the building's lobby, a visitor realizes that the building's internal space is divided into a number of separately enclosed, horizontally stacked spaces (i.e., stories) that are physically bounded by floors and ceilings. To enter an upper floor, the visitor must pass through a specialized "opening" in the form of an elevator or stairwell that enables the visitor to overcome the force of gravity that would normally keep the visitor trapped on the ground floor. Having reached an upper floor, the visitor is typically confronted by a hallway whose walls physically block access to the individual apartment suites; the only entrance to a given apartment is through a doorway whose door can only be opened through successful manipulation of its physical lock. Once within a particular apartment suite, partition walls divide its space into smaller rooms, with some typically being accessible through permanent openings while others are accessible through doorways that may be periodically blocked by swinging or sliding doors that prevent the passage of persons and animals and reduce the transmission of light, heat, air, and sound.

The physical boundaries that give rise to physical spaces are just one piece of the puzzle, though: there are other ontologically distinct types of isolators at work within a building that give rise to qualitatively different

types of (non-physical) spaces.[5] For our purposes, it is worth considering two other types (depicted in Figure 2) that play a major role in shaping one's experience of dwelling or spending time within a building: (1) informational boundaries and (2) psychosocial boundaries.

3.3. Informational Boundaries of a Real-world Building

Informational boundaries are those semipermeable barriers that regulate the flow of data and information in and out of a building. If a fortress-like building's windowless exterior stone wall is perforated only by a lone copper coaxial cable passing through it, the wall remains an almost impenetrable *physical* isolator. However, in its capacity as an informational boundary, the wall presents a huge "opening" that renders it more ephemeral than solid: that coaxial cable is capable of transmitting phone calls, TV broadcasts, and Internet traffic, thereby allowing vast quantities of data to move rapidly in and out of the building.

3.4. Psychosocial Boundaries of a Real-world Building

Psychosocial boundaries regulate the degree to which social beings,

[5] For discussion of the many qualitatively diverse overlapping spaces created by architectural works, see, e.g., Norberg-Schulz (1980), Stanek (2012), and Erk and Uluoglu (2013).

behaviors, relations, roles, institutions, and expectations and taboos can extend into a building from the surrounding environment or out of a building into its environment. A security guard or receptionist sitting behind a desk inside a building's main entrance may not constitute a significant *physical* barrier for objects entering the building: it's theoretically possible for someone entering the building to run past such a person and move deep into the building's interior without being physically impeded. Rather, the "barrier" created by the person behind the desk is psychological and social: it discourages one from trying to enter the building, unless one feels that one possesses the proper (socially granted) "authorization" to do so. A child who is unaware of the gatekeeping role of security guards and receptionists might run exuberantly past such a person and into a building's interior; the fact that the guard or receptionist is unable (or unwilling) to leap up and block the child's path shows that the boundary created by the worker was always psychosocial rather than physical.

