#029 An Architectural Approach to Level Design - Chapter 1 - A Brief History of Architecture and Level Design

By truly understanding humanity's built past, we can learn more exactly **how space affects interactivity.**

BREAKING THE RULES OF LEVEL DESIGN

At the time of this writing, level design is undergoing an identity crisis that game design has been undergoing for several decades. Level design in game design **lacks a universally applicable**

methodology, and success depends on considering a variety of factors, including theory, playability, and technology, in a game-specific context.

In order to advance the field of level design, it's important to break traditional rules and think more broadly. While it can be valuable to explore level design for specific game genres, there's also room for generalization.

Architectural history provides valuable insights for level designers, offering practical theories and principles related to spatial design that can be applied to create engaging and emotionally resonant game spaces.

AN EXPERIENTIAL HISTORY OF ARCHITECTURE

The history of architecture can be understood through various lenses or perspectives. These perspectives include:

- **Structural Components:** Some scholars focus on the history of architectural elements like post-and-lintel construction, columns, arches, domes, and vaults.
- **Evolution of Styles:** Others concentrate on how architectural styles have evolved over time, often emphasizing the formal and sculptural aspects of buildings.
- **Architectural Experiences:** A third perspective considers the evolution of architectural experiences, which can be influenced by cultural factors and reflect the intentions of the designers and builders. Experientially focused buildings use spatial design to create specific experiences or convey broader ideas.

An understanding of various aspects of architectural history can be beneficial for game and level designers. Specifically:

1. **Structural Believability:** If in-game structures don't appear structurally sound, it can break player engagement.
2. **Art Direction:** Understanding architectural styles and forms is crucial for art directors in shaping the visual aesthetics of games.
3. **Theming and Immersion:** Architectural allusions and design choices can help theme game spaces and immerse players in the game world.
4. **Language of Communication:** Style and form are essential aspects of how games communicate with players, and they play a significant role in conveying the game's narrative, atmosphere, and themes.

This book primarily emphasizes the experiential aspects of architecture in the context of level design.

Elements of Architecture and Level Design

The Roman architect Vitruvius, who lived around 40 BCE, considered *firmitas* (firmness), *utilitias* (utility), and *venustas* (delight) to be the vital elements of architecture. This book, based on spatial design theory while addressing practical elements of level construction, utilizes elements similar to those outlined by Vitruvius.

Functional Requirements

First and foremost, your game must work. This is the firmitas of level design. It is for this reason that this book will keep theory discussions grounded in level construction methods. Chapter 3, for example, discusses practical elements of level design, including overviews of level construction methods for several engines. Later chapters discuss theory with an eye toward how game assets may be used to fulfill experiential goals for level design.

Usability

Next, gamespaces must be usable. In this way, we should concentrate on how players see gamespace through points of view, game cameras, and how they navigate levels. This element of level design concentrates on **navigation and teaching.** As we will see, levels are an opportunity for game designers to have an indirect conversation with players. As such, our game levels should teach players how to use themselves and speak in easily understood language.

Delight

Lastly, our gamespaces should be rewarding to go through. For this, we must engage the **psychological elements of level design** and understand **how levels guide players through emotional experiences.** By challenging and rewarding players, we offer them opportunities to have agency over the climactic elements of games in ways no other media form can offer. For this, we should strive to create the most engaging experience possible.

The Beginnings of Architectural Sight Lines

The evolution of architecture reflects human history and societal changes.

Several key points:

1. **Functionality and Shelter:** Architecture initially served the primary purpose of providing shelter, with early human dwellings ranging from caves to temporary structures made of animal skins and poles, suitable for a migratory lifestyle.

2. **Transition to Settlements:** As humans shifted to settled agricultural lifestyles around 12,000 years ago, their dwellings became more permanent and hut-like.
3. **Rise of Cities:** With the growth of settlements into cities, new societal roles emerged, including priests and other important figures responsible for spiritual matters.
4. **Spiritual Architecture:** The development of spiritual aspects of life led to the construction of buildings for worship and burial. These architectural designs were influenced by sacred elements and astronomical considerations.

