

CHAPTER



Levels

creating the world

Key Chapter Questions

- What is *level design* and how is it related to gameplay?
- What is the importance of the *structural* features of game worlds—such as duration, availability, relationship, and progression?
- What is the importance of the *temporal* features of game worlds—such as authentic, variable, player-adjusted, and altered?
- What is the importance of the *spatial* features of game worlds—such as perspective, scale, and boundaries?
- How are *reality* and *style* achieved in a game environment?

The process of creating game worlds is often focused on *level design*—an area of game design that is wrought with confusion. Some are under the impression that level designers are members of art teams and primarily focus on 3D modeling. Others believe that level designers are programmers and focus heavily on scripting gameplay events. This chapter takes a physics or “space-time” approach to discuss level design—focusing on how designers construct the architecture and visuals of the physical game environment, and how they divide the basic structure of the world into different sections (levels). (Gameplay—which involves events that might occur in each level—is closely associated with level design. Please be sure to read or review Chapter 6 so that you have a solid understanding of the relationship between these two game design components.

For further reading on this topic, please see *Game Level Design* (Castillo/Novak)—part of the *Game Development Essentials* series.

Level Design

Level design is defined as the creation of environments, scenarios, or missions in an electronic game. A level designer usually utilizes level design tools (or level editors), such as Valve Hammer Editor (Valve Software), UnrealEd (Epic Games), World Builder (Electronic Arts), or the Aurora Toolset (BioWare)—and/or 3D graphics editing software, such as 3ds Max, Maya, or Softimage. Level designers might also use game engines and authoring tools such as Unity 3D, Torque 3D, and GameSalad. (Modeling/animation software, level editors, and game engines are discussed in more detail in Chapter 10.) Traditionally, *level design* involved the creation of game worlds for real-time strategy (RTS) or first-person shooter (FPS) genres. However, this form of design is now necessary in all but the simplest of games.

Consider what function the level fulfills in the game. The level could introduce a new character or object, focus on a plot point (such as discovering a secret or preventing an attack), or create a mood through visuals or storyline. The level's function should center around an idea that becomes a unifying theme.

Structure

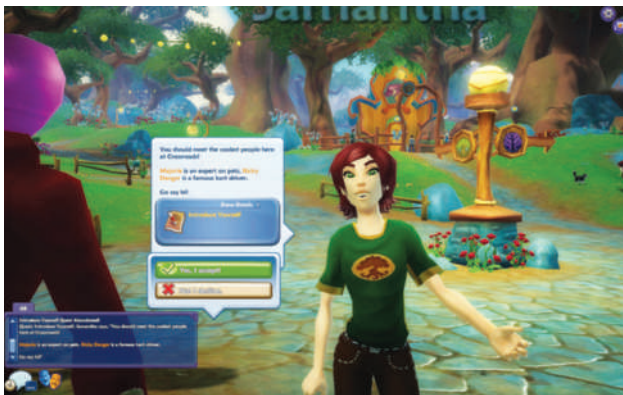
Levels can be used to structure a game into effective subdivisions, organize progression, and enhance gameplay. When designing levels, consider their goal, flow, duration, availability, relationships, and difficulty.

Objectives

Each level should have a set of *objectives* that the player understands. Otherwise, the players are simply moving, shooting, puzzle-solving, and collecting until a signal appears indicating that the level is complete or that a new level is loading. Sometimes developers ensure that players understand the objectives for each level by creating a

briefing in the form of a cut-scene or interactive tutorial at the beginning of each level, and by providing access to a status screen during the course of the game. The players might also be immediately thrown into the game's action, engaging in tasks that are fairly easy to solve and situations that immediately illustrate the rules of the game in the context of the game's environment. You should let the players know where they stand in relation to their goals by giving them progress reports—preventing a surprise defeat. This applies to a single-player mode. In multiplayer mode, the focus is on balance and strategic/tactical options presented to the player in FPS or RTS games.

Sony Online Entertainment



Free Realms uses tutorial quests to teach new players.

Flow

There are two main issues with game *flow* that you should address while designing a level. You first want to make sure that a player stays in a particular area of a level until he has accomplished necessary objectives. For example, in open world levels, there are not any natural barriers to the player's movements. A player can then run past opponents rather than engage them in battle (which is sometimes a strategy in itself). This problem can be solved by creating natural barriers that are destroyed as a by-product of the player's progress in the level. You also might want to prevent the player from returning to a particular area once the objectives associated with that area have been met. A method for doing this is to close off the area after the player has completed it (creating a one-way barrier, such as a door that locks after the player walks through it), which lets the player know that he is making progress.