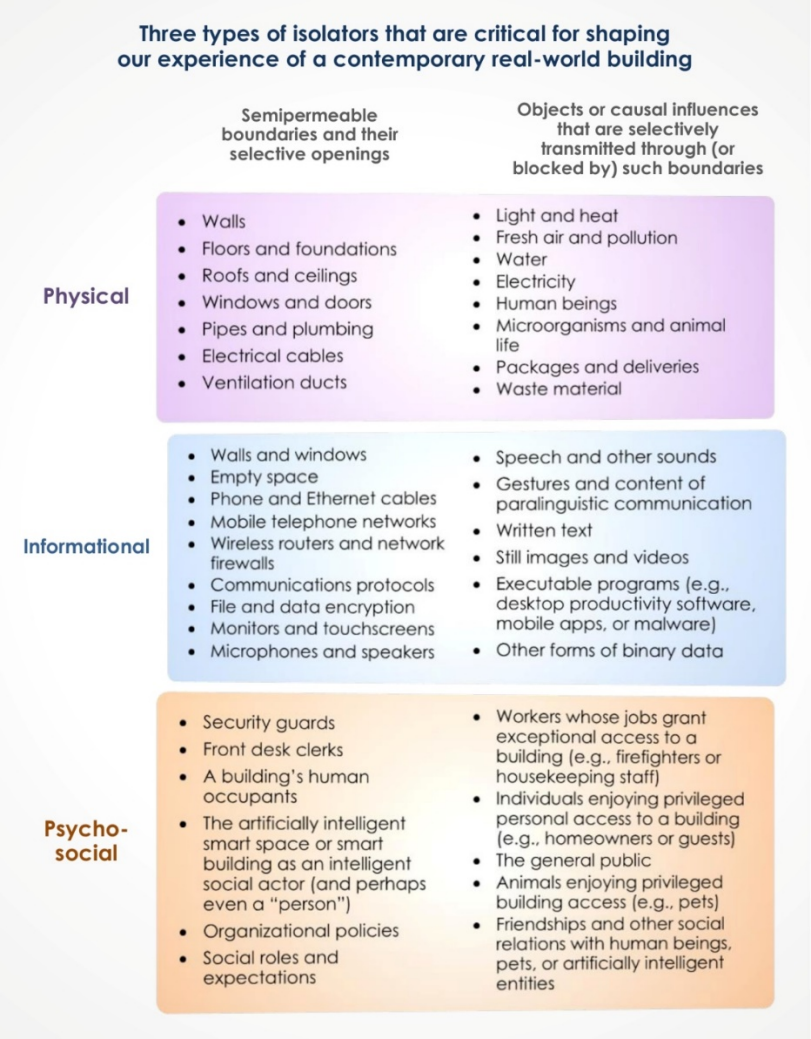

Figure 2: Three types of isolating boundaries that shape our experience of a contemporary real-world building. (Source: own design.)

3.5. The Relationship of the Physical, Informational, and Psychosocial

The nature and contents of a given building's nested interior spaces are affected by (1) the characteristics of the objects or causal influences attempting to pass through the structure's boundaries, as well as (2) the characteristics of the boundaries themselves.

In some cases, an object attempting to pass through a building's exterior boundaries may possess considerable extension in all three physical, informational, and psychosocial dimensions. For example, a human being not only occupies significant physical space; he or she is also the bearer of vast quantities of information (e.g., contained in the person's memory and conscious awareness, as well as in his or her genetic code and the arrangement and activity of the person's cells and organs), as well as being a bearer of diverse, complex social roles and expectations and a continual generator of meaningful social behaviors. A physical boundary (e.g., a solid exterior wall) that prevents human beings from physically entering or leaving a building thereby also serves as an informational and psychosocial boundary that blocks the flow of at least many types of informational and psychosocial entities and influences. In other cases, an object attempting to pass into a building may possess significant extension in either the physical, informational, or psychosocial dimension but negligible extension in the

other dimensions.

In some cases, a single boundary serves as a powerful physical, informational, and psychosocial barrier that reflects, absorbs, or blocks the transmission of all three types of influences simultaneously. For example, a thick brick wall that lacks any doors or windows not only prevents the passage of physical objects; it also severely impedes the flow of information (as borne, e.g., by beams of light, radio waves, or sound waves) and makes it very difficult for a person located on one side of the wall to engage in social interaction with a person located on the other side. In other cases, though, a given boundary might block the transmission of one type of object or influence while demonstrating significant permeability in the other two dimensions. For example, a transparent glass living-room window that is permanently sealed blocks the flow of fresh air and prevents human beings from physically entering or leaving a house through it; however, it simultaneously creates a large opening in the building's informational and psychosocial boundaries.

3.6. Developing a Schematic Systems-Theoretical "Profile" of a Building

A particular "building" can be conceptually represented, described, and analyzed in terms of the unique combination of semipermeable physical,

informational, and psychosocial boundaries that it possesses and the ways in which they interact to give rise to a set of interior spaces that partially isolate and partially engage their occupants with the external environment (and with one another) in complex and meaningful ways.

Such systems-theoretical properties may be schematically captured using an illustration of the sort presented in Figure 3. For purposes of simplification, in the illustration, a building's nested sets of physical, informational, and psychosocial boundaries have been divided binarily into "outer" and "inner" layers; in reality, a large and complex building may possess many more than two such layers.