Designed Sight Lines: Examples like Newgrange in Ireland and Stonehenge in England illustrate how early architectural elements were carefully planned to align with astronomical phenomena. This shows that even in ancient architecture, designers used forms to direct the attention of occupants and create specific experiences.

Understanding how architectural forms influenced human behavior and interaction can be valuable for level designers in shaping player experiences within game environments.

Architecture as Representation in Ancient Mesopotamia

Ancient civilizations, like the Sumerians, used architectural forms and designs to convey symbolic and representational meanings, such as connecting with gods or demonstrating power.

Ziggurat, a temple raised on an artificial mound, often built of kiln-fired brick. The development of the *ziggurat* is important in the development of architecture as a system of representation. The *ziggurat* form is said to have fulfilled two functions:

1. elevating temples closer to the gods;
2. recalling the mountains from which the Sumerians migrated.

In this way, the Sumerians were usingshapes or ornamentation of buildings to convey a larger idea.

The representational systemsutilized by Mesopotamian cultures will be useful as we study how to build game worlds and use art and sound assets to set environmental tone.

Architecture as Statement in Ancient Egypt

Ancient Egyptian monumental architecture served to establish connections between pharaohs and gods, with a focus on the sun god Ra. Pyramids and temples were designed to symbolize these connections. Egyptian architecture evolved from pyramids to temple forms with sequential spaces, and their use of columns influenced later Greek styles.

This architecture standardized forms and associated cultural ideas with them, contributing to a modular architectural language.

Spatial and Symbolic Relationships in Greek Architecture

Classical Greek civilization, known for its advancements in various fields, including art and architecture, provides valuable insights into how relationships between objects and environments influence our experience of space. Greek architecture, influenced by principles of proportion and form, emphasized ratios and dimensions to create forms and spaces.

Architectural elements such as columns and spatial sequences in Greek architecture，these architectural elements, along with consistent vernacular elements, contributed to the development of a distinct architectural vocabulary, which is crucial for creating game worlds

Later Greek public architecture, like the Athenian Acropolis and Agora, employed carefully planned spatial sequences and articulated public and private spaces, offering insights into how gamespaces can influence player actions.

Indian, Southeast Asian, and Asian Representational Architecture

Civilizations in the Indus Valley (modern-day Pakistan and Afghanistan) developed early urban centers with regular grid layouts and raised citadels. As these civilizations evolved, their architecture was influenced by the rise of important religions such as Hinduism and Buddhism around the sixth century BCE.

In Buddhist architecture, there was a strong emphasis on symbolic verticality, representing the cyclical nature of existence through hemispherical building forms. Hindu architecture, on the other hand, linked gods and worshippers through sacred forms, often using mountain-like verticality to enclose cave-like chambers in temples.

Religion also played a significant role in East Asian architectural histories. Daoism emphasized harmony with nature and influenced garden design, while Confucianism emphasized respect for authority and hierarchical planning, seen in structures like Beijing's Imperial and Forbidden Cities. Chinese and Japanese domestic architecture relied on consistent architectural forms and alluded to natural landscapes through garden design.

Linear Experiences in Roman Architecture

While the cultures mentioned earlier were known for creating experiences with choices and expansive simulated landscapes, the Romans, who followed the architectural forms of the Greeks, were primarily focused on delivering linear experiences. During the Roman Empire, which lasted from the first century BCE to around 337 CE, Roman architecture placed a strong emphasis on engineering and structural innovations.

Examples such as the Imperial Forums in Rome and Roman temples like the Pantheon, these structures featured spatial arrangements that were influenced by Greek architectural elements like stoas and agoras but were designed to guide visitors through public spaces in a linear fashion. Roman temples, unlike their Greek counterparts, emphasized a single, hierarchically important view for visitors and offered rewarding interior vistas.

Roman architecture also excelled in creating large interior spaces through the refinement of architectural elements like arches, vaults, and domes. This engineering prowess allowed for expansive and climactic interior spaces, as seen in Emperor Hadrian's Villa in Tivoli. These architectural innovations greatly influenced later cultures and were utilized to embody spiritual ideas.

Medieval Christian and Islamic Symbolic Architecture

The rise and development of religions, particularly Christianity and Islam, had a significant impact on Medieval architecture. Christianity, which became the state religion under Emperor Constantine, influenced architectural elements such as modular design and axial arrangements in churches. The use of clerestory windows created an ethereal atmosphere through the manipulation of lighting conditions.