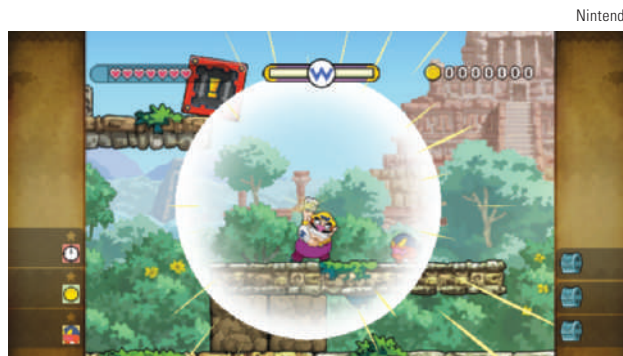


Sony Computer Entertainment America

In many action games, such as *God of War III*, players must remain on a particular level until they complete a specific goal.

Duration

How much time should be spent on each level? One universal rule seems to be that a player must complete at least one level of any game in a single session. For computer games, level *duration* should be fairly short, 15-minute spurts for children, to approximately two hours of continuous concentration for hardcore gamers. Console game levels usually run about 45 minutes. If you'd prefer to develop a game with much longer sessions (e.g., strategy games such as *Age of Mythology* or *Civilization III*), make sure you provide milestones of achievement, such as advancement or task completion, on a regular basis.



Nintendo

The duration of levels in puzzle games such as *Wario Land: Shake It!* is fairly short.

Nintendo



In *Wii Sports Resort*, players can choose from several different games at the resort.

Hi-Rez Studios



Players choose levels from all over the world in the mission selection screen of *Global Agenda* (above), including desert and water missions (below).

Hi-Rez Studios



Hi-Rez Studios



Availability

How many levels will you include in the game? You will need to consider the various gameplay goals in the game and ensure that each level covers one primary goal. A greater issue is how many levels should be *available* to a player at once. If you were to allow only one level to be available at a time, this would work for games that require first-person immersion. If you were to allow only a small number of open levels at a time, this could alleviate frustration for many role-playing game (RPG) players, who might have several quests to fulfill and need to shift their focus. If you were to allow many open levels at a time, many players might become confused—but these levels would work well in process sims and RTS games.

Relationship

What are the *relationships* between levels in the game? Think of each level as a scene or even an episode within a larger story. From Chapters 5 and 6, you learned that story and gameplay are intertwined—and that story structure often consists of several acts or plot points. Levels in puzzle games are often related only through some increase in difficulty. Some levels are related through storylines—similar to traditional media such as television. In this episodic relationship, each level is self-contained, with its own internal plot line and conclusion. For example, many strategy games use the term *campaign* to describe a series of levels (known as *missions*) that need to be completed to finish the game. Some games contain several campaigns that are all separate from one another. Each time players complete a mission, they are closer to completing a campaign.

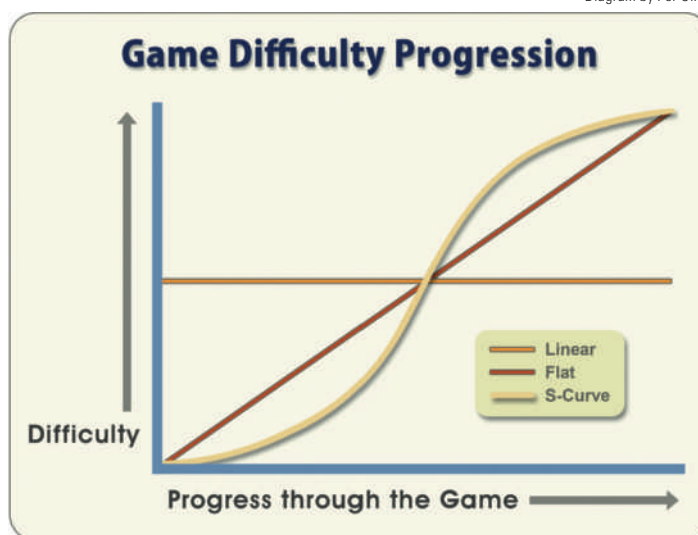
Progression

How do you pace the game's *progression* through level design? As discussed in Chapter 6, you want to make sure that a game's difficulty slowly increases as it continues. Just like story and character development structures discussed in Chapter 5, you need to make sure that each level builds conflict in a series of arcs. Vary the pace of your levels—allowing the player to alternately struggle to stay alive, systematically explore the environment, and reflectively solve challenging puzzles. Always keep the player occupied with things to do. Do not make your level a ghost town! Challenge is a good thing, but do not make your levels so difficult that only experts can survive, while other players die again and again.

A game does not have to be *linear*—consisting of challenges that steadily increase in difficulty as the game continues. It could also be *flat*—where difficulty does not vary from one level to the next. There is also the *s-curve* model, a combination of the linear and flat models that begins with a flat section consisting of a tutorial during which the player learns the game. After this training period, the difficulty level rises steadily throughout the game, and then flattens again a few hours before the game ends so that the players who get through most of the game will eventually be able to finish it.

