Patrick
**Holleman**

# REVERSE DESIGN

## Half-Life

CRC Press
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# Reverse Design

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# Reverse Design Series

Author

Patrick Holleman

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### Series Titles

**Reverse Design: Final Fantasy VI**

**Reverse Design: Chrono Trigger**

**Reverse Design: Super Mario World**

**Reverse Design: Half-Life**

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## Half-Life

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# Introduction

This is fourth entry in the *Reverse Design* series, attempting to analyze all of the design choices that went into the classic game *Half-Life*. The first three books in this series were written about *Final Fantasy VI*, *Chrono Trigger*, and *Super Mario World*. You do not need to read those books to understand this one. The first two books (*FFVI* and *Chrono Trigger*) are mostly irrelevant to this one, although hopefully they are interesting in their own right. Some of the game design theory from *Reverse Design: Super Mario World* does show up in this book, however, because it shares a core design structure with *Half-Life*. The challenge/cadence/skill theme (CCST) structure, which Nintendo invented in *Super Mario World*, still shows up in games designed today. The CCST structure also appears in *Half-Life*, although there are some significant modifications to that structure that emerge from this game. To help new readers catch up, this introduction will review the CCST structure so that you do not need to read *Reverse Design: Super Mario World* before beginning this book. As was the case with the last book, however, this book is best used while playing the game. That is, you'll understand a lot more of this book's content if you are playing *Half-Life* while you read through it.

There are two big, historically important design changes that take place in *Half-Life*, and the evolution from the composite/CCST style into the set piece style is the first one. *Half-Life* is a transitional game, a game that has one foot of its design in two different eras. On the one side, there are numerous examples of the traditional CCST structure in this game. On the other side, the majority of the game's content takes place as set pieces rather than challenges. Challenges are the fundamental unit of content in a composite game, and they tend to be brief and densely packed into a level. Set pieces, on the other hand, are much longer than challenges and tend to be spread out across a level less densely than challenges. Later on, we'll get into a much more comprehensive definition and overview of what I mean by the terms "composite game" and "set piece." The

important concept to know is that *Half-Life* was the first real-time, mainstream videogame to deliver content as set pieces.

The other important historical development occurring in *Half-Life* is the development of cover. The cover-based shooter is, as of this writing, one of the most popular forms of shooter in both the first-person shooter (FPS) and third-person shooter genres. It wasn't always this way; the earliest FPS games are much closer to a type of shooter we now call the arena shooter. Like their modern descendants, the ancestors of the arena shooter emphasize free-ranging movement and quick reaction times. The cover-based shooter emphasizes using the structural features of the map to obtain tactical advantages. While cover does exist in a rudimentary sense in games like *Doom*, *Quake*, and *Goldeneye*, *Half-Life* begins to develop the vocabulary of cover both in structure and in use. (*Half-Life's* closest contemporary, *Rainbow Six*, also did this at the same time, but neither game seems to have influenced the other.) Considering that *Half-Life* inherits from its ancestors only the most basic forms of cover, the amount of progress that it makes in advancing the design of shooter cover is remarkable. By the end of Chapter 13, *Half-Life* has shown us five separate segments that advance the design and use of cover in the FPS. We will take a look at each development in detail.

# 1

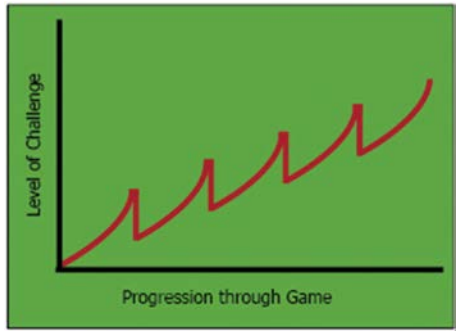
# *Half-Life* and the History of Videogame Design



Through the *Reverse Design* series and other documents, we have already set forward the overall history of videogame design several times. Therefore, for this summary I will try to be as brief and as specific to *Half-Life* as possible about the overall history of games. We will go into great depth about the history of the FPS, however, because of how relevant it is to *Half-Life's* design. For a more in-depth look, I suggest looking at the first few sections of *Reverse Design: Super Mario World*, which covers the composite era in greater depth. That said, it isn't necessary to read it to understand this book; a synopsis follows just below. At any rate, this book focuses primarily on the transition from the composite era into the set piece era, and how that was an inevitable consequence of the collision of Western development techniques with Japanese game design styles. *Half-Life* straddles the composite and set piece eras in a significant way, and so it makes for a great example of the third great inflection point in videogame design history.

## Nishikado Motion and the Arcade Era

The history of videogame design, as we understand the field today, began in 1978 with the game *Space Invaders*. Obviously, videogames had been invented before this, but *Space Invaders* was the first game to demonstrate the core principle of videogame design. The designer of *Space Invaders*, Tomohiro Nishikado, was also the lead engineer responsible for building the physical components of the arcade machine. Because of an unexpected property of the processor he used for the game, the ranks of enemies (the "space invaders" themselves) moved progressively faster as the player cleared the level of them. This meant that every level would get progressively harder toward the end, and then the difficulty would drop off considerably when the next level started. Although this was accidental, Nishikado kept this feature in the game and then embellished it by making the beginning of each level successively (but only slightly) more difficult. I have visualized the difficulty of the game just below.

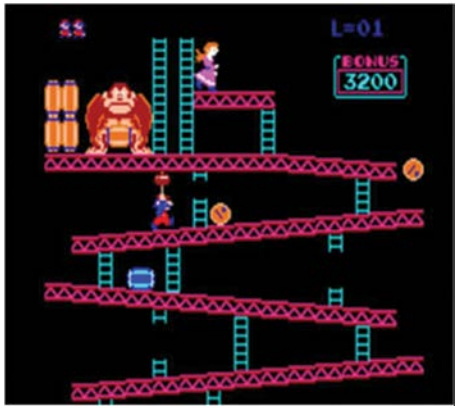


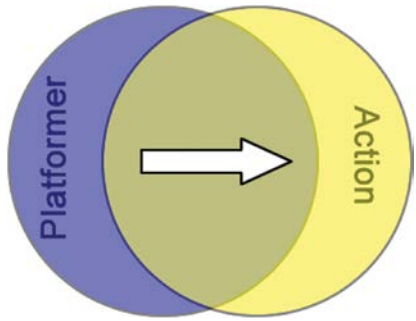

The regular up-and-down motion of the game's difficulty is what I call *Nishikado motion*. Other designers and writers have sometimes referred to this as a "series of ascending arcs," which is a fine term as well, but I'll be using the former term throughout the rest of this chapter (in this book).

In the first few years after the discovery of Nishikado motion, there were two primary ways that designers implemented it in their games. First, designers could change the numbers, strength, and timing of their enemies or obstacles. In *Space Invaders*, Nishikado accidentally changed the timing elements of the enemies; they moved faster when there were fewer of them. As the player gets through a level of *Asteroids* (1979), the asteroids themselves become more numerous and move faster. In *Missile Command* (1980), the missiles fall more rapidly and there are more of them as the player gets deeper into the game. The invention of the powerup added a second means of causing the difficulty to rise and fall, however. In games like *Phoenix*, *Galaga*, or *Pac-Man*, the player periodically gained powerups that made the game easier. For example, in *Galaga*, the multi-ship powerup doubled the player's firepower.

These powerups really just accomplished the same thing as changes in the number, strength, and timing of enemies or obstacles. For instance, in *Galaga* it's obvious that the designers were simply increasing the ship's shooting ability numerically by doubling it. It's not that different than if the developers were to simply cut the number of enemies by a large fraction. In *Pac-Man*, it's less obvious, but still essentially the same design idea. Over time, the duration of the energizer powerup gradually diminishes while the enemies only grow in difficulty. Again, this is just a change in difficulty variables from another source.

