#030 An Architectural Approach to Level Design - Chapter 2 - Drawing for Level Designers

The working definition of level design: "the thoughtful execution of gameplay into gamespace for players to dwell in."

In this chapter, we discuss what game levels do to create user experiences. We will then discuss different tools used for level design both on and off the computer. With the tools in this chapter, you can analyze historical precedents the way architects do to inform their own designs and implement your ideas in your own gamespaces.

LEVEL DESIGN GOALS

There is something exciting about the act of creating. This is what many people who aspire to be architects and game designers are ultimately looking for—fulfillment in the act of creation.

Great or even simply good levels should be planned—not only to get an image of what the level will look like, but also to understand the kind of experience the designer hopes to create for players. Therefore, before exploring the different digital tools for level design, it is important to know that **game levels are the primary tool of communication between game makers and game players.**

If game levels are executions of ***gameplay***—the system of rules that create a user experience—then levels are also the medium that game designers use to express this gameplay to players.

As the primary tool for communication between game designers and game players, game levels should be built with three goals in mind. By reaching these goals, designers can better direct players through games and create meaningful user experiences:

1. Adjusting player behavior
2. Transmitting meaning
3. Augmenting space

Adjusting Player Behavior

Many designers argue that a level's primary function is to teach players how to play a game - Repetition of ***Skill gate*** situations could reinforces gameplay lessons.

> ***Skill gates*** are required challenges that block a player's progress unless he or she performs a specific action to pass. Such obstacles can be very simple, such as an enemy or object that

> players must jump over, or more complex, such as games that require you to use new abilities to escape from the room where you acquire them.

While behavior adjustment can be accomplished in very planned ways, another way to adjust behavior is to build your levels to **support or encourage unplanned play.** If a game allows players the choice of many things to do, especially in massively
multiplayer online games, players will find inventive ways to make levels fit their play style.

Transmitting Meaning

Embedding meaning in structural systems is a hallmark of architectural design. Much of architectural history is focused around sacred structures.

In games, narrative descriptors contained within a game's dialog, art, and symbolism interact with formal and structural elements of game levels—rules of movement and level geometry. Understanding how these work together helps create meaningful game levels. Rather than simply turning to cutscenes for storytelling, designers can make their game levels do a lot of narrative legwork for them.

Augmentation of Space

In some games, levels can give information to players in ways that allow them to make informed decisions about what is coming next. Patterns in level design can inform players when bosses or other significant enemies are coming.

Patterned spaces can be powerful ways to communicate with players. In architecture, formal ***symbols*** are often used to communicate the function of a building.

Establishing a set of formal or spatial symbols allows players to understand what's next in a level, or even what objects are interactive. Through this type of formal interaction, gamespaces build their own "languages" that can assist in directing player behavior or communicating meaning and narrative.

NON-DIGITAL LEVEL DESIGN TECHNIQUES

When designing levels, especially 3D ones, designers should prototype their levels in interactive form as soon as possible. In this way, there is tremendous value in using non-digital tools for level design.

Non-digital sketches and maps answer a lot of questions without taking up a lot of production time.

Drawing in this context refers to diagrams used to communicate ideas and construction drawings used to show how buildings will go together in very plain visual language.

Basic Drawing Techniques

In architectural drawing, you are trying to capture:

- **shapes,** the twodimensional boundaries of objects;
- **forms,** three-dimensional masses of objects;
- **relationships,** how each object interfaces with others in space.

Architectural drawing is meant to be more communicative than regular sketching, so they must be **neater and more precise.**

How to Draw a Line

Two techniques can help in drawing clean, straight lines:

1. Beginning and ending each line with a dot or dash.
2. Squiggle your lines as you draw them.

When creating shapes that are not linear, such as circles, it is useful to create straight ***reference*** lines and measure out the shape rather than simply attempting to draw it correctly.

Contours and Line Weights

Contour drawings follow the edges of shapes and forms, describing where objects are in space.

When sketching in contour and when drafting, line weights communicate object distance. ***Line weight*** refers to the thickness or darkness of a line used in a drawing.

When drawing with line weights, the thickest weights are assigned to edges that do not immediately connect with others, such as the outer contours of an object or group of objects. Contours of objects that directly meet other objects are given very light line weights.

Drawing with References

When sketching designed spaces, reference lines can be used in much the same way as when you are sketching shapes.