Depending on the goals of the level, you might want to warn players of impending danger, such as a monster behind a door or a sniper on a rooftop. One way of doing this is through audio (which will be discussed further in Chapter 9). It is also debatable whether developers should pit players against powerful enemies with only one weakness that the player must discover while trying to defeat the enemy. Although sometimes frustrating for the player, this is done in most platform-style console games. To challenge expert players, you can either build more difficult versions of your levels that can be accessed separately by the expert players—or you can build different levels of challenges within the level. There should also be several ways in which a player can meet each challenge and complete a level. Ideally, the different methods of success will appeal to different playing styles.

Diagram by Per Olin



Comparison of linear, flat, and s-curve progressions.

Level structure gives players a sense of progression and a mental map of where they stand against the rules and storyline of the game.

—Jennifer F. Estaris (Senior Game Designer, Nickelodeon Virtual Worlds).

James Portnow on the Practical & Theoretical Sides of Level Design :::::

JP



James Portnow
(Chief Executive Officer,
Rainmaker Games;
Professor, DigiPen
Institute of Technology)

After receiving his master's degree from Carnegie Mellon University's Entertainment Technology Center, James Portnow worked for Activision as a designer on the *Call of Duty* series. He then founded Divide by Zero Games and launched Rainmaker Games—a design and narrative consulting firm that has worked with partners from Warner Bros. to Zynga. James has written for major trade publications including *Gamasutra*, *The Escapist*, and *Edge*. He is currently the writer on *Extra Credits*, the hit consumer series focusing on game design. James is known for his theories on socially positive design and has spoken at universities and companies worldwide. He is the co-author of a book on invented languages.

Level design is made up of two parts: the practical and the theoretical. The practical side involves assessing your tool and deciding what is efficient to make; the theoretical side involves understanding how your mechanics and systems interact with space.

On the practical side, simply learn your system inside and out, then find where you can push the bounds. This is really where a lot of the great level design happens, by experimenting with the limits of what a particular scripting engine or level builder can do. Once you have all the tricks down, just take a moment, sit back, and think to yourself: 'What types of levels give us the most bang for our buck?' 'What types of interactions allow me to build the coolest levels in the shortest amount of time?' To an even greater degree than most other areas of design, level design requires iteration. You have to get it out in front of an audience to understand how to improve it, and this takes time—so the quicker you can construct it, the more iteration you'll be able to do ... and the better levels you'll create.

On the theoretical side, you need to have a very deep understanding of your mechanics and how they relate to your space. This involves everything from player mechanics (e.g., how far can your player jump?) to AI (e.g., how many units wide does a gap have to be for enemies not to get stuck in a chokepoint?) to spawning (do enemy units spawn on triggers? on a timer? how does the player stop them from spawning?). A good level designer understands how all these elements interconnect and how they connect with the space in order to set up pacing, challenge, and novel experiences.

Jack Snowden on Level Design as the Foundation of Gameplay :::::

Prior to working at the Art Institute of Seattle, Jack Snowden spent nearly 10 years at Nintendo as a Lead 3D Artist working on such titles as *Machinex* (Wii), *1080 Avalanche* (Game Cube), *Bionic Commando* (Game Boy), *Pokemon Attack* (N64), and many others. Jack has also worked as a Lead Artist at Riverdeep and Electronic Arts—as well as at his own company, Laughing Mountain Productions. In addition to the Art Institute of Seattle, Jack’s academic experience includes several years of service on the faculty of Washington State University (Pullman, Washington), where he was an Assistant Professor in the Interior Design department. Jack holds a M.F.A degree in Painting, Graphic Design, and Sculpture from Washington State University, and a B.F.A. from Fort Wright College in Spokane, Washington. He is also a graduate of the Cornish School of Allied Arts in Seattle, Washington.



Jack Snowden
(Academic Director,
Game Art & Design,
Art Institute of Seattle)

The “level structure” of a game is the foundation to gameplay. Level design incorporates and reflects the psychology and interaction all players have from their daily life (with “life” being *macro* and game levels being *micro*). At the micro level, players soon lose interest if the design doesn’t provide mini adventures or distractions. The level designer is sending messages to the player through form, psychology of color, and historical image references. Through subtle messages, the levels are set up to control the journey and information the player will need to interact with the game. I call this *harnessing* the players to do, or *directing* what I want them to see, feel or discover. The game designer is the “Master of Ceremonies” for the good (or bad) experience had by the player.

Elements of Level Design

Level design is the process of creating a world filled with goals, sub-goals, and lots of obstacles between the player and those goals. The level designer is responsible for designing the level’s world; determining which enemies, weapons, and power-ups appear in the level; how and when the enemies appear or spawn; and the overall balance of the level (so the level is neither too easy nor too hard). A level designer may also be expected to build the 3D environment or at least some of its elements, using 3D programs such as Maya or 3D Studio Max, and even program some of the triggers or other interactions, using scripting languages. While the level designer is constrained by the rules and mechanics envisioned by the lead designer, the level designer is also in the position to offer changes to those rules, if those changes (a) will result in a more engaging game and (b) do not alter the world or the game to the point that it does not match the overall vision intended for the game.