Another more important way of using powerups arose in the work of Shigeru Miyamoto. While most of the games of the early 80s used powerups as a back door into controlling difficulty, Miyamoto's first game—*Donkey Kong*—did something very different. When *Jump Man* (Mario's first incarnation) gains the Hammer powerup in *Donkey Kong*, he loses the ability to jump, but gains the ability to attack enemies. The game temporarily stops being a platformer and starts being an action game.

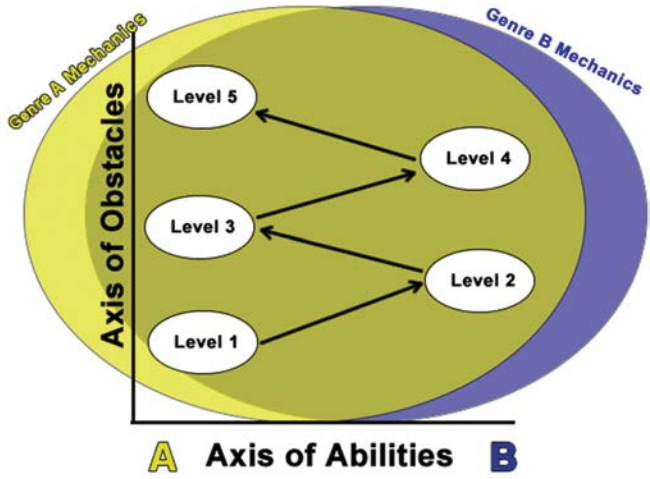





Instead of treating the powerups as another quantitative modifier of game difficulty, *Donkey Kong's* powerup makes the gameplay change genres. In *Donkey Kong*, this was a very rudimentary idea and probably the product of serendipity rather than a clear plan, but Miyamoto and his team must have gotten the sense that moving between genres within a game would be the design style of the future. The great strength of a game that moved between genres (even if only in a small way) is that the game could present new challenges to the player without always getting quantitatively more difficult. The great weakness of arcade games was that they forced the player up an endless hill of quantitative increases in difficulty. As a result, those games lost many players who became frustrated before they could really get into the game.

In 1985, Miyamoto and his team took this idea to its logical conclusion and created the first real composite game, *Super Mario Bros*. A *composite game* is a game in which a player can use the mechanics of one genre to solve the problems of another genre. In *Super Mario Bros*, the player can use platforming mechanics (jumping with momentum) to solve action game problems (defeating or avoiding enemies). The secret of a composite game, though, is not just combining two genres, but rather moving between those two genres without ever abandoning either one. Each level in *Super Mario Bros* "declines" (literally, leans toward) one of the two composited genres while never ceasing to be a combination of both. In the screenshots below, you can probably guess whether the levels in question are in the platformer (lots of jumping) or action (more combat) declensions.


The back-and-forth motion between genres in the composite creates "composite flow." This is a phenomenon similar to ordinary psychological flow in that the player becomes immersed in the task and forgets everything else. The unique feature of composite flow is that it is achieved by moving from one genre declension to the other just before the player gets bored or frustrated. All the while, however, the game is also getting more difficult. If you were to make a graph of it, it would look something like the figure you see below.




Nishikado motion is still the foundation of the composite game; it's just incorporated into larger framework. In the figure above, the ebb and flow in difficulty typical of Nishikado motion is still visualized on the y-axis, or what I call the *axis of obstacles*. Now, we also add another axis that measures changes in genre, what I call the *axis of abilities*. Immediately after *Super Mario Bros* came out, videogame designers all over the world latched onto the idea of the composite game and started making their own combinations.

## Genre Creation in the Composite Period

Composite design displaced the arcade style of design, and so we call the period from 1985 until about 1998 the *composite period*, after which point another game design style became equally popular. During this time, dozens of different composites flourished, and the practice of composite design advanced considerably. Designers created some truly great composite games through innovative combinations. *Mega Man* and *Metroid* both added shooting to platformers to great effect. *Sonic the Hedgehog* took the Action/Platformer composite of *Super Mario Bros* and added racing game mechanics. *Castlevania* added RPG elements to the *Mario* formula. *ActRaiser* created an

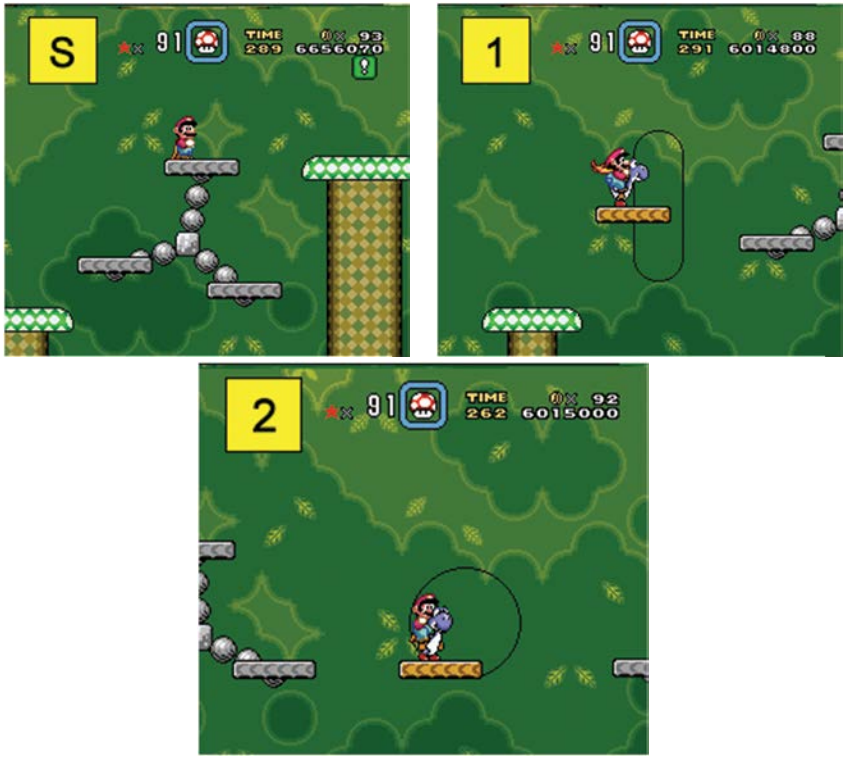
odd but extremely likeable composite out of the Simulation, RPG, and Action/Platformer combination. Even after the heyday of composite games, we still see new composites like *Portal*, which allows the player to solve platforming problems with shooter mechanics, or *Katamari Damacy*, which is really a racing game that operates by an accelerated RPG level-up system. *Half-Life* is partly a composite game, involving both the FPS genre and a considerable amount of platforming. The relationship between *Half-Life's* composite parts is unusually complicated, because *Half-Life* is both a composite game and a set piece game, and the kind of composite game that *Half-Life* draws from has some special properties, too.

One of the most surprising developments of the composite era was the creation of new genres out of old ones. Plenty of games combined two genres in a way that left those two genres apparently intact. For example, everyone can see the way that *Mega Man* or *Metroid* alternates between shooter and platform content and sometimes mixes the two. Similarly, the RPG and action elements of *The Legend of Zelda* are still distinct. In the middle of the composite era, however, composites began to appear where the mix was blurrier. The real-time strategy genre is a good example of this. There are plenty of examples of strategy videogames, but players of the "pure strat" game tend to disdain the RTS as not really being "strategy." In a certain sense, this is correct because the RTS is quite a bit more than just strategy. *Dune 2*, the first real RTS, mixed several other genres into the formula. By adding not just action game combat, but also *Sim-City*-style economic simulation, the RTS became its own distinct genre. That new genre didn't really retain the audiences of any of its composited parts; instead, it created a new RTS-specific audience.