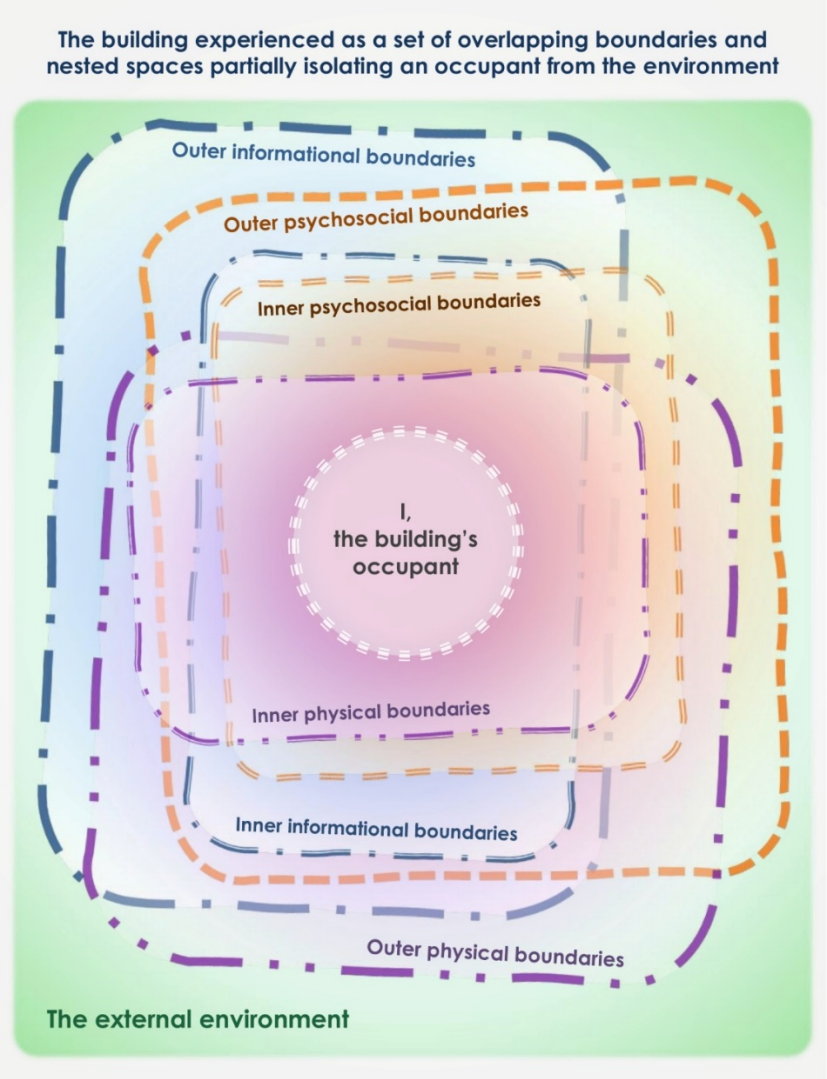

Figure 3. The schematically simplified systems-theoretical depiction of a generic real-world building. (Source: own design.)

3.7. The Fluid, Dynamic, and Organically Irregular Nature of the Building

The purposeful "fluidity" of the boundaries' visual depiction in Figure 3 emphasizes the dynamic nature of a real-world building's boundaries. This fluid aspect of a building's nature is sometimes concealed by the fact that a building's most obvious physical boundaries – its exterior walls and roof – are often constructed of solid, unmoving, flat, rectangular, orthogonally arranged surfaces, especially within those architectural traditions that manifest what Norberg-Schulz (1980, pp. 71-75) describes as the "cosmic" or "classical" mode. Even in the case of cosmic or classical buildings whose regular exterior surfaces present the appearance of fixed rectilinear boundaries, though, the structures' (less obvious) informational and psychosocial boundaries are necessarily highly fluid, dynamic, irregular, and organically "messy."