During the Middle Ages (476 to the 1500s CE) in Europe, church architecture evolved to embed biblical narratives into designs through relief sculpture and mosaics. The Gothic style, marked by minimal structural stone and extensive stained glass, aimed to create an atmosphere where patrons felt closer to God.

Islamic architecture, during a prosperous period, focused on embodying religious ideas and narratives. Mosques were designed with directional orientation towards Mecca, and minarets were constructed for the call to prayer. Ornamentation containing passages from the holy book was used, and the embodiment of narrative ideas was exemplified in structures like the Taj Mahal.

Both Christian and Islamic architectures blended practical religious elements with the need for narrative expression, aiming to create ethereal experiences through lighting and separation from the outside world. Over centuries, these architectural spaces changed hands between cultures, adding

unintended narrative elements, making Medieval Christian and Islamic architecture important narrative and simulation spaces.

The Renaissance Return to Human-Centered Architecture

During the late fifteenth and early sixteenth centuries, the Renaissance period brought about a revival of classical influences, particularly in architecture. Renaissance architecture incorporated elements from the classical period such as arches, domes, and classical column orders, while also emphasizing symmetry and centralized floor plans in many buildings.

What's more significant for exploration is the Renaissance's focus on mathematical ratios, inspired by the works of Plato. This emphasis on ratios led to the development of humanist architectural forms, rooted in the belief that the human body was created with divine proportions. Renaissance architects like Michelozzo Bartolomeo, Leon Battista Alberti, and Andrea Palladio used these proportions to design buildings with specific room size ratios and emphasized the use of space based on human proportions.

This Renaissance emphasis on the relationship between architecture and human proportion is relevant to modern level design, as it forms the basis for understanding how to measure and design spaces in games and other contemporary contexts.

Ornamental Reformations and Material Revolutions

Architecture has evolved over the centuries, influenced by societal changes, religious movements, and technological advancements.

The centuries following the Renaissance saw many societal changes that were reflected in the architecture of the period.

Baroque architecture has two main facets that will become important to us as we study level design:

1. The first is the previously mentioned use ofornamental elements in the architecture.
2. Another facet of Baroque architecture useful to level designers is Baroque city planning.

The eighteenth-century period of Enlightenment, during which intellectuals in Europe challenged ideas based on faith in favor of those based on reason and scientific enterprise, would return architectural styles to a focus on classical forms.

The clashing of ideas that occurred in the centuries following the Reformation—ornamentation as a system of rhetoric, the refocusing of cities around user experience, and the industrial innovations that

ultimately led to the reassertion of natural materials—would come to a head during the twentieth century in various interpretations of Modernist architecture.

This overview of architectural history through the lens of user experience is the basis for how we will understand gamespace in this book.

- Unconcerned with formal expressions, prehistoric builders emphasized sight lines and responses to human experiences of celestial phenomena.
- Early civilizations and religious cultures, on the other hand, focused on form as a system of remembrance and communication, building structures that represented important landscapes or that asserted their own cultural ideas.
- Classical cultures utilized these elements in directed spatial experiences, using axial and experiential relationships between buildings to create sequences that influenced user movement.
- These rules were later combined with embedded ornamentation to create spaces that emphasized both the mechanics of their use and spiritual narrative ideas.
- Lastly, new industrial building technologies created a backlash from designers interested in preserving natural and treasured building methods and materials.

These elements—user views and experience, representation, communication, lighting conditions, materials, and others—all have a great impact on how we conduct our own players' spatial experiences.

THE HISTORY OF GAMESPACES

The history of gamespaces has been influenced by the purpose of the space (i.e., the game being played) and the limitations of materials for constructing these spaces.

In many ways, games are as old as the architectures that we have just explored, with early examples of both occurring in the same locations around the same periods. Even then, it was important that **gamespaces corresponded to the rules of play.**

Board Design for Early Games

Understanding non-digital design is not only a great way to test games quickly, though: it's also a way to understand the history of how game spaces are linked to game experiences. Many early games wove game mechanics and board design together for uses beyond entertainment: religion, military, and cultural.