The FPS genre is largely the same. Obviously the FPS is a shooter and shooters go all the way back to the 1970s, but consider how little overlap there is between the hardcore enthusiasts of the FPS and the 'shmup, for example. They're both shooters, but the audience is different, and that difference stems from the genre composite. The first FPS, *Wolfenstein 3D,* brought together the aiming and dodging elements of the shooter, but it adopted first-person mechanics, exploration, and level design of the CRPG.


On the left is the layout of the UI from a PC RPG. On the right is a screenshot from *Wolfenstein 3D*. *Wolfenstein 3D* retains the elaborate dungeon, the stat-oriented HUD, the secret treasure rooms, and progressively more powerful equips of an RPG. It has the fast-paced, live-action feel of a shooter. Despite this obvious mixture, the FPS does not have the same audience as the CRPG or the 'shmup. The FPS has its own audience, one that has come to be a dominant force in gaming today.

Before we get to the set piece era, I want to highlight a design practice from the composite era that carried over into *Half-Life*. Earlier, I mentioned the challenge, cadence, skill theme (CCST) structure that appeared first in *Super Mario World*, but then spread to other games. At a basic level, this structure is a way of tying together the challenges in a level so that the level seems consistent, but also so that it becomes progressively more challenging. The consistency arises from a precise form of iteration. Designers start with a simple idea at the beginning of a level. I'll use some examples from *Super Mario World* to illustrate the point first because it's much easier to see the iterations in that game, then we'll see some examples from *Half-Life*. A Mario level starts off with a simple challenge made up of just a few jumps. This challenge then gets more complicated.



You can see here how in the first iteration, the number of available platforms has decreased, and the type of platform has also changed. In the second iteration, the minimum distance between platforms and the total number of jumps have gone up. The first iteration is an example of mostly qualitative changes, which I call an evolution. The second is an example of a quantitative change (the distance between platforms grows numerically), which I call an expansion. These terms are used throughout this book and are necessary to understanding some of the concepts that appear later.

Evolutions and expansions on their own are meaningful, but the relation of sequential iterations is where we begin to understand the real structure of a game's design. When we see several iterations upon one design idea, I call the relationship between those iterations the cadence of a level. The relationship between many of the set pieces in *Half-Life* can be described this way as well. *Half-Life* doesn't structure entire levels the way a composite game would; it doesn't design whole levels around any single design philosophy. *Half-Life* is a transitional game and is inconsistent in the design styles it uses, but there are definitely segments of the game in which the designers take the same basic design idea (or core of a set piece) and iterate it several times to form a cadence structure. A good example of this is the very similar arena-style challenges in Chapter 14.

You can see how the same arena-style room with a cut-out floor in the center is the basis for all three of these set pieces, and yet, each one is different. One set piece adds barnacles; one set piece puts three grunts on the floor instead of dividing them between floor and catwalks. One set piece has multiple teleport-spawns. The cadence of Chapter 14 tells us something—that the designers are shifting away from the cover-based content they began with and are now focusing on a series of evolving arena encounters. Of course, the cadence of level 14 isn't composed of challenges, it's composed of set pieces, and that difference is meaningful.

Although *Half-Life* uses many composite design techniques, it is also one of the first examples of the next era of game design: the set piece era. The set piece style of game design grew out of the practical necessities of increasingly large software projects. As videogame production grew in size, duration, and profitability, it was inevitable that the business and production constraints of making games would impact design. When this happened, game design entered the set piece era. Until the mid-90s, videogames had been created by relatively small teams who would work together for multiple games. Their small size and familiarity with one another made communication easy, and so it was easy for those teams to adhere to a shared vision for a game. Once teams grew larger and had more replaceable parts (with people moving onto or off of a project frequently), it became harder for the team to maintain a single design style. Thus, software production methods that were employed in non-game projects began to have more prevalence in the production of games. The impact on game design that these new methods had was visible as modularity. If members of the project couldn't always communicate easily with one another, and if staff members were moving on and off the project frequently, it made sense for projects to modularize their content to a greater degree; modular content offers convenience. Modular content also requires less intensive collaboration because solo designers can create numerous small modules from pre-existing tools and assets, without having to draw in other team members very often. That module can be moved around in a game to find wherever it fits. As long as that module fits the style of the game, everything else about it is essentially fungible.

The module that began to appear in *Half-Life* was the set piece. There are three important characteristics of a set piece. A set piece is an extended, self-contained and quantitatively-focused unit of content.

1. By *extended*, I mean that the content of a set piece lasts much longer than the content of a challenge, which was the primary unit of content in a composite game. A level in a composite game would have many challenges, usually more than 10, and each challenge would last only a few seconds. Set pieces tend to last for around 60 seconds or more, and can last as long as five minutes each. Accordingly, there are fewer set pieces in a game like *Half-Life* than there are challenges in a typical composite game.
2. *Self-containment* means two things. The first is that a set piece is a unified action; once the player begins a set piece, they have to finish it in order

to move on. The second aspect of self-containment is the way that every set piece tends to contain within it everything that the player needs for that set piece. The best example of this is the phenomenon of regenerating health/shields. If the player character can heal fully between every set piece, then the designers never have to worry about whether the player is entering set piece seven with enough health to survive after completing set pieces one through six. The same is largely true of ammo; if every enemy in a set piece drops a little bit of ammo and maybe a grenade or two, the designers never have to worry about the player suddenly running out. The set piece contains everything the player needs to beat it.

3. The final defining aspect of a set piece is an emphasis on *quantitative changes* in content between modules. While composite games focused on qualitative and quantitative changes, it was easier for set piece games to emphasize quantitative changes because they are so easy to communicate. If a series of replaceable low-level designers are simply trying to push out as many set pieces as possible while using the same set of tools, they can simply make sure that each successive set piece has more enemy marines than the previous one did so that the difficulty of the game keeps rising to challenge the player.

All of what I said in the list above is a simplification, of course; no game is entirely built on a string of set pieces that only change numerically. *Half-Life's* focus on qualitative variation is striking, in fact. Although Half-Life begins the trend of set pieces, it doesn't develop the idea all the way into its modern form. The biggest discrepancy between *Half-Life* and the "modern" set piece game is the absence of regenerating health. *Half-Life* takes a step in that direction; a majority of the set pieces in the game feature some kind of health-regeneration apparatus before or after the battle, but very few set pieces feature health regenerating items in the middle of the fight.


The regularity with which these regeneration stations come between Chapters 3 and 13 was especially astonishing for the time. The great FPS games had previously

featured a lot of level-long attrition. It's clear that the designers of *Half-Life* were trying to move to a more modularized kind of content, but it hadn't yet reached the point where the player could hide behind a piece of cover and regenerate fully. That extreme would come a few years later. Additionally, *Half-Life* lacked the quantitative emphasis that its descendants would have. There are sections in the game that are more quantitative than others—Chapters 8, 13, and much of Xen spring to mind—but overall, the designers of *Half-Life* still employed a much more cadence-like sequence of qualitative evolutions. These two differences are part of *Half-Life's* identity as a transitional game; even while beginning the set piece era, it shows its composite heritage.

## The Vocabulary of Cover

The story of *Half-Life's* design is largely the story of shooter cover. The largest single portion of the game's content is a series of set pieces that involve meaningful cover. Before I begin to talk about cover, I want to come up with a functional definition for the purposes of this book. Technically, anything that a player uses to hide from enemy fire is cover, but that definition is unhelpfully broad. Cover in *Half-Life* is at its most meaningful when it allows the player to move in and out of safety while firing on the enemies. To illustrate, I'll pull from a different game from the *Half-Life* era: *Time Crisis*. In *Time Crisis*, the player is able to use a pedal (in the arcade) or button (at home) to move their character in and out of the sheltering safety of a wall, box, or other object.