—Richard Wainess, PhD (Senior Research Associate, UCLA/CRESST)

Time

The concept of time was introduced in Chapter 2 in the discussion of time intervals (turn-based, time-limited, and real-time). Time can also be thought of with respect to real-world time. “Game time” can move slower, faster, or not any differently from real-world time. In many turn-based and action games, there is no concept of time passing at all. Everything idles or runs in a continuous loop until the player interacts with it in some way.

Authentic

Some games try to portray time *authentically* and use the passage of time as a game-play characteristic. The cartridge for *Boktai*, developed for the Game Boy Advance, contains a sensor that detects the amount of light where the game is being played.

Blizzard



World of Warcraft has a 24-hour day, with different servers set to different time zones.

The object of the game is to drag vampires out of the darkness into the sunlight. The game must be played outside during the day, and weak sunlight negatively affects your character’s energy level. You must enter the correct time of day to configure the game before playing. Lionhead Studios’ *Dimitri* provides a variant of authentic time through its characters, who progressively age as the game continues. In Wide Games’ *Prisoner of War*, the player character must participate in both morning and evening roll calls. If the player is absent during any call, the POW camp officers conduct a search. In the game *Shrek*, the player can control time of day to accomplish different tasks. *Animal Crossing* also uses the date to trigger special events.

Konami Digital Entertainment



Konami Digital Entertainment



Boktai uses a sensor to detect the presence of daylight.

Limited

Time is sometimes implemented as a part of the setting of the game but not of the gameplay itself. Time creates an atmosphere and provides some variety, but it does not alter gameplay. Game time can feel artificial because players can do the same things at night that they can do in the daytime. However, there are a few games in which time is meaningful. Sometimes a player is put under pressure by being given a *limited* amount of real-world time to accomplish something. In *Baldur's Gate*, the shops are closed at night and characters run an increased risk of being attacked by monsters (because it's dark, and the monsters are harder to see).

Variable

If time is significant, the virtual time in a game is variable—running out much faster than in reality, jumping around, and skipping over periods when nothing interesting is happening. War games generally do not bother to implement a night time or require that soldiers sleep. Since players often want to play continuously without having to pause and wait for “morning,” the night time portions of the game are not missed. *The Sims* depicts days and nights because the game is a process simulation and the characters require rest and sleep for health. However, time speeds up when the characters go to sleep.

Player-Adjusted

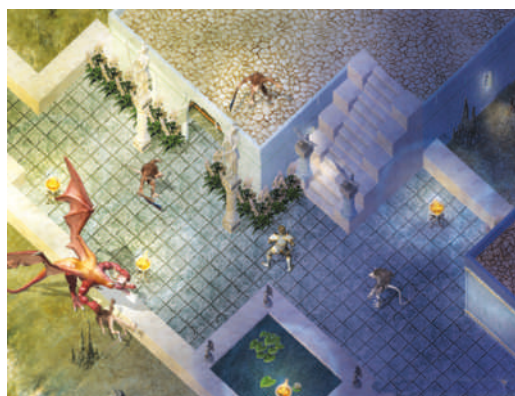
In many sports games, players may modify the time associated with game levels—known as *player-adjusted* time. Players can sometimes play shorter (5–10 minute) quarters instead of the standard 15-minute quarters in a football game. It's important to provide time options to players when possible. Many players do not want to devote a whole hour to playing a simulated football game. In some flight simulators, there can be long periods where nothing interesting is happening during the flight. In these cases, players might have the option of speeding up the time.

XxSugarLovexX (Photobucket)



Time is crucial in *FarmVille*, where a few hours can mean the difference between a bountiful harvest (above) and a field of wilted crops.

Electronic Arts



Time is variable in *Ultima Online*: nights are always shorter than days.

Electronic Arts



Players can adjust the time interval in sports games such as *Madden NFL 11*.

Altered

Several games incorporate *altered* time as an effect. *Max Payne* was the first game to use *bullet time*—the technique of going into slow motion while retaining the ability to move the camera’s viewpoint at normal speed. (This technique was introduced in the film, *The Matrix*—and it was later used in games based on the franchise.) Since the game models bullets as real objects, it is possible to see a bullet in flight while this feature is activated. This same effect is seen in action movies such as *The Matrix* and *Crouching Tiger, Hidden Dragon*. In *Blinx*, the player can rewind time—and in *Prince of Persia: The Sands of Time*, the main character has the power to stop time during the game so that he can avoid being defeated by opponents.

Ubisoft



Players can stop time in *Prince of Persia: The Forgotten Sands*.