> Using your pencil as a viewfinder to observe spatial relationships. Holding your pencil with your thumb halfway up the shaft allows you to measure the image you are seeing. Holding the pencil further down toward the eraser allows you to use the shaft of the pencil as a straightedge to determine angles and relationships between objects so you can draw your reference lines.

Shading

Despite the usefulness of contour drawing, you will occasionally want to describe the ***surface conditions*** of forms you are observing or the ***lighting conditions*** of a space. To do this, use ***shading*** to describe these conditions.

Shading is using your drawing tools in such a way that describes light as well as ***tonal*** information related to color.

There are several different methods for shading. One of the most commonly used is ***hatching,*** where the artist uses a series of parallel lines to describe tonal value. ***Crosshatching*** is a similar technique to hatching where two sets of lines are crossed over one another to create values. Crosshatching and hatching can be used interchangeably in the same drawing to create many different tonal and textural values.

Hierarchical Drawing

With all these methods, it is important to remember the purpose of your drawings—**communication of the spatial conditions of places you are observing.**

In this way, you must remember to create your drawings in a ***hierarchical*** fashion, that is, in such a way that best communicates the information you are trying to convey without getting caught up in extraneous details.

Types of Architectural Drawings

Each type is used to show specific information about a building design from a specific point of view:

- Plan
- Section
- Elevation
- Axonometric
- Perspective

Plan

Plans are top-down drawings of a space that show spatial relationships between the elements of a design (rooms, hallways, stairs, gardens, lawns, landscaping features, etc.) from above.

> Le Corbusier: "the plan is the generator."

Plans are typically the first drawing that an architect creates when designing a building. Plans show the arrangement and flow of spaces in a design. They provide a useful top-down view of spaces that make them suitable for diagramming.

When designing levels, many designers will draw at least one plan diagram or sketch to visualize how their gamespaces will be arranged.

Major downsides: lack of any three-dimensionality.

Section

Sections show views into the building as though they had been cut through vertically. Like plans, cut-through masses are colored in with poché or hatching. Sections are often used in tandem with plan drawings to describe threedimensional space.

> Matthew Frederick: "Good designers work back and forth between plans and sections, allowing each to inform the other."

Sections can help a level designer map out vertical spatial arrangements for things like multilevel puzzles or battle positions in multiplayer maps.

> As many 2D games are viewed from the side, sections can offer the same overview of side-scrolling game levels for better planning of level pacing.

Having several sections of the major play spaces in your levels will allow you to visualize alternate ways of transitioning from play space to play space. Sections allow you to better utilize height-based spatial transitions such as ramps, overhead bridges, cliffs to jump down, and similar structures that are difficult to encompass in a plan drawing.

Elevation

Elevations are the third type of architectural drawing. Elevations are similar to sections, but instead of cutting through a design, the viewpoint is from the outside of the building. Elevations are used to show exterior views of a building’s sides.

Game levels often lack the need for real building conditions like having both an exterior and an interior. Instead, the designer will only create those surfaces that the player will look at. Even so, elevations are still important for designing good building exteriors for scenery. Elevations in level design fall more under the category of concept art rather than spatial planning.

Axonometric

Axonometric drawings can be used to represent a design's three-dimensionality. To create an axonometric (axon) drawing, artists take an already-made plan drawing and turn it either 30 or 45 degrees, and then project the plan upward to create 3D forms of the design.

Axonometrics are powerful spatial planning tools. They often combine plan and elevation drawings, and can even combine plan and section to create sectional axonometric drawings.

Level designers that use axonometric drawings tend to create semiplanned axonometrics. Several different purposes:

- Create spatially planned concept art for a game level space, combining plan and elevation to communicate what the final level geometry may look like.
- Use axonometric-like drawings, or axons, of levels to demonstrate threedimensional gameplay concepts.

These axons create the level space only as a visual guide. Rather than a plan of the actual level, they instead use this visual guide as a backdrop for sketches of gameplay events that will happen in the level in a three-dimensional way—allowing for the mapping of vantage points, sniping spots, or spatial puzzles. In this way, axons become both concept art and a game design tool.

Perspective

Perspective drawings show how an object distorts based on the viewer's positioning relative to a vanishing point.

Perspective drawings can be drawn with multiple vanishing points:

1. Drawings based on one vanishing point, where one side of an object is drawn without distortion in an elevation style, is called a ***one-point perspective***.
2. Drawings that utilize two vanishing points to distort more than one side of an object are called ***two-point perspectives.*** Two-point perspectives are the views most commonly seen from a human's eye level.
3. Drawings using ***three vanishing points,*** most often done for views of tall buildings from above or below, are three-point perspectives.