While in cover, the player character is unhittable and can reload, but the player cannot see the enemy or fire. The player can press the pedal or button to pop out of the cover and take shots. Good players will know exactly when to pop in and out of cover so as to avoid damage and still shoot enemies. It is this pop-in/pop-out process that defines what I mean by cover. If the player has more than a couple of seconds where he or she can use cover in this way, then the game is deploying a cover-based set piece.

## The Earliest Cover

As far back as *Space Invaders*, cover has been a part of shooter designs. We already saw in the previous section how *Space Invaders* was a very forward-looking game for its basic design structure, but its shooter-specific elements were also prescient. Not only did *Space Invaders* have cover when many subsequent shooters did not, but that cover was destructible.

Cover would disappear as a meaningful part of shooter design until the composite era. Side-scrollers in the mode of *Galaga* became the dominant type of shooter during the arcade and early composite era. Having little or no cover, the design of scrolling shooters (would later be called 'shmups) instead emphasized constant movement and did so in a way that diverged from the path eventually taken by *Half-Life*. The first problem in a scrolling shooter is not being shot; actually hitting targets is secondary to that because the player has so little in the way of HP and extra lives. As the genre evolved, this emphasis on dodge-first, fire-second mechanics became increasingly apparent. This is why 'shmup powerups tend to greatly magnify the player's field of fire (by adding extra shots, beams, or explosions). Those powerups are designed to aid players whose first concern is surviving, not aiming. Usually, those weapons also feature infinite ammunition because precision firing is not the point of the game. Obviously, as a player masters the game they will be able to concentrate on both dodging and aiming, but moving and dodging are the central skills.

During the composite era, the shooter genre was an important ingredient in many classic games like *Metroid*, *Mega Man*, and *Contra*. These shooters all made some use of what we can call cover, although its implementation was different than that of a pure shooter. All of the games listed above are composites of the platformer and shooter genres, and so most instances of cover take the form of platforms.



The player isn't hiding behind an object as much as waiting to make a jump. Although many platforms or other pieces of level architecture serve as cover, their true purpose is to force the player to make platformer-style jumps. Often, those jumps are combined with shooting tasks, but this means that a lot of the "cover" in those games makes the tasks in question more difficult, rather than less difficult. While there are definitely some similarities between this and what we'll eventually see in the FPS genre, that one difference is very important. *Half-Life*

has plenty of examples of platforming content, but only two examples where that platforming content blends with shooting in a meaningful way.

## The FPS Beginnings

Cover in the first person shooter began, like so many great videogame design ideas, as an accident. We've already discussed how the level design of the early first person shooters was derived from western CRPGs and adventure games. The game to show this most clearly is the first real FPS, *Wolfenstein 3D (W3D)*. The very dungeon-like structure of early *Wolfenstein* levels is obvious just from even a cursory play-through. These levels don't resemble anything in the modern FPS.

Wolfenstein features nothing immediately identifiable as dedicated cover. All those walls and doors look alike, regardless of whether there are enemies beyond them or not. That said, the walls and doors of the dungeon can be used as cover because of the way that enemy AI works. In *Wolfenstein*, enemies move in herds. There are three principal characteristics of an enemy herd:

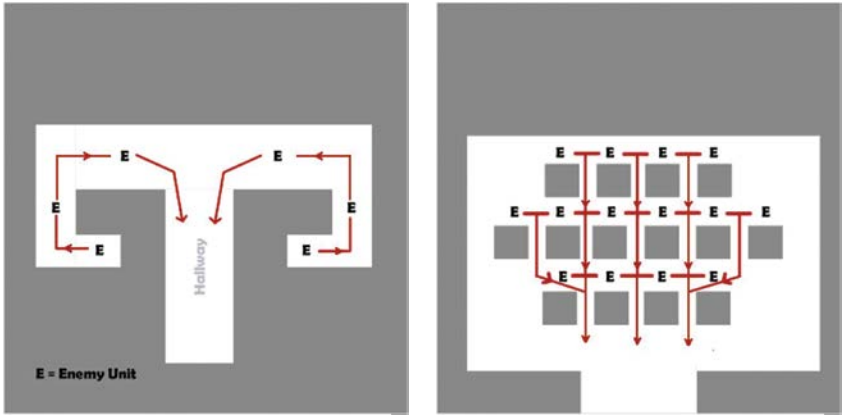
1. Herds of enemies share aggro.
2. Herds of enemies feature no distinct tactical roles, although they may have heterogeneous firing ranges and projectile types.
3. Herds of enemies, no matter what shape they start in, always collapse on the player.

Not every encounter with enemies is with a herd; there are plenty of solo enemies in *W3D*, too. When a player does encounter a herd, though, what tends to happen is that a room full of soldiers will start moving towards the player character as he stands at the point of encounter. That point of encounter is most often a doorway or aperture into a new room, even though that door isn't designed to operate as cover, merely as a way to inflict a sudden surprise on the player. When the herd collapses on the player who is moving and shooting, the player can move backwards through the aperture, cutting off the enemy's angle of fire and stacking

them up neatly in the aperture space or around the edge of a corner. By reducing the number of angles from which enemies can shoot and stacking enemies up so they can't fire around each other, the player is in a very basic form of cover.

The architecture and AI in *W3D* do not demonstrate any intent on the part of the designers to allow for what we perceive as cover mechanics. Rather, the cover-like strategies that players employ are an emergent property that the designers probably didn't plan for in the original game. Every doorway is more or less the same shape, regardless of its proximity to a group of enemies, meaning that no door is tactically more useful than any other. The doors in the game close automatically after just a few seconds, meaning that sustained firefights through a doorway are interrupted without much warning. Furthermore, the controls in *W3D* do not allow for strafing. The left or right movement controls rotate the player character, and mouse controls (which were added later) are not independent of key controls either. Ducking in and out of cover is difficult and only possible in a few limited circumstances.

The development team must have noticed the emergent strategy of using rudimentary cover because the sequel to *W3D*, *Spear of Destiny (SoD)*, takes frequent advantage of it as a part of level design. What we see in *SoD* are huge, oddly-structured herds that are designed to force the player into the "cover" situations described above. Although the whole game is more or less based around this one idea, it can take a variety of forms in terms of practical execution.




Both of the encounters above operate by the same principle: a large herd collapses on the player and the unusual level architecture causes the herd's movement to approach the player character in a variety of strange ways. The ram's-horns structure on the left sends successive waves of enemies at the player. The game's AI doesn't support delayed movement, but it does support herds of any shape, and so by staggering the enemies geographically, the designers were able to stagger

their emergence from the corridors as well. The player can manipulate the enemy action by backing down the hallway and stretching that herd out further, to pick them off one or two at a time from behind a corner. In the "forest" of columns on the right, above, the herd will suddenly appear from behind those columns when the player obtains aggro on any one of them. The player has to move around the outside perimeter of the columns to isolate small groups of enemies before the whole herd comes out into the open. By changing position, the player keeps the herd in the columns where they can't all fire at once.

While it's clear that the designers of *SoD* are able to communicate to the player the importance of minimizing exposure to enemy fire by using the terrain, it still doesn't look like cover as we understand it. For one thing, in both of the aforementioned examples, the player is mostly standing or moving around in open space; that's the case throughout *W3D* and *SoD*. It's really the enemies that are in what we might call the "cover" rather than the player because they get tangled up on doorframes. Later FPS games preserve this to some degree; doorways are always a great place to stack enemies up. Some FPS games also preserve the constant movement and large open spaces of *W3D* and *SoD*, but *Half-Life*, as we'll see, diverges from that idea in a profound way.