Moreover, architects are increasingly employing AI-facilitated form-finding and parametric design (Woodbury, 2010; Jabi, 2013; Schumacher, 2016) to create real-world buildings with remarkably complex, curvilinear, organic, and biomimetic elements (Pohl and Nachtigall, 2015); such a building may seem to possess a living "skin" that mediates the relationship between its interior and exterior (Januszkiewicz, 2010). Such structures are a novel embodiment of the Deleuzian architectural concept of the active,

generative, continuous, undulating, mediating, and reconciling "fold" as a fundamental organizing principle of the universe (Deleuze, 1993; Borowska, 2010; Januszkiewicz, 2010): their outward form makes visually explicit the hidden fluidity and biomimeticity of their physical, informational, and psychosocial spaces in a way that was hinted at by earlier buildings constructed in the "romantic" mode (like those built in medieval Central European towns or, later, in the Art Nouveau style (Norberg-Schulz, 1980, pp. 69-70)), which revealed their dynamic, organic nature even in and through their permanent physical boundaries.

4. Comparing the Systems-Theoretical Properties of "Real" and Virtual Gameworld Buildings

The schema presented above can also be used to represent, describe, and analyze a virtual building appearing within a computer game in terms of its systems-theoretical properties. While it is possible to recognize what we might describe as "physical," "informational," and "psychosocial" boundaries and interior spaces in the buildings that we experience within gameworlds, the virtual nature of the gameworld means that those boundaries and spaces differ significantly from those displayed by buildings in the "real world." Some differences are highlighted in Figure 4.

As we shall see in the examples below, such differences make it

possible for the virtual buildings found in a gameworld (1) to possess particular types of selectively isolating boundaries and partially isolated spaces that are *impossible* for real-world buildings or (2) to lack certain types of boundaries and interior spaces that are *required* in the case of real-world buildings.