Two of the earliest known games are the Royal Game of Ur and Senet, created in Sumeria and Egypt respectively, between 3500 and 2500 BCE. These were race games whose boards reflected the

pattern that players had to traverse to win the game, precursors of what we know now as backgammon. Senet, in particular, evolved into a tool for religious ceremonies: the pathway created by the board represented the pathway through the netherworld.

Later games would marry board design and game mechanics to demonstrate military strategy. Chess and Go are about territorial control and the capturing of opponents' pieces based on the movement rules of one's own pieces.

Physical Gamespaces and Architecture

Physical gamespaces such as playing fields and arenas are another case where the needs of a game are embodied in the space where it is played.

In Man, Play, Games, anthropologist Richard Caillois identifies fundamental categories of play, one of which is mimicry, which includes theater and other staged productions.

> The stage for a theater production anticipates the choreography of the production:
> how will the lighting be arranged to best show the performance?
> Is there an orchestra pit or choir area?
> Is there room for dancing if the production calls for it?
> How do scenery and lighting describe the setting?

Ancient Greek amphitheaters utilized many of the elements common in theater design today, a circular area for the orchestra, a *skene* building that acted as the backdrop and backstage, and the *proskenion,* from which the performance occurred.

This modularity of uses was also reflected in stadiums such as the Flavian Amphitheater, popularly known as the Roman Colosseum. Famous as a venue for gladiatorial combat, it was also the site for animal hunts and scenic recreations that utilized real tree and animal life.

Digital Gamespaces

A common theme through the history of level design in digital games is how the technology used to build the space influences how the space works.

One of the first visually displayed electronic games, 1952's *Noughts and Crosses*—a translation of tic-tac-toe—has the same spatial rules as the non-digital version: line up three of your own shapes while preventing your opponent from doing the same. The game was created to show how information could be displayed on the small screens of the Electronic Delay Storage Automatic Calculator (EDSAC).

Another early electronic game from 1958, *Tennis for Two*, borrowed its simulated gamespace from the sport tennis. It displayed the game from the side rather than the top down, necessitating a simplification of tennis's rules to focus on getting the ball over the net, leaving out some specific rules based on court lines.

In 1962, *Spacewar!*—created by a group of MIT students led by Steve Russel—simulated a battle between two ships in space around a gravity well. Like *Tennis for Two* and the later games *Tennis* and *Pong*, this game occurred on one screen, but introduced a wraparound feature where a ship leaving one side of the screen would appear on the other.

For much of the early history of digital gamespaces, action occurred largely on one screen. This was due to technical limitations of hardware, as well as the engagement time of many arcade games. One of the first popular games to have a scrolling environment was *Williams's Defender*. Its use of an environment several screens long is considered a breakthrough, though that environment is not very detailed. *Konami's Scramble*, released in 1981, was one of the first games to feature multiple scrolling environments that were distinct from one another.

While single-screen games worked for short play sessions in arcades, home games needed to be expansive enough to provide value for the consumer's investment. Warren Robinett's *Adventure*, published on the Atari 2600 in 1979, addressed the problem of single-screen gameplay by displaying rooms of the gamespace one at a time.

The spatial languages established in earlier games were used to create bigger worlds as computers and game consoles became more powerful. *Pac-Land* and *Super Mario Bros* utilize the screen-scrolling of *Defender* to create lengthy and colorful obstacle course worlds, but adds Adventure-style rooms to create secret bonus levels both above and below the main gamespace to delight curious players. These models continued to grow and expand into bigger, more complex, and more visually interesting 2D game worlds.

Three-dimensional game worlds were also evolving at this time. One of the first was *Battlezone*, a tank game where players could move around a 3D vector world. Other 3D games mainly utilized perspectival or axonometric projections, mainly for aesthetic novelty.
A true 3D successor to *Battlezone* emerged in 1992 when developers at id Software created *Wolfenstein 3D*, one of the earliest first-person shooter games.

The history of gamespaces is a combination of building spaces to accommodate specific game rules and play styles and allowing for unique implementations of the spaces later. This history involves overcoming the limitations of the platforms these games were built upon, especially for digital games. These earlier spaces, however, can still show us how meaningful and rewarding game experiences were created even from limited hardware.