The next evolution in the meaning of cover comes, of course, from the early *Doom* series. There are four big advances in *Doom* and *Doom 2* that change the way the player interacts with enemies. The biggest change was the introduction of the ability to strafe. Modern players trying *Doom* for the first time may find that strafing ability to be much clumsier than what they're used to, but they expect to find it and they do. Players who started with *W3D*, on the other hand, would have found the ability to strafe to be an incredible boon, making it possible to dodge enemy fire in a way hitherto impossible. Really, *Doom* was just reclaiming an ability lost when the shooter took on the FPS form. Strafing is essential in *Space Invaders*, and every scrolling shooter that followed it because those games were about dodging as much as they were about shooting. With the ability to strafe came the ability to use level architecture as real cover by popping in and out of cover.


Thus, the second big advance was in a greater variety of level design forms. These forms are fairly chaotic and mostly defy any form of organized classification, but they're a lot closer to what we understand as being "cover" in the modern sense of the word than anything in *Wolfenstein* was. You can see in the images above how these new architectural developments were only usable because of the player's ability to strafe.

The other two big changes were the introduction of the iconic (but short-lived) monster closet, and the arena-style disposition of health and ammo. The monster closet is one of the most highly-recognizable features of the FPS genre, and it definitely had an impact on level design in its heyday. For those who aren't familiar with the term, a monster closet is simply a hidden cache of enemies which opens when a player passes a certain point or takes a certain action. Triggers for monster closet openings can include hitting a switch that also controls doorways, or even picking up a new weapon or item. Much of what a monster closet did was simply to refill areas already cleared of enemies by the player at an earlier time.



The area the player is staring back at in these screenshots is the passage that actually leads to the dead end where the player stands. A large number of enemies emerge from monster closets in previously-cleared hallways and move, as a herd, toward the player. One rule that tends to be true for monster closets in general is that closets that open at the same time tend to feature enemies who are in a single herd, no matter how far apart those closets might be. The other purpose of a monster closet was to fuel a frantic arena battle. Many monster closets in later battles put enemies on every single side of the player character, meaning that the player has to be moving constantly to avoid close-range fire.

The use of monster closets to turn empty rooms into frenetic arena encounters is where the last big *Doom* innovation, the disposition of items, comes into play. In *W3D* and *SoD*, healing items and treasure were located in hidden rooms and alcoves, much as they would be in an RPG or adventure game. In *Doom*, many of those items are strewn around the perimeter of an intense arena encounter (in this case, they're actually on the closet doors) to encourage movement—especially circle strafing.



The obvious purpose of these items is to replenish the player character's health when numerous demons suddenly leap out of the walls and start firing. All of the frantic running helps to dodge enemy fire, but it also allows the player to pick up items from around the floor of the arena. The ammo, health, and armor make it possible to sustain an intense, roving battle without real cover. Later in the history of the shooter, these items are going to appear less often in the middle of battle (although they'll never cease to appear there), and will be moved to the battle's beginning and end. Sometimes, rather than placing items directly in the line of fire, the designers placed health and ammo in the very closets which have opened to let out monsters. The player has to charge through and around the enemies in order to access it. It makes sense for *Doom* to put its health in dangerous places because that placement achieves what the *Doom* designers wanted: reflex-oriented shooting sprees. The game that they were designing is much more frenetic than most of the shooters that we play today; *Doom* is a kind of game that was much closer to its 'shmup ancestors than it is to its cover-based descendants.

## Big Advances: Quake and Quake 2

*Half-Life* originally started as a mod of *Quake 2*, so it's no surprise that it owes much to its immediate ancestor in terms of design as well as in terms of technology. Indeed, the first two *Quake* games are probably the most influential shooters of all time from a mechanical perspective. *Quake 2*, especially, solidified the fundamental mechanics that still make up the foundation of contemporary FPS games. *Quake* made the transition to true 3D. In *Wolfenstein* and *Doom* (and the lesser-known *Marathon*), the environments were 3D, but the characters were all 2D sprites that were (effectively) infinitely tall. The player never has to aim upwards (not that it was possible to do so) because both the character's shots and the enemy's sprite have no upper limits on the y-axis. If the player is aiming at the correct coordinates on the x and z axes, the bullets will hit. In *Quake*, the player has to actually aim at the 3D model of the enemy to hit them. Aiming is actually possible in *Quake* in a meaningful way, where it wasn't before. Before *Quake* the player could only shoot at the center point of the screen; the player had to move their character to move the target icon.

*Quake* separated the viewing/aiming controls from the movement controls so that the player could fire in any direction—including away from the direction the character faces.

The introduction of true-3D aiming mechanics opened up many new design ideas above the mechanical level. The most widespread of these ideas was the introduction of zone-specific damage (i.e. headshots). Both *GoldenEye* and the original *Team Fortress* (a *Quake 2* mod) used this as a natural outgrowth of the ability to target enemy models precisely. Another thing both games did was to put a greater emphasis on verticality in their level designs.

*Half-Life* would take both of these things significantly further. One thing I want to point out here about these games is how the mechanical and supra-mechanical changes like verticality led to the use of modern cover. Once players were finally able to really strafe and aim precisely, popping in and out of doorways or just over the lip of a catwalk to take a quick shot at distant enemies became a viable strategy. In *Doom* and *Wolfenstein*, the player's ability to do this was much more limited even when there was a type of "cover" available. In *Quake* and *Goldeneye*, it's a lot easier to perform this maneuver, but even then cover play is really only an emergent property of new mechanics rather than a conscious effort by the designers to create cover-based encounters.

Although *Quake* had incidental cover and the mechanics to use it, the series went in a very different direction than *Half-Life* eventually would. *Half-Life* took the seed of the cover idea from *Quake* and developed it into an entire game because *Quake* did not. *Quake* was designed to be fast-paced and chaotic in the same way that *Doom* was. The large apertures and empty rooms of *Quake* certainly don't make it easy to avoid enemy fire.

Encounters with some of the large, durable, and aggressive enemies in *Quake* make pop-in/pop-out tactics unsustainable for game-wide usage. For better results, the player needs to perform maneuvers like kiting, circle-strafing, and jumping up and down through vertical portions of the levels to avoid the enemies. This kind of combat would come to be known (after *Half-Life* and several more *Quake* sequels) as the true arena shooter style. The arena style of combat isn't limited to single player either; many of the most popular multiplayer maps from the early *Quake* games are actually complete single-player levels with the computer-controlled enemies removed.

*Half-Life* takes the emergent cover mechanics of *Quake* and builds the majority of its content from that idea. *Half-Life* also features some of the arena combat that we traditionally associate with *Quake* and its descendants, as well as a lot of platforming content which comes from the composite design tradition. These are the three ingredients that make up *Half-Life*; for the purposes of analysis, we'll call each of these ingredients a "design theme." The single largest design theme is the cover theme, which makes up about 55% of all the set pieces in the game. This theme also sees the greatest amount of development (increasing complexity) from beginning to end. *Half-Life* does so much with the use of cover that most of the lessons we can learn from the game are about cover as it relates to level architecture, pacing, and the use of AI and weapons.

## The Structure of *Half-Life*

Even though *Half-Life's* cover theme represents the largest portion of the game's content, that theme doesn't start until Chapter 4, reaches its climax in Chapter 12,

and then drops off significantly after Chapter 13. This means that the cover theme is densely packed into those 10 chapters. It also means that the game has a peculiar structure because there are 18 chapters and only three design themes to fill them with. There are certainly pieces of content in the game that don't fall into any of the themes; usually these take the form of boss fights or small pieces of through content. Most of the game's content comes as set pieces, though, and most of the set pieces fall into one of the three themes. Of the three themes, the cover theme is simply the most frequently seen.