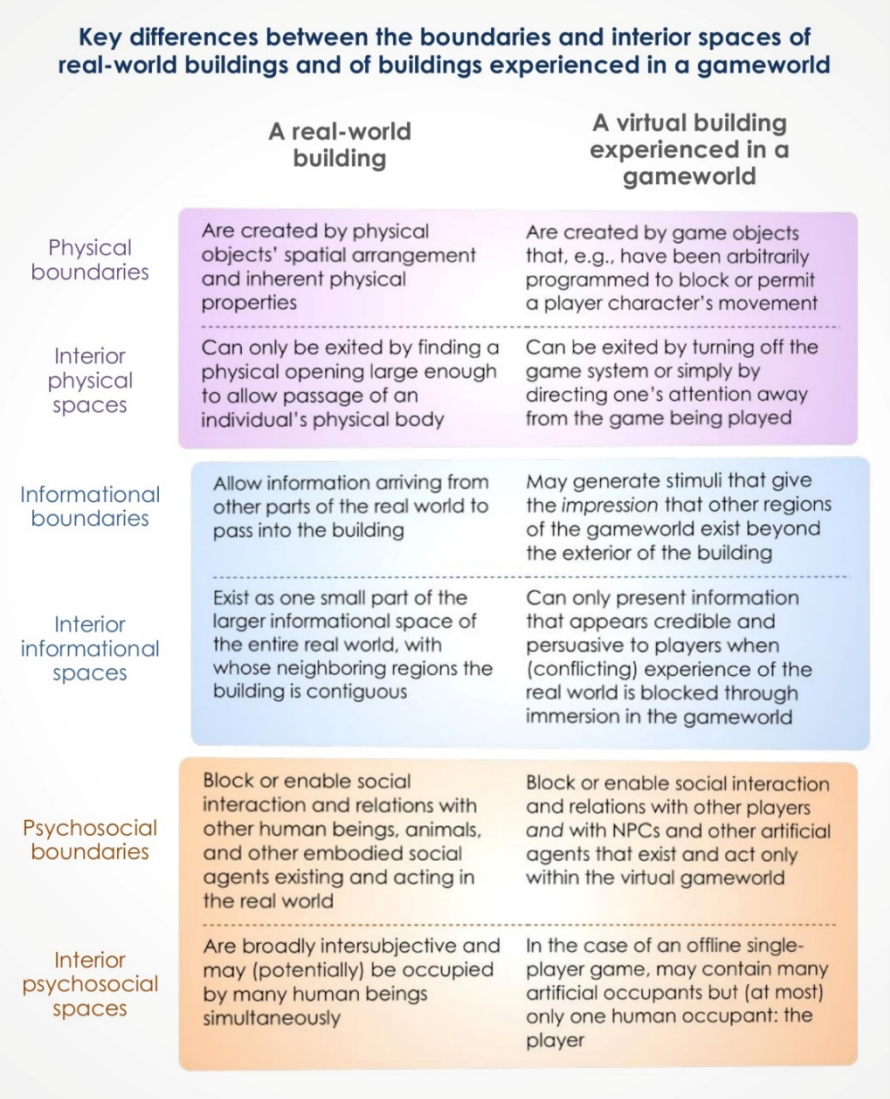

Figure 4: Selected systems-theoretical differences between real-world buildings and buildings experienced in a virtual gameworld. (Source: own design.)

4.1. The Novel Impossibility of Computer Games' Buildings

In itself, the notion of employing diverse art forms to allow human beings to experience impossible architectural structures is nothing new. Myths and folktales have long helped us to envision such impossible structures;[6] however, when we read or hear about such a structure, we experience it primarily via our imagination and not (as in the case of a real-world building) via our senses. Meanwhile, there is a long tradition of architects preparing sketches (e.g., as thought experiments or artistic exercises) for structures that cannot actually be built in the real world due to economic constraints or the inadequacies of available construction techniques or building materials (Maluga, 2006).[7] However, the impossible structures suggested by such static, two-dimensional sketches cannot be experienced *as* "buildings"; they are not three-dimensional structures that one can move around in, explore, touch and manipulate, hear the acoustics of, and view from countless vantage points that yield distinct and varied sensory content.

Prior to the advent of computer games, we could thus either: (1) experience an actual (and thus necessarily "possible") building via our

[6] The *Prose Edda* of Nordic mythology (Sturluson, 2005), for example, describes Bifröst, a bridge believed to link the realms of Midgard and Asgard that takes the form of a rainbow upon which physical beings can walk.

[7] Of yet another sort is the geometric impossibility of buildings depicted by artists like Escher (Ferrero et al., 2009).

senses, as we move around within and interact with it; (2) virtually move around within and interact with an impossible building via our imagination; or (3) use our senses to experience a static, two-dimensional depiction of an impossible building that does not allow us to move around within or interact with it.

The novelty of computer games – and especially VR or first-person games – is that they finally allow us (a) to experientially *move around within* and *interact with* (b) truly *impossible* buildings that we access by means of (c) our *senses* and not simply our imagination.[8] Sufficiently immersive gameworlds may even allow players to truly "inhabit" or "dwell within" such impossible structures.

5. Analyzing Three Types of Impossible Computer-game Buildings

Below we use the systems-theoretical framework to analyze three types of impossible buildings that are a recurring fixture in certain video game genres.

[8] For example, a game might create "impossible" VR environments in which distances covered by a player character in the gameworld do not correspond to the locomotion performed by the player in the real world (Suma et al., 2012; Garg et al., 2017) or turn a building "inside out" through weird geometric transformations (Wąsowicz, 2015). Novak (1991) has suggested many other ways in which the virtual worlds that we access through computers may present impossible buildings or environments.

5.1. The Floating Castle

"Floating castles" have appeared in many computer games that have a medieval fantasy theme or fairytale-like setting, as well as in other games in which the presence of magic, psionics, superpowers, or alien or far-future technologies within the gameworld allows such structures to exist. Variations on the theme include the Floating Castle in *Final Fantasy* (1987), Whomp's Fortress in *Super Mario 64* (1996), Exire in *Tales of Symphonia* (2003), the Castle That Never Was from *Kingdom Hearts II* (2005), Bhujerba from *Final Fantasy XII* (2006), the Night Palace in *Sonic and the Secret Rings* (2007), the Black City from *Dragon Age: Origins* (2009), and Skyloft in *The Legend of Zelda: Skyward Sword* (2011). Moreover, floating structures that players can customize and control constitute a central element of games like *Stratosphere: Conquest of the Skies* (1998) and *Project Nomads* (2002).