Perspectives are most often used for concept art, as they are the least useful for actual spatial planning but most useful to develop the visual art of a level.

Sketching and Journal Writing

One of the most important tools for level design is the sketchbook: a graph paper booklet small enough to be carried easily or slipped into a backpack.

For the architect, sketching is an important way to both capture design ideas and record elements he or she has seen while studying a piece of architecture. The drawing techniques covered in the two previous sections are a big part of creating your own design sketchbook. By sketching your ideas as you have them, you can more easily remember or communicate them to others later.

Record the 10 ways of seeing for level design, these kinds of observations. Having such a sketchbook can be vital for understanding design precedents that will be inspirations for your own levels.

Granted, for many games, it's really hard to sketch and analyze while being attacked by waves of enemies. In these cases, keeping a gameplay journal and sketchbook concurrently can help players retain their memories of gameplay. On computers, taking screenshots or videos during gameplay and adding them to your journal is also an excellent way for marking what to analyze later on. From your screenshots and notations, analysis sketches can be derived.

Designing on Paper

In architectural design, initial ideas are often sketched out in sketchbooks or on trace paper. A standard way of forming design ideas on paper is to do ***parti*** sketches.

> An architectural parti is a simple formal study that seeks to isolate the shape a building will eventually take.

Perhaps as importantly, parti studies are noncommittal, meaning that a designer can quickly create a large number of them without having to commit a lot of effort and detail into any one design, only to realize it was the wrong choice later. They also lack measurement in most cases, so designers can focus more on spatial and formal ideas rather than sizing.

For more measured level design drawing, a useful tool for generating paper level ideas is ***graph paper.*** It comes in many types, but the type most commonly used by building engineers is ***Cartesian graph paper***, which features a regular grid. It is especially useful for figuring out the proportions of objects in a sketch.

To properly design levels, a level designer must understand a player character's ***metrics.*** Metrics are gameplay-based measurements expressed in in-engine units that describe size and movement properties of characters in games.

> Measurements that could be considered metrics include the size of the character, the space traversed by jumps, the space taken up by attacks, the distance traveled over time when the character runs or walks, and many other movement-based things.

Graph paper can help designers figure out proportion before the design is created on the computer.

Notation Methods for Level Design

Not all drawing methods are used to describe the “physical” (as physical as spaces in a digital game can be) aspects of game levels.

These methods describe how users flow from one place to another, the “pace” at which users travel from one place to another, or other types of relationships.

Proximity Diagrams

Proximity diagrams are made up of bubbles and connected with lines:

- Bubbles represent rooms or spaces that are to be part of the building and are sized according to square footage requirements for these spaces.
- Lines connecting the bubbles are sized according to how important it is for them to be adjacent.

It is important to note that proximity diagrams are not actual spatial plans. They are a tool for analyzing the functional idea for a building but should not be understood as its final spatial plan.

Proximity diagrams can be used for level design as they would be used for real-world architecture. Each bubble has the name of a gameplay space, such as boss room, sniping spot, or finish line. The sizes of these bubbles can stand for their size type. The size and type of line used to connect the bubbles can describe proximity priority and the type of connection spaces have.

Concept Diagrams

Concept diagram, used in architecture studios for diagrams that show a design’s core idea, to describe diagrams that show a variety of spatial conditions similar to the parti sketches.

A hallmark of concept diagrams is not any particular symbol or spatial description, but rather the use of one or more symbols to illustrate conceptual aspects of a space’s design.

> A popular concept to diagram might be the amount of ***public space***, where occupants dwell among large crowds, versus ***private space***, where occupants can be alone or in small groups. A ***public–private*** diagram is usually a simplified floor plan with rooms hatched in with varying levels of density.

Hatching is a useful symbol for describing varying levels of a spatial condition like public–private, lighting, or the functions of spaces. Since hatching can be drawn with lines of different orientations or patterns, there are many possibilities for communication.

Other visual elements useful for diagramming include:

- ***Arrows:*** these are useful to show the direction of foot traffic, major sight lines, or a design's ***axes***, imaginary lines that inform a building's shape.
- ***Colors:*** describe the function of spaces or as an alternative to hatching.
- ***Shapes and Forms:*** used in lots of architectural diagrams, either as an abstraction of the spaces within a building or as a parti illustration of what a shape might eventually be.