One of the most-discussed problems of *Half-Life* is that the last four chapters (in Xen) are stylistically different from the rest of the game, and also of a lower level of quality. Some of that is the sudden and radical change in the gravity and accompanying emphasis on long-range jumping puzzles. It's a bad idea to introduce sudden, permanent changes to the fundamental physics of a game when the player is more than 80% of the way through it, but I think the real reason that the Xen levels feel so much weaker is that the game design goes backwards in time. Xen, with its sudden lack of meaningful cover, emphasis on arena-style encounters, large hallways/apertures and frequent, small engagements is a lot more like *Quake* than it is like Chapters 4 through 13 of *Half-Life*. If we see the cover theme as the core of *Half-Life's* design, then the climax of the game is in Chapter 12 (Surface Tension), with Chapter 13 serving as a kind of denouement to that. What if the portal that opened in Chapter 14 had gone directly to the fight with Nihilanth? I think the overall flow of the game might have seemed a little more even, but that isn't what the designers made.

Instead, the arena theme comes to dominate the later chapters of the game with large doses of platforming mixed in. In the rest of the game, the incidence of platforming and arena content follows the rhythms of composite flow, although not in the traditional 1:1 ratio that a true composite game might employ. From Chapter 4 until Chapter 13, what we usually see are two to four set pieces in the cover theme followed by one or two out of the platform theme, the arena theme or a unique piece of through content. There are exceptions to this rule, especially in Chapters 8 and 10. Chapter 8 has a lot of long, slow through content thanks to the monorail cart Freeman has to ride, and so it eschews the kinds of arena and platforming challenges that might make the chapter much longer. Chapter 10, meanwhile, is entirely made up of platforming—and some fairly orthodox platforming, at that! Chapter 10 could almost be taken from a straight 3D platformer in the way it operates. Starting in Chapter 11, set pieces in the arena theme start to appear more often, and then they mostly displace cover-based set pieces in Chapter 14 and after, with a couple of interesting exceptions.

## A Note on Mechanics

This work primarily concerns itself with level design, and little has been said so far of the shooter mechanics at their most basic levels. I have not deliberately ignored them, but I feel that while *Half-Life's* shooter mechanics are very solid,

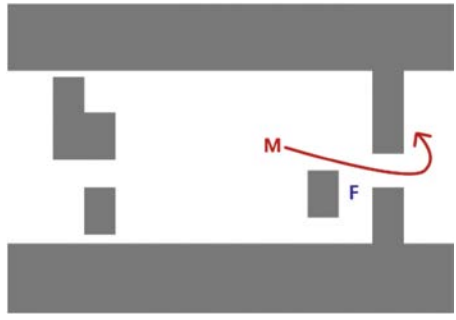
they are generally unremarkable. The auto-aim (or aim-assist) function, for example, is mostly like other aim-assist mechanics before and after *Half-Life*. The only big difference in *Half-Life* is that the always-centered reticle will come unstuck from the center for a second or two if an enemy enters the magnetic area of the auto-aim function. Aside from very minor differences like that (and couple of other things we'll get to, below), there are not huge mechanical innovations in *Half-Life*. Weapons do not do variable damage (i.e. there are no randomly-chosen critical hits) except when hitting a specific area on the enemy target (i.e. headshots). There are not really any specialized weapons for specific enemies. Only the rocket launcher has a truly novel mechanic in its laser guidance system.

This screenshot is from set piece 12–6, during which Freeman has to fight a helicopter from the mouth of a cave. Forcing the player to track the target with a laser pinpoint defeats that player's ability to hide behind cover. That is, the player can't simply fire a rocket and then duck behind the ledges and walls that would otherwise be available here. This means that players have to learn to shoot rockets at relatively close range in order to shorten the length of time that Freeman is exposed to fire while steering that rocket. That's a novel and important mechanic, but most of the other weapons are simply versions of things that appeared in games before *Half-Life* or that don't receive that much development. (For example, the enhanced recoil from the tau cannon is a new idea, but it's never particularly relevant to any single set piece or platforming puzzle.) What makes the weapons interesting is the way the levels are designed. This becomes a lot more apparent when it comes to multiplayer. If you buy, or have bought, the eBook version of this document, there is a section detailing how the most successful multiplayer maps drew most of their appeal from their use of cover. Many of the more arena-oriented *Half-Life* maps were forgotten because they were too much like *Quake*,

and did away with all the level-design innovations that really made *Half-Life* what it was.

The one big exception to everything I wrote above is *Half-life's* AI. The AI of any game is actually composed of many mechanics, although only two of those mechanics are really continuous throughout the game. Many reviews have credited *Half-Life* with having some of the best AI of all time, but this impression is the result of a series of clever illusions. While the AI in *Half-Life* was certainly ahead of its time, many of the most memorable moments in *Half-Life* are not a result of continuous AI, but rather of discrete, one-use scripts and specially-created tools. (There is an entire section about these moments in the later part of this document.) Whether it's an unusual emphasis on grenade-tossing or a sudden and preternatural ability to detect Freeman no matter what he does, these behaviors are examples of custom scripts that exist beyond the normal scope of the AI. Clever level designers can create the illusion of greater enemy intelligence by using hidden scripts, but once players figure out where those traps are laid, they can avoid them. For example, if enemies run only to specific locations, that's a one-use, custom script and not a part of the general AI. The system of decisions that enemy units can make independent of custom scripts is what really counts as a systematic advance in artificial intelligence.

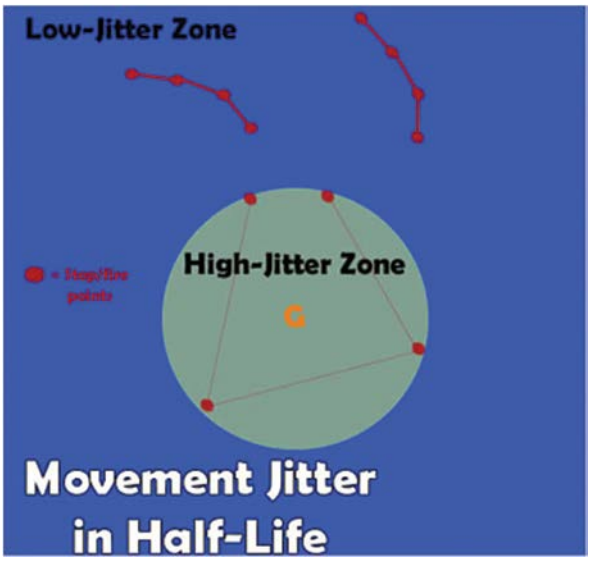
The fundamental AI which almost all marines are equipped with features two new ideas: cover-seeking and what I call "movement jitter." Cover-seeking is just what it sounds like; under certain conditions, the HECU marines will seek cover. The circumstances vary, but generally come down to two criteria. The first criterion is the presence of other marines; if they have companions, marines will often fall back towards those companions and take cover temporarily so as to draw Freeman into a trap. Marines in groups of one or two don't do this very often. The second criterion is health; marines low on health will often seek cover of any kind just to get out of Freeman's line of fire. In either case, but more often the second case, marines will display a flaw in the design of the cover-seeking behavior.




(Marine in red, Freeman in blue, cover structure in grey, the white space is empty.)

Marines are not very picky about their choice of cover when the behavior is triggered. Sometimes, they'll seek a piece of cover that is on the other side of Freeman, meaning they have to pass right by him while he fires. This bit of design has been fixed by *Half-Life's* inheritors, who have used methods like threat gradients and invisible beacons which call enemies to pieces of cover specifically. Indeed, this might be *Half-Life's* most antiquated design idea. We can still learn from watching enemies take cover because that tells us something about the cover design of the set pieces, but the underlying design idea is only remarkable for its place in the history of FPS design.

Movement jitter, on the other hand, means that enemies in *Half-Life* (mostly marines) have irregularities deliberately programmed into their movement patterns. When cover-seeking behaviors are not active, the first priority of a marine is to acquire line of sight on Freeman. After that happens, the enemy's behavior then gains the movement jitter attribute. Movement jitter usually means that an enemy will take stuttering steps while firing upon Freeman. At range, these steps are short and somewhat frequent. In close quarters, enemies can move quite a bit in between shots. Below, I have compared *Half-Life's* movement jitter to its predecessor behaviors in the *Wolfenstein*, *Doom*, and *Quake* games.