Such a floating castle may be directly suspended in the air; however, in many cases (as illustrated in Figure 5) the castle stands on a small island of rock and dirt which itself hovers (often far) above the surface of the earth. Sometimes the castle and its island maintain a constant position relative to the earth; in other cases, the castle-island may drift like a cloud, or it may even be capable of traveling purposefully in a particular direction.

Figure 5: Depiction of a prototypical "floating castle" of the sort that might be found within a computer game. (Source: own design.)

Within the context of its gameworld, how does such a floating castle differ from a conventional ground-based castle? If we analyze the floating castle using our systems-theoretical framework, we find a ready means of accounting for its unique properties by employing the concept of partial isolation. For example:

Rather than relying on solid fences to create a physical barrier around the castle and its property, the floating castle employs a physical boundary fashioned of the most pliable substance imaginable: empty air. Such vacant

space – which is exploited in a way that would be impossible with a real-world building – serves as a more effective isolator than a physical wall over which one can easily climb.[9]

In one sense, the floating castle's levitation also creates significant and unconventional informational boundaries, insofar as methods of information transfer that rely on tangible transmission lines or the movement of physical objects between the castle and the surrounding countryside (like horseback messengers or physical telegraph or telephone lines) are impractical. At the same time, the castle's elevated aerial position gives it a commanding view of the countryside, allowing its occupants to visually gather real-time information about events occurring in the environment that would be unavailable to the occupants of a castle that rests upon the ground – and conversely allowing persons standing on the earth to view the castle even from vast distances. In this sense, the castle's levitation dissolves informational boundaries that would otherwise exist.

5.2. The Shapeshifting Haunted Mansion

A second type of impossible building that is not infrequently encountered in horror, mystery, or puzzle games is the shapeshifting (and often "haunted")

[9] Regarding the role of empty space (e.g., between stars or planets) as a selectively isolating boundary, see Ingarden (1974, p. 111).

mansion. Examples include Derceto in *Alone in the Dark* (1992), Stauf's mansion in *The 7th Guest* (1993), the Tremere Chantry in *Vampire: The Masquerade – Bloodlines* (2004), the eponymous mansion in *Mystery of Mortlake Mansion* (2011), and the house in *Layers of Fear* (2016).

Such a building resembles a conventional large, rambling mansion; however, the size, shape, and arrangement of its structures and spaces continually shift or seem to manifest impossible "alien geometries." For example, the first time a player character walks down a hallway, a door might open into a bedroom; however, when the character later visits that hallway again, the same door opens into a library or classroom, instead. A door that once opened into an adjoining room may now open into a yawning interstellar void or reveal a seemingly ancient brick wall that blocks one's path. Rooms that were once at opposite ends of the building may now be adjacent; travelling up several flights of stairs may lead one to a room that had previously been on a story below. A room may seem impossibly large, given the size of the rooms on either side of it. Walking in a straight line down a hallway, one may find that one has somehow circled back to one's starting point.

It may be impossible to escape such a building: every door opens into a new room or hallway, never onto the surrounding terrain; any windows that do not prove to be bricked up or works of *trompe-l'œil* simply open onto a sealed interior courtyard, not to the external world; no matter how

many flights of stairs one ascends, one can never reach the rooftop.

The shapeshifting mansion might be understood as a type of "labyrinth" that could never exist in our everyday real world: its layout and dynamics are not simply exotic or confusing but truly impossible. Such a structure may exist as a sort of trap or experiment engineered by the game's antagonist, or it may be portrayed has having emerged spontaneously – often, as a result of paranormal forces or horrific events. Such a building can continually throw up strange and unexpected new obstacles that isolate player characters from the external world (and, in the case of a multiplayer game, from one another). From the perspective of our systems-theoretical model, we can identify several ways in which it differs from otherwise similar real-world buildings. For example:

The shapeshifting nature of the building can allow a potentially infinite number of rooms to exist in a structure that – from the outside – appears to occupy finite volume. If the building "wishes" to frustrate a visitor's escape, then no matter how many doors the visitor opens, there may always be another room waiting on the other side. Such a building continually and limitlessly generates new boundaries and interior spaces.