Space

Space incorporates the physical environment of the game—including its perspective, scale, boundaries, structures, terrain, objects, and style (color, texture, look, and feel). In Chapter 5, you were introduced to some visual character creation techniques—including concept drawing, modeling, texturing, and animation.

Environmental art is created using many of the same techniques as in character art—although it often is not animated specifically but utilizes some special environmental effects. Concept artists often sketch out a scene related to a game, which can reflect a particular level’s style. After a sketch has been completed, you might use a level editor to build a 3D version of the level. Software for level design is discussed in more detail in Chapter 11. The editor should allow you to view the world in multiple perspectives (including the player view); modify geometry while you place characters in the world; and navigate through a level as you are building it.

Instantiated Spaces

More and more massively multiplayer games are incorporating instantiated spaces into their design in order to help solve some of the problems with a wholly persistent world. Persistent spaces offer an open play space in which players can interact spontaneously with the entire player base of that game, but fail to provide the much needed guidance that helps players understand how to succeed and grow within that game. On the other hand, instantiated spaces can offer a more directed/guided experience for players, but require much more work to create, and can potentially isolate players from opportunities to discover new friends within the player base. I expect that we will better understand the pros and cons of the instantiated space model in the future, and that developers will work to further refine them.

—Carly Staehlin (artist; Owner, Burrow Owl Trading, LLC)

Perspective & Camera

In Chapter 5, you learned about the importance of both first-person and third-person *point-of-view (POV)* with regard to characters in a game. POV is related to the *perspective* of the game world—or how the player views the game environment.

Omnipresent

In the *omnipresent* perspective, the player has the ability to view different parts of the game world and can take actions in many different locations of the world (even if parts are hidden at times). The omnipresent perspective allows players to look down at the game world from above. In Chapter 3, you learned about process simulations and god (or toy) games. *Populous* and *Black & White* were coined “god games” by the press because they not only utilized the omnipresent POV, but also allowed other characters to view the player as if he was above the game world—akin to a god looking down on the other characters.

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Halo Wars uses an omnipresent perspective.

Aerial (Top-Down)

The *aerial* (or *top-down*) perspective shows the player the game as seen from above—a bird's-eye view. This view is popular for games such as the original *Legend of Zelda* and *Pac-Man*.

Take-Two Interactive



Railroad Tycoon 3 has an aerial (top-down) perspective.

Ubisoft



Anno 1404 uses an isometric perspective.

Isometric

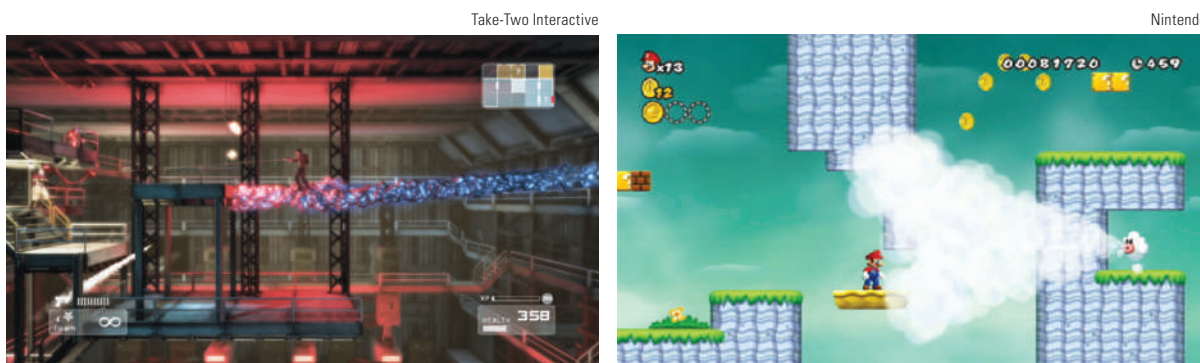
In the *isometric* perspective, the player can look slightly across the landscape at a 30- to 45-degree angle. In an isometric world, you can create many different angles of objects, and then place those objects on the screen. This allows you to create reusable objects rather than having to render them in real time. This perspective also makes the player feel closer and more involved with events than a top-down or aerial view. However, the fact that artists must create several (usually four) different versions of all objects from each angle can cause the process to get a bit tedious if the camera rotates. (Many RTS and strategy games were created in 3D isometric view without camera rotation.) Early versions of *Sim City* and *Civilization* were almost entirely aerial views—mainly because the hardware at the time did not support enough detail for any other view. Eventually, these games adopted an isometric view using 2D technology to create a pseudo-3D world—creating the effect of playing with scale models, appropriate for process simulations!

Height Maps

A popular technique for generating landscapes, a *height map* is a contour picture depicting the elevations of intersecting points on a 3D grid. Height maps translate quite well to 3D landscapes and are created by using grayscale to represent height.