Because I do not have access to the decompiled code of *Half-Life*, I can't determine how the high-jitter, point-blank zone works. (The *Half-Life* SDK has many tools, but it doesn't instantly recreate the AI as it exists in *Half-Life*.) It may be that the principal line-of-sight-seeking behavior causes enemies to prefer a longer range, secondarily causing them to perform a run that appears highly jittery. It may be that any enemy who reaches point-blank range is subject to cover-seeking behaviors. Nevertheless, the practical effect of point-blank range on the AI makes enemies run around in unpredictable ways, even when they do not appear to seek cover. As far as the player's experience goes, the extreme movement jitter of point-blank range seems only like an exaggeration of the same behavior that is occurring at long range. Ultimately, it's easy to see how the development of movement jitter was an important mechanical evolution in the history of FPS campaigns. While many aspects of single-player campaigns before *Half-Life* prepared the player for the level-design aspects of multiplayer combat, it was rare for single-player enemies to approximate real players in their behavior. No game-based AI can ever match the resourcefulness or intuition of a human player, but by giving the player a more difficult target, *Half-Life* made its single-player campaign more interesting, and its multiplayer experience more accessible (if only slightly so).

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# 2

# The Cover Theme



## Introduction and Structure

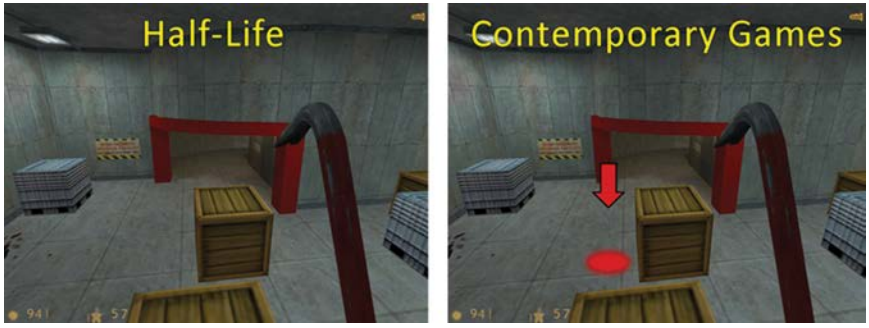
The cover theme in *Half-Life* is made up of seven segments, each composed of several set pieces. Each segment shows the player variations on a single idea. The first segment teaches the player how to use cover and features mostly obvious object-type cover (like crates, boxes, etc.) from which the player does not have to move. The second segment is similarly structured, although the cover is architectural rather than of the object type. In the third segment, the player is required to move between multiple pieces of cover. Whereas the first two segments generally allow the player to find a convenient piece of cover and stay behind it for a while, the third segment requires the player to shift between multiple pieces of cover in order to find the best angle from which to fire on the enemies. The fourth segment causes the player to shift between different pieces of cover by surprising the player with a variety of unusual enemy placements and enemy behaviors. The fifth segment goes beyond this, forcing the player to move from cover to cover constantly because that cover will often be destroyed, or its protection negated by concentrated, high-explosive munitions fire. The sixth segment goes the furthest of all and puts the player in situations where Freeman is surrounded on all sides, meaning that constant

readjustments are necessary to take advantage of any cover at all. (There is also one final segment in Xen, but it consists of assorted ideas that are never developed.)

For convenience, here is a list of each segment and how it aims to improve/test the player's cover discipline.

1. Identifying basic cover (mostly objects) and staying in it.
2. Identifying subtler architectural cover.
3. Moving between multiple pieces of cover to get the best angle on a set piece.
4. Reassessing cover quickly after a deceptive initial engagement.
5. Fleeing from temporary cover.
6. Fighting in cover while surrounded.
7. [*Fragmentary*] Moving cover, and cover that is itself dangerous.

It's easy to see how the overall trend is towards greater danger and more movement between pieces of cover, but the use of cover never becomes obsolete. In each segment, we'll see how different features are introduced and fall out of use as the game goes on. The biggest two features are the *cover descriptor* and the practice of *cover discipline*. The cover descriptor is an introductory feature that tells players how to "read" the cover in a set piece. Usually, the cover descriptor takes the form of a conspicuously placed object like a large box or laser beam. From the placement of this object the player can figure out how the entire set piece operates. Here's an example of a cover-describing object, and then beside it, I've put an example of how this would be handled in a current game.




Of course, there are not floating icons like this in in *Half-Life*. In this set piece, a scientist and Headcrab are blown to bits, demonstrating the necessity of this piece of cover. We'll examine a variety of cover descriptors in detail in the first two segments, but descriptors become scarcer and more abstract in later set pieces. Cover descriptors never disappear entirely, however, and we'll see a few examples of their role in later set pieces, too.

Cover discipline, on the other hand, is a skill that the cover descriptor helps to teach early in the game. Cover discipline is the ingrained practice of staying

in cover despite the appearance of pressuring enemies or events, finding the best angle to fire upon enemies from, and eliminating the closest and most dangerous enemies first. Cover discipline also means knowing when to back into the cover to avoid damage. Eventually, cover discipline comes to be knowing when to abandon cover and move to the next piece of it because a grenade has landed, or several enemies are converging on Freeman's position. At its most complex, the kind of cover discipline needed in segment six means always standing in the best location to take advantage of a little bit of cover while fighting on multiple sides. Interestingly, there are a couple of set pieces in Xen that take cover discipline to new and strange places, but they don't do it in any regular way, and so don't constitute a thematically linked segment. Nevertheless, we'll see what cover discipline means when the cover is moving, or when destroying the cover means releasing additional enemies.

## Segment One: Basic Cover

This segment is very simple and is focused on merely teaching the player how to use cover. In 1998, cover of the kind that *Half-Life* was offering would have been completely novel, and its use would have seemed alien to anyone who had grown up on the arena shooter. Thus, we see many instances of the game telegraphing the direction and quality of fire before the player even has to enter the set piece. Cover in this segment is almost always in the form of large, obvious boxes. Most of the enemies in this set piece are static turrets that, while highly damaging, do not move and cannot charge Freeman's position to negate his cover. In the middle of this segment, the designers use teleporting enemies to try and force the player to break cover discipline, but none of the teleports are terribly threatening on their own, usually consisting of one enemy. The goal of these teleports is to teach the player not to panic, which is one of the first and most important lessons a game can teach a player.

### Set Piece 4-2: Cover!

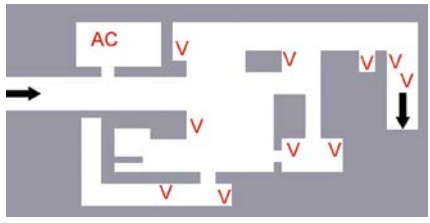
The cover theme begins with a simple exercise in obvious, one-directional fire and one type of cover. The source of the fire is an automated turret that puts out a lot of damage and isn't immediately visible upon entering the set piece.

The designers do a great job here of alerting the player to the danger here with two elements that control the player's movement. The stopping mechanism is the vertical drop out of the crawlspace that will probably cause the player to pause long enough to see a scripted sequence (a scientist and Headcrab being messily shot to pieces), which is the cover descriptor. The only really difficult thing about this set piece is that it's a little hard to see the layout of the cover from the vent aperture. The player has to either run clear across the set piece into the safe zone on the other side or drop and duck immediately behind the right-hand cover. Either move is a kind of "leap of faith" that first-time players might be reluctant to take. Taking the leap will teach the player something very important about the use of cover: that enemies don't start shooting immediately. This is one of the facts that make the use of cover possible. Without that important delay, jumping out of cover to move or fire would be impossible, and players would be paralyzed.