Conversely, if the building wishes, its shapeshifting ability can be used to dissolve the structure's internal psychosocial and informational boundaries. If two persons are located in rooms "at opposite ends" of a large building, they should not normally be able to see, hear, or directly interact

with one another; however, the building can continually rearrange its structure so that no matter how hard the persons try to put distance between themselves by moving into new rooms, those rooms always turn out to be adjacent to one another.

5.3. The Building-as-an-AI's-body

A recurring theme in computer games with a science-fiction theme is that of the architectural structure (e.g., a futuristic space station, military base, or high-tech R&D facility) that essentially serves as the "body" of an AI that controls the structure's smart-building systems. Examples include the structures controlled by SHODAN in *System Shock* (1994), by GLaDOS in *Portal* (2007), by a ZAX supercomputer impersonating a human being in *Fallout 3* (2008), and by the Thinker in *Bioshock 2: Minerva's Den* (2010).

Such an AI may be able to exploit its structure's built-in security cameras, microphones, motion detectors, wireless networks, and other smart-building systems, in order to sense everything happening within its manifold spaces.

The structure's smart-building mechanisms also provide the AI's body with a powerful motor system. For example, the AI can trap player characters and isolate them from one another and from the outside world by selectively darkening windows and deactivating lighting systems to make it

impossible to see what's happening within or beyond the occupied space; electronically locking doors and disabling elevators, to prevent movement to other parts of the structure; flashing misleading messages on computer screens; playing loud music over the audio system to make it impossible to converse or notice other sounds; or shutting off the power to electrical outlets or computer terminals or disrupting radio transmissions in order to block electronic communication. From the perspective of our systems-theoretical model, we can observe several noteworthy characteristics that distinguish such a structure from contemporary real-world buildings. For example:

The network of sensors permeating the structure allow its AI "brain" to monitor all real-time activity occurring throughout the building; this effectively dissolves all of the building's internal informational boundaries *from the perspective of the AI* – but not from the perspective of the player character, whose perception of distant locales within the building is still blocked by diverse informational boundaries.

The fact that the AI can "move to" and "occupy" any space within the building by sensing and acting within it effectively allows the AI to pass effortlessly through the structure's walls, floors, and other internal boundaries and be "present" within all of its interior spaces. In practice, this dissolves the building's interior physical boundaries for the AI – but not for

the player character who must still struggle to find (or create) adequate openings in those physical boundaries in order to move from space to space.

The AI's ubiquitous presence means that it can engage in ongoing social interaction with the player character regardless of where the character may be; as a player, there is "nowhere to hide" from one's social relations with the AI. On the other hand, the fact that the AI is able to continuously confuse, flatter, threaten, or plead with the player character by broadcasting speech through the building's computer speakers, displaying text on computer screens, or performing other social behaviors provides the AI with a means for raising psychosocial boundaries that distract, frighten, or charm the player into avoiding certain areas, despite the fact that there are no physical boundaries that physically block the player character's access to those spaces.

6. Implications for Game Design

As an art form, the computer game's ability to allow game developers to fashion (and players to experience) impossible buildings opens up many distinct design paths that can potentially be exploited. The sort of systems-theoretical phenomenological architectural aesthetics presented here can provide developers with tools for understanding the qualitatively different paths that are available to them and choosing an architectural approach that

will yield a gameworld capable of generating the desired types of gameplay experiences.[10] We consider some such possibilities below.

6.1. Hyperdeconstruction

In the sphere of real-world architecture, many varieties of postmodernism – and especially deconstructivism, which became prominent in the 1980s – have sought to fashion physical structures that are jarringly fragmented, intricate, self-contradictory, transgressive, exaggerated, and (either ominously or humorously) irrational (Borowska, 2010; Januszkiewicz, 2010). Deconstructivist buildings often appear as if they have been split apart by powerful (yet meticulous) forces; such a building's components may appear to hover in space, disconnected from one another, like a hyperdimensional structure whose elements are connected in ways that are imperceptible in our three-dimensional space. While clever design and construction techniques can yield real-world structures that *suggest* such radical deconstruction, the limitations of physical building materials and techniques make it impossible to pursue such deconstructivism to its logical extreme. However, within a computer game, it becomes possible to push