Side-Scrolling (or Flat/Side-View)

In 2D space, characters can run only from left to right or jump up and down. They cannot run toward the player or away from the player. Working around these limitations, classic 2D arcade games used *side-scrolling* navigation to create the illusion of space. The player character would travel from left to right horizontally across the screen as the background moved from right to left. In a technique known as *parallax scrolling*, the camera moves vertically or horizontally, with different layers moving at different speeds—which gives the feeling of depth.



Shadow Complex and *New Super Mario Bros. Wii* are very different games, but both use side-scrolling navigation.

Designing Levels for Role-Playing Games

There are really not a lot of specific design issues—as long as you: stick to the role-playing game (RPG) formula (explore – kill – loot – sell/power up – level-up – repeat); make sure you space out your carrots along the level (here’s a unique item, here’s an area where the player can gain a bonus feat, here’s a part of the level where a new part of a story mystery is solved, here’s a nice vista in the level for the player to look at); and then, if you can, try to give players options to pursue their goals depending on how they made their characters (like rogues being able to sneak into situations, diplomats talking their way out of situations, or gunmen slaughtering their way to the end). A game should stroke the players’ egos, and there’s no better way to do this than to present them with levels and situations that allow them to flex the skills and abilities in they spent the most points.

—Chris Avellone (Creative Director & Co-Owner, Obsidian Entertainment)

Terrain & Materials

Environmental *materials*—such as metal, glass, sand, gravel, sky, and clouds—directly influence the look and feel of the game. A shading model defines how materials behave when they are lit. It combines the attributes of each material—such as texture, color, shininess, and translucency—with the attributes of light sources, including color and direction. Materials can then be shaded differently depending on their physical attributes. Terrain refers to textures that appear on ground surfaces—such as dirt, grass, tile, and pavement.

Sony Computer Entertainment America



Nintendo



Interiors made of steel, chrome, and wood textures in *Killzone 2* contrast with park-like exterior textures in *The Legend of Zelda: Skyward Sword*.

Normal Mapping

The technique of normal mapping is used a great deal in level and environmental design—enhancing the appearance of low poly models by adding details to shading without using more polygons. Normal mapping is an application of bump mapping, which simulates rough textures by creating irregularities in shading. While bump mapping perturbs the existing normal of a model, normal mapping replaces the normal entirely.

Consistency, Realism & Imagination

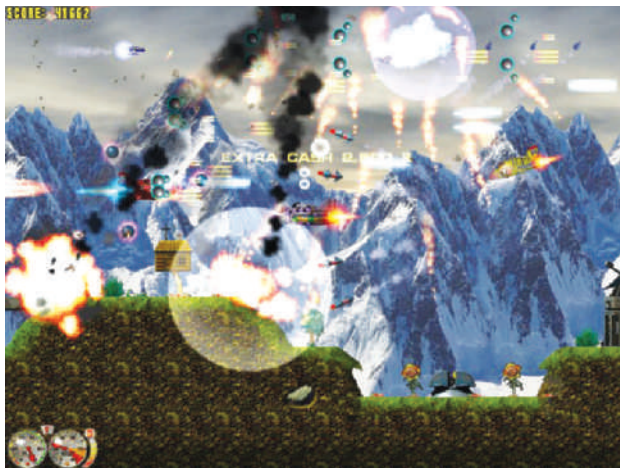
A level serves as the medium through which all game systems travel. If a game has shooting, acrobatics, and explosions, it better have levels that present a variety of shooting situations, scenery that can be navigated with grace, and plenty of reasons to blow up people and property. While levels need to showcase the systems, they also need to mesh with the story and setting. If an alien hive looks like a series of square rooms and long hallways—or if it looks suspiciously like a warehouse with some creepy textures on the wall—the game will be a disaster. Players pick up on poor level design, and it sours their view of every other feature in the game.

—Matt MacLean (Lead Systems Designer, Obsidian Entertainment)

Radiosity & Effects

Radiosity or *lighting* is just one effect that is used on game environments. Without the proper application of radiosity, players will not be able to navigate through the game environment—nor will they be able to see and interact with details that might determine whether they can progress through the game. Radiosity can also be used to give the effect of reflection (on water, glass, and other elements). Other environmental game effects include climate (rain, snow, lightning) and other natural movements (waves, wind, flotation) created through animation.

Rake In Grass Games



Radiosity makes this screen come alive in *Jets 'N' Guns Gold*.

Evoking an Accidental Mood

In developing the environment for a game in an archeological setting, I was challenged by the need to match the surroundings of the time (e.g., wind, no windows, no electricity)—ensuring it wasn't too creepy so that younger students wouldn't be frightened. I addressed the issue by first trying to identify all the environmental conditions that would have had an impact on the people who used the area. For example, windy spaces due to the lack of glass in the holes built into the sides of buildings to admit light meant that I needed to build in various degrees of "draftiness"—but I also needed the wind to interact with: (a) the monks' robes and hair; and (b) the oil lamps and other light sources. This resulted in the need to create shadows that reacted dynamically with the objects in each scene—which ironically made the eeriness unavoidable after all!