You should experiment with different techniques when you make diagrams of levels from your or others' games to find a "grammar" that works for you.

Game-Mapping

Somewhere between diagramming game levels and more exact types of drawing, like drafting or graph-paper planning, lies ***game-mapping.*** Using map helps designers analyze how levels take character metrics into account and plan the same in their own work.

Maps can be combined with diagrammed information: the graph paper drawings could combine mapped representations of game levels with arrows, shading, and other diagramming symbols.

Flow Charts

Flow charts map the progression of decisions that a user can make when operating a system. Where previous diagram styles represent the "physical" reality of levels in some way, flow charts try to approximate what a user thinks while playing.

Flow charts are great tools for planning games with branching stories or where players have to manage complex systems. However, they can also work well mapping important nodes or gameplay points in a level.

When drawing a flow chart, it's best to use differently shaped bubbles to represent different types of nodes. Like any diagram, establishing and maintaining a consistent visual language is important to ensure usability.

Mark Brown's Boss Keys diagrams

In Mark Brown's video on the 2001 Game Boy Color ***Zelda: Oracle*** games, Brown develops what he calls an "objective and universal" way to diagram these spaces. Each ***dungeon graph*** resembles a

flow chart, drawing a straight ***critical path*** between the entrance and exit of the dungeon. Next, the number of ***locks*** existing on the critical path is drawn on the path itself. Branching from this critical path are sub-paths with ***keys***. Laid further on top are places in the sequence where ***puzzles*** or significant ***obstacles*** exist blocking player progression (switches requiring special items, etc.). In special cases where dungeon-specific obstacles block player progress, they are treated as ***unique locks***: drawn with the same notation as locks but with a label of what the obstacle is instead of a keyhole symbol.

Like a flow chart, Brown's dungeon graphs do not resemble the map of these levels, but describe structural relationships between gameplay elements. One of Brown's major analysis criteria, linearity, is tracked by showing how many locks or keys are in front of a player at one time: multiple keys on the graph preceding one lock or one key before multiple locks implies open-ended exploration.

DIGITAL LEVEL DESIGN TOOLS

Eventually, non-digital sketches and diagrams of levels need to become interactive. Off-computer design is vital to establish project goals, but digital prototyping is what helps you ***playtest*** the level design.

> ***Playtesting*** is when a designer plays a game to evaluate whether it fulfills its original design goals.

CAD Programs

- Digital drawings have great advantages in clarity over hand drawings, as shown in Figure. Clear drawings can convey information much better than rough ones.
- CAD programs have features that force designers to work in logical ways that translate well into game engines:
  - ***snapping***
  - ***modular design*** (this applies to level design is in the discovery of what pieces of a level will be utilized multiple times.)

Digital Art Programs

Rendering is the process by which a designer enhances a drawing with color and lighting information through artistic media—often watercolor paint or colored pencils.

In the game industry, they are used to create concept art of game environments: often perspective drawings of what a level will look like. Some architects also use these tools to also render their 2D

design drawings.

Doing the same with level design diagrams, plans, sections, and elevations adds new information only found in concept art (for example: atmospheric progression).

Engine Primitives and Placeholder Art

It is much more efficient, however, to design the spaces of a level and create any required ***scripts***, pieces of code that make game elements work, while art is being developed.

To do this, game prototypes can be created out of ***engine primitives***, the simple geometric forms that come with some game engines. For engines without primitives, like many 2D game engines, designers can use ***placeholder art*** (often also called ***programmer art***) in the same way.

Another benefit of getting right into primitives is that designers will have full access to an engine's systems, such as particles, lighting, and others that can influence the look of a game.

3D Modeling Programs

In 3D game engines, environmental objects are designed in 3D modeling programs and imported into the engine itself.

Like engines, 3D content creation programs have their own scales and measurement systems that designers can build their models to, typically defined as a generic unit.

SUMMARY

These tools allow designers to plan out the experience they'd like players to have and make modifications quickly as they go from paper to polygons.

- By understanding the different methods for drawing and diagramming space, we can become better observers of gamespaces.
- By planning levels in such a way that we focus on measurements, we can prepare for the realities of gameplay.
- Implementing these findings in game engines and prototyping them in an iterative process can ensure that our game levels meet our original experiential goals

> ***write by Hellinus - 10.28***