[10] One example of potential applications of Ingarden's systems theory for the design of computer game environments can be found in the software program *Parinsula* (2019), which draws on Ingarden's (1974) thought to develop real-time visualizations of organism-like systems that can potentially be adapted for use in architecting dynamic virtual worlds.

deconstruction to its theoretical limits: a game might, for example, feature "deconstructed" buildings in the form of monumental floating, colliding geometric solids or "immaterial" wireframe structures like those depicted in the classic film *Tron* (1982), which was a vivid realization of Norberg-Schulz's (1980) cosmic mode of architecture. Depending on their context, gameworld structures and environments that demonstrate such "hyperdeconstruction" might be especially effective at producing a lifeless and unwelcoming atmosphere that elicits feelings of awe, dread, insignificance, alienation, confusion, or loneliness for players (Gladden, 2018b).

6.2. Hyperfolding

As noted earlier, an alternative path in architecture is that of parametric design and the Deleuzian *fold*, which generates biomimetic, curvilinear structures that appear to comprise dynamic, interactive skins, skeletons, and other organs and reflects the romantic mode of architecture described by Norberg-Schulz (1980). Such environments and structures are spontaneously engaging and mediating and might almost appear to be sentient, intelligent, and alive. As with deconstructivist approaches, there are limits to the degree of "foldedness" that can be incorporated into real-world buildings; however, when developing a computer game, designers can

fashion "hyperfolded" structures whose biomimeticity exceeds what is possible for physical structures.[11] As with other romantic buildings, hyperfolded gameworld structures can be especially effective at generating organic, animated, enveloping atmospheres that (depending on their nuances) elicit feelings of warmth, comfort, reconciliation, safety, sensuality, ferality, anxiety, or companionship for players (Gladden, 2018b). Such a structure might offer a consoling embrace – or smother a player character in beastly fashion.

6.3. Architectural Posthumanization

As experienced by players, a gameworld appears "posthumanized" to the extent that it includes intelligent social agents other than just "natural" biological human beings who contribute to the world's structure, dynamics, and meaning Gladden (2019). While one readily associates posthumanization with sci-fi gameworlds that are full of social robots, neuroprosthetically augmented hackers, and sapient AIs, fantasy gameworlds that include faeries, elves, vampires, or talking dragons are equally posthumanized. However, the introduction of exotic humanoid or anthropomorphic non-player characters is not the only way for a developer

[11] See Januszkiewicz (2010) for discussion of the way in which virtual architectural "skins" can be more active and interactive than their real-world counterparts.

to posthumanize a gameworld: the introduction of weird or alien buildings whose scale, materials, or geometries contravene real-world norms can suggest to players that a world is (or has been) home to far-flung populations of non-human intelligent social actors, even if players never have a chance to directly spy or interact with such beings – a technique visually pioneered in films like the sci-fi classic *Forbidden Planet* (1956). Moreover, within a gameworld, buildings themselves can become radically non-human intelligent social actors that are not only *loci* but also agents of posthumanization. Creative use of strange, deanthropocentrized isolating boundaries is one way to grant such posthumanized flavor to a gameworld's structures.

7. Conclusion

In this text, we have illustrated how Ingarden's later systems theory can be adapted to develop a phenomenological aesthetic account of the kinds of "impossible" architectural structures that cannot be physically constructed within the real world but which are frequently encountered in computer games' virtual gameworlds. Such impossible gameworld buildings may possess unusual types of physical, informational, and psychosocial boundaries and give rise to unusual interior spaces and dynamics. It is hoped that this analysis will not only be of theoretical interest to aestheticians but

might also be of practical value to game developers: by reflecting on, playing with, and seeking to further develop (or subvert) the systems-theoretical characteristics of impossible buildings described in this work, game developers might be able not only to design surprising new iterations of the floating castle, shapeshifting mansion, or architecturally embodied AI; they might also be able to fashion radically novel impossible building that will yield more memorable and meaningful gameplay experiences for players.

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