—Virginia R. Hetrick, PhD (Game Architecture & Programming Consultant)

Game Environments: Creating the Illusion

Most often, when you think of game art, it is the characters and creatures that come to mind—even though it is the environments those creatures inhabit that really create the illusion of a world. You want your game to be convincingly real to truly inspire mood and drama—and yet you have to be inventive, without straining credulity. It's a matter of combining and synthesizing, keeping the aspirations in your head, but looking for new ways to fit it all together.

—Marc Taro Holmes (art director, concept artist, and illustrator)

Scale

The *scale* of the game space includes the total size of physical space and relative sizes of the objects in the game. Since simulation games try to emulate reality, the space and objects within this genre should be scaled to relative size. In games involving

Muzzy Lane



Troops, tanks, and planes are all the same size in *Making History II: The War of the World*.

Sony Online Entertainment



Griffons in *EverQuest II* offer rapid transit throughout the world.

a first-person perspective, the view is usually only contained within a few hundred feet of space—so scale is not a major issue. However, important objects such as keys, weapons, and ammunition should be exaggerated so that the player can easily spot them. Scale exaggeration is used in *Civilization III* to represent character units as larger in scale than structures so that players can easily manage and select the units. In games with an aerial or isometric perspective, the scale might need to be distorted. For example, buildings are often just a little taller than the characters in the game (making the height of the characters appear to be exaggerated). This allows players to see the roofs of buildings or the landscape without being unable to see the characters—and it allows units to be shown that otherwise would be behind a building.

The size of the physical space in the game might also be distorted to accommodate the player. The scale of the space needs to be small enough so that a character only takes a few minutes to get from one end of the game world to another (unless the object of the game is to explore a detailed environment). In contrast, the game's scale loses its distortion when a character walks into a building and interacts with objects within

it. In this case, the interior space in the game is not distorted, while the exterior space is distorted. A great example of this is *Grand Theft Auto*, in which the player navigates the character quickly from place to place in the city—yet may take time to explore interiors of the surrounding buildings that seem much larger by contrast.

Tile-Based Worlds

A *tile*—also known as a *cell*—is a rectangular or square area of a map. (In isometric worlds, tiles are almost always diamond-shaped.) A tile can be any size, but it is often approximately the size of the character you are using—or at least the size of the part of the character that touches the ground (such as feet). Tile-based worlds (TBWs) are common in strategy games such as *Advance Wars* and the *Civilization* series.

Boundaries

In Chapter 5, you learned how game developers attempt to maintain a player's suspension of disbelief through immersive storylines. Many games do not explicitly reveal that the game world has *boundaries*—and that the world is limited. Since no game has yet to contain a limitless, infinite world, developers have come up with some solutions for dealing with the boundaries while keeping the player immersed in the game. Some games can explicitly reveal their limited worlds—such as football stadiums, racing tracks, or theme parks. Underground or indoor settings also help create artificial boundaries. Other games, such as flight simulators, allow the flat game world to wrap around itself—creating the impression of a spherical world. Another common tool for accomplishing this is terrain that the player will view as impassable—such as mountain ranges or thick vegetation. In many RTS games, the edge of the world is simply a black void!

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Flight Simulator X: Acceleration uses arbitrary environmental boundaries in the air.

Cultural Context

The cultural context of the game includes the beliefs, attitudes, and values held by the characters in the game world. This culture is reflected in the items that appear in the game environment—such as clothing, furniture, architecture, art, emblems, religious/magic items, decorations, and surroundings. What objects and structures should exist in this particular world—and how should they look? What rules apply to your game's culture? Consistency is important here. The same rules should apply to both the players and NPCs (including enemies).

Realism

Actual photographic and land-height data is used to create a realistic model for most flight simulators (such as *Flight Simulator 2002*). Extra details such as trees, buildings, and other traffic are created procedurally, and even the weather is realistic. In Chapter 5, you learned that miles of Los Angeles streets were re-created for *True Crime: Streets of LA*; this realistic environment enabled the designers to focus story elements on real-world events that have happened—or could occur—in present-day urban Los Angeles.

Consider how much detail you want to include in your game. As you add detail, you often must subtract speed and efficiency. Many simulation games attempt to model the real world—and players often rely on real-world common sense when playing them. But all games represent some abstraction and simplification of the real world. How real do you want your game world to be? In *The Getaway*, 40 square kilometers of London were re-created using over 20,000 digital photographs—incorporating everything from tourist hot spots to back alleys to overcast skies. All of these provide an instantly recognizable simulation of everyday life in their respective cities. In *Prisoner of War*, structures associated with different levels (such as the Colditz Castle level) are photographed hundreds of times. The structure is then modeled to scale, and then rescaled to provide an effective game arena while also maintaining authenticity.

Take-Two Interactive



Major League Baseball 2K11 uses familiar details to portray the game world realistically.