WAYS OF SEEING FOR LEVEL DESIGN

To fully understand spatial design principles for level design, precedents from both real-world architecture and video games must be analyzed.

For level designers, this type of seeing can be transformative for how we learn from the levels of previous games—and not just the good ones: learning what makes bad levels bad can be hugely educational.

To *see* in this way may involve breaking some habits common to game players. For example, gamers don't usually look up when playing games. As designers, the verticality of gamespaces can be an important element in establishing the grandiosity of a setting or for communicating direction with players. For players, it is common to run directly to the next action scene rather than pause to explore game environments. Designers should look for ways to direct the pacing of a game environment in subtle ways—placing narrative elements in the way of player pathways or incentivizing exploration with rewards.

In Hal Box's book *Think Like an Architect*, Box proposes ten ways for exploring and understanding a building:

1. Learn why a building was built, what it was for, and what it is now.
2. Look up as you walk around—noticing visual elements, layering of forms, and materials.
3. Sense the space by its size, shape, and how it interacts with light, sound, and other spaces.
4. Train your eye to understand the structure of the building and how it holds the building up.
5. Determine how materials are working—in compression or tension-or if they feel heavy or light.
6. Determine how the building was constructed and from what materials.
7. Examine the historical precedents of the building.
8. Analyze the composition, proportions, and rhythms of building elements.
9. Observe the appropriateness of the building to its setting.
10. Analyze what makes the building special from others.

Level designers can modify their ways of seeing with the following methods:

1. **Identify what gameplay occurs in the space.** What are the game mechanics supported?
2. **Look up as you walk around,** noticing visual elements, especially art that contrasts the rest of the environment or somehow calls attention to itself. **Also look down**—is the space's verticality used in reverse to make you feel in danger?
3. **Sense the space** by its size, shape, and how it interacts with light, sound, and other spaces. How do the lighting or sound conditions make you feel?

4. **Analyze the pacing of the level.** Does the level usher you through itself quickly, or are there opportunities to explore? Are these required or are they bonuses for extra curiosity?
5. Is there one **gameplay style** reflected in this level, or are multiple supported? (For example, does a deathmatch map have places for snipers, offensive players, defensive players, etc.? Does a game level play well for barbarians but poorly for mages?)
6. How does the space express the **narrative** of the game? Is it a backdrop, or does exploring the level tell you about the game world in some way? Are narrative events scripted to occur around the player, or are there cutscenes?
7. **Examine any historical or gameplay precedents.** What kinds of spatial experiences were in those games?
8. Analyze the **compositions, proportions, and rhythms** of environment art elements.
9. **How does level geometry compare with the movement abilities of your avatar?** Is everything well within its capabilities, or does the level space challenge these measurements? Is there anything that is outside of these capabilities? If so, does the game offer any way to expand these abilities?
10. What **environment art elements** are repeated? Are they interactive? If so, do they correspond to a specific gameplay mechanic?

These ways of seeing for level design, as well as the architectural and gamespace precedents found earlier in this chapter, will guide our explorations of spatial design principles for level design.

SUMMARY

This chapter has been an introduction to the mindset of studying architectural space, with insight into how game levels are designed.

We discussed **how theory could be utilized to enhance our practical level design activities.** We also discussed how exploring the principles of fields outside of game design can give us a framework from which to better understand existing gamespaces.

To form the foundations of our studies throughout the book, we examined **Vitruvian elements of architecture** and discovered how they can help us frame our own elements of level design: **functional requirements, usability, and delight.**

These also framed our **explorations of historic architecture** through a number of civilizations. Our explorations followed an emphasis on the experiential elements of architectural design—use of architectural language, spatial sequences, communicative art, materials, and others—that will be useful as we move forward through the book.

We also looked at the **development of spaces within games,** from board and physical games and play spaces to electronic games that evolved with expanding technology. We looked at **how the design of these spaces was influenced by game elements:** rules, settings, and the drive to create expansive worlds.

Finally, we explored **how we see spaces in both architecture and games.** Following the suggestions of experienced architects, we formed ways of seeing for level analysis that will allow us to better identify the elements that create memorable level experiences.

write by Hellinus - 2023.9.30