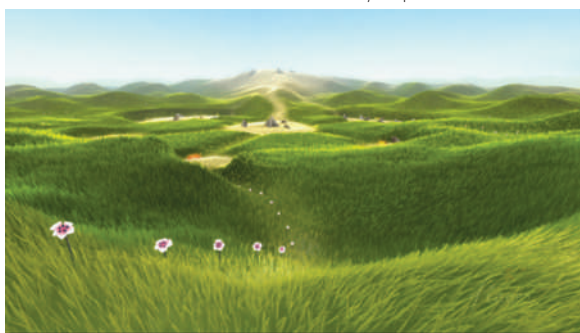
Hyperreality

Sometimes exaggerating visual reality can make a game more dramatic. If actual weather patterns were followed to a tee in a flight simulator, the lightning would probably not appear so close and threatening. In extreme sports games, such as *Transworld Snowboarding*, the drops are steeper than they would be in reality.

Style

The *style* of the game world influences everything from the character, interface, manual, and packaging. Although Western game art tends to be fairly conservative, students graduating from game art and design programs at universities appear to be pushing style boundaries—getting inspired by more cutting edge games from Japan, such as *Rez*, *Freak Out*, *Vib Ribbon*, and *Space Channel 5*. The physical appearance of the characters in Lionhead Studios' *Fable* transforms as they age, engage in battle, exercise, and drink—resulting in wrinkles, scars, muscles, and beer bellies! The environments in the game also incorporate vivid detail.

Sony Computer Entertainment America



Capcom



Flower's style evokes the beauty of nature, while *Resident Evil 5* reflects a much darker vision.

•••• Cel-Shading

Cel-shading is the art of rendering objects to look like hand-drawn cartoons—in contrast to photorealistic renderings. The most simplistic algorithms simply fill the object with a solid color and then overlay lines on the edges of the objects. More complex algorithms engage in shading; take into account light sources and shadows; or attempt to mimic a more stylistic cartoon style—such as charcoal, watercolors, or etching.

Take-Two Interactive



Borderlands uses cel-shading to give a 2D look to a 3D world.



The crafted Monkey King in *Little Big Planet* is an example of the game's unique style..

There are two main style forms that need to work together in the game: the style of the objects in the world, and the style of the artwork that will depict the world. For example, the neighborhood in the game could consist of Spanish-style homes, while the style of the art could be anime. As long as each style is consistently used for its purpose throughout the game, it will not detract from the gameplay.

Many styles have been overused in games. Do not borrow a style or setting from another game, but instead try something new. Forget the same old villains and environments. Think about the emotion you would like the world to bring out in the player: awe, fear, excitement, amusement? This will help you formulate your style.

Space & Time: Levels, Gameplay & Story

You probably noticed that level design draws upon both gameplay and story elements. The game environment acts as a setting for a story—and the elements within it tell us a lot about the characters. Consider the environment's spatial elements—natural resources, structures, vehicles, props, and other objects; all of these elements are utilized by the environment's inhabitants. The environment also informs us about time by giving us clues to its origins, climate, and place in history (past, present, future). The structural elements of game levels are closely related to all gameplay elements—including balance, progression, challenges/strategies, and victory/loss conditions. Creating a game that has a clear level structure will allow you to take full advantage of a wide variety of game mechanics and aid in replayability.

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In this chapter, you learned the importance of temporal and spatial environments—including various ways that games can be structured using level design within the game world. In the next chapter, we move from the game world to the direct connection between the player and the game through physical and visual interfaces.

Expanded assignments and projects based on the material in this chapter are available on the Instructor Resources DVD.

:::CHAPTER REVIEW EXERCISES:::

1. What is level design and how does it relate to gameplay, story, and character development?
2. What are some unique ways games have utilized time—both real-world and game-world—to make a game more compelling? Create an original game concept around one of these methods. Can you think of another method that has not been used?
3. What are some spatial perspective tricks used in level design that sometimes overcome the limitations of the game environment? Which of these tricks might you incorporate into your original game?
4. How can a game retain authenticity through environmental design? Discuss some features you might use in developing a game centered around real-world rules.
5. Play a game in any genre and analyze how the game handles structure. Is the game split into levels? Does each subsequent level increase in difficulty? Does the game follow a linear, flat, or s-curve progression?
6. How does a game's style relate to its mood? Describe the mood of your original game. Then describe a particular scene in terms of setting and environmental atmosphere—incorporating that mood in your description.
7. Design an environment for your original game idea, First, go location scouting and take pictures of some unusual objects, textures, and scenes. Then, incorporate these textures into concept sketches of an original environment. What materials or terrain will you use in your design? What sorts of objects and structures will you add to the environment?
8. How does a game's cultural context affect its environment? Create a culture around your original game idea, and discuss how this culture might determine the look of interiors, exteriors, objects, vehicles, and structures, and the rules of the game world.