The other apparently difficult thing about this set piece isn't a difficulty at all, but rather a constraint that helps to teach the player about using cover. The turret is essentially impossible to kill at a distance, and it's pretty obvious that trying to fight it is a bad idea. The only real option is to use the cover to hide from it. This is ideal because it forces new players to focus on hiding rather than shooting. The combination of hiding and shooting will come later. As a reward for players who figure out that some of the cover objects are moveable, there's a panel allowing the player to disable the turret beneath its platform, and a health station above. This is an ideal example of "bonus goals" because it's totally in keeping with the theme of hiding rather than fighting.

### Set Piece 4-3: Office Combat

Although the Vortigaunts in this set piece do move and will charge at Freeman, they still don't require the player to do that much moving. The many offices in this section of the level serve perfectly as accessory spaces. An accessory space is an empty room with a narrow aperture that gives the player a perfect location to engage enemy units. (The best one here is marked "AC" on the map below.) The rooms are so handy and so obvious that they serve as their own cover descriptors. The player simply draws the aggro of the Vortigaunts and then parks Freeman in any of the several spaces indicated below.



The Vortigaunts will line up perfectly in these narrow apertures to be shot. The player doesn't have to do that much backtracking because there are so many good spaces designed right into the architecture. While the cover here isn't made up of the same boxes as elsewhere in the segment, it's nevertheless obvious that these rooms and narrow apertures can make it easy for the player to stop and fire on groups of disadvantaged enemies.

### Set Piece 5-1: A Sleeping Turret

Here we have our first look at the puzzle aspect of cover and the first good example of a geographic cover descriptor (rather than a script that performs a revealing action). The turret in this set piece starts in a dormant state and is alerted by Freeman crossing the laser tripwires. The turret will immediately spring to life and start depleting his HP rapidly. The aperture for the room is too wide to use for cover, so what does the player do?

While it's technically possible to slip through the trip-lasers without detection, most new players aren't going to accomplish that feat. Instead, the player needs to quickly form a plan of how to get into cover, and where to go after that. The descriptor that tells the player how to do this is the shoot-through lattice highlighted in the screenshot. This screen won't stop bullets, but because it's connected to an obviously impermeable pillar, Freeman can't walk through it.

The pillar on the right shows us exactly where the impermeable screen stops. The plan starts to spell itself out after this: get to the first box on the left, and then slowly move Freeman around the turret counter-clockwise.

It's not until after the player has a tentative plan that the designers start throwing in complications. The first big complication is a series of Headcrabs that teleport in one by one once Freeman has reached the second (right) cover boxes.

This is just the designer's way of teaching the player not to panic while in cover. This is a fundamental concept the player needs to know about. Standing and running will result in damage or death, especially since the next box ahead is actually an explosive crate. Staying relatively still will result in the turret shredding the Headcrabs as they overleap a crouching Freeman. This is a lesson that the player needs to know, and one that this set piece teaches well: don't panic. The nature of cover is that it allows the player to wait for the right moment; rushing will only remove that advantage.

### Set Piece 5-2: Turret Evolution/Expansion

This set piece is a typical evolution/expansion of the last set piece. There are more turrets here, and there are several new elements with which they combine. The basic setup is the same: the player needs to get into cover and then slowly work Freeman around each corner to defeat the turrets. The trip-laser is also nearly unavoidable but for completely different reasons. Where earlier the trip-lasers were set up to cover the entire passage, this time the trip-laser is easy to jump over, but that's not going to help.

When Freeman enters the first cover location, two Vortigaunts will teleport in one-by-one directly behind him, which is a classic evolution of the previous set piece—an upgrade from Headcrabs to Vortigaunts. Without knowing beforehand that they're coming, it's almost impossible to stop them before they trip the laser and activate all the turrets. The designers were kind in that they accounted for a panicked reaction to the teleport and placed two explosive barrels behind the Vortigaunt spawn. The explosion that kills the teleporting Vortigaunts is actually part of the descriptor mechanism for the room. In the center of the room there's another set of explosive barrels that can be used to disable the middle turret without exposing Freeman to fire.

Two explosions into the set piece, it should be clear that this set piece is all about triggering explosions (or just generally killing enemies) from behind safe cover. The player has recently picked up grenades, and this is the perfect time to use them by bouncing them off the walls or pillars to hit the turrets The two rear turrets aren't immediately dangerous because they're behind indestructible crates, but the confined space and height differential make them perfect targets for more bounced grenades thrown from above or through the small cracks in the crates.

If the player does choose to use grenades (instead of guns, which are effective from behind cover), the only really difficult part of this is learning the physics and making the throws before running out of grenades.

## Segment Two: Architecture as Cover

The second segment of the cover theme pushes the player's ability to interpret cover by removing object cover and offering architectural features that serve the same purpose more subtly. Object cover does not disappear completely during this segment, nor does it ever vanish from the game, but it's less clear in later set pieces what is and isn't cover.

Most of this cover looks like ordinary walls and pillars; that is, the kind of "cover" players might find in *Quake* or *Doom*. There are several important differences in both quality and quantity, however. In *Quake*, an enemy might chase the player character from one arena, down a straight hallway into another arena. There's no place to stop; everything is done by kiting and strafing. When there's cover in *Quake*, it's often an accident of the level design. In *Doom*, the player can make cover out of the terrain, but only because the enemies are slow and usually have a simple herd AI. In *Half-Life*, the enemies will act as individuals, shooting at medium range, charging at the player, and lobbing grenades. The player doesn't know what to expect, and as such, he or she can use the cover to buy time.

*Half-Life* set pieces are, to a certain extent, puzzles to be solved; cover is one of the pieces of that puzzle. In *Doom*, and especially in *Quake*, the player has to start running as soon as the enemies aggro. By ducking into the first piece of cover available, the player gains a little bit of time with which he or she can look out on the rest of the set piece and plan the next move. Because the enemies in a *Half-Life* set piece aren't usually in a herd, it's actually possible to isolate certain enemies rather than take on the whole set piece at once. In the first segment, we saw how the first aspect of cover discipline was not panicking. The second aspect of cover discipline, which emerges here, is strafing around the corner of a piece of cover to create the most advantageous angle of fire. The right angle can cut down the number of enemies that can fire on Freeman while still keeping a few in sight to pick off. Especially in the second half of this segment, we'll see lots of geographically large set pieces that the player can cut into smaller sections by using cover properly. Mostly, the player can use the same one or two pieces of

cover for the entire set piece, so we haven't yet reached point-to-point cover. In the next segment, the player will have to use several pieces of cover in sequence, but here the player mostly has to edge out a bit in one or two spots.

Cover descriptors are a bit scarcer and subtler in this segment, although they do appear more than once. The left-hand hallway in set piece 5-3 can only exist for one reason—because the player should use it to get a different angle on the enemy in the back of the set piece. That's a descriptor, although it's a bit unusual. The barnacles in set piece 5-4 will eat enemy marines, and so serve as a kind of descriptor, too, telling the player to simply stay away from the enemy's line of sight and let the infighting do the rest. Laser trip-mines, making their first meaningful appearance in the player's arsenal, serve as an unusual descriptor for set piece 7-2, calling for their own use in the narrow halls of the surrounding area. None of these are as clear or as definitive as the cover descriptors of the first segment, but they do give shape to the set pieces they occupy.

### Set Piece 5-3: First Marines

The purpose of this set piece is to introduce the next evolution in enemy type: the HECU marine. Up until now, the cover set pieces have been based around stationary turrets or small handfuls of alien enemies, none of which present a particularly complex threat. The turrets do a lot of damage, but they can't move. The aliens can do damage and have a decent amount of HP, but their AI doesn't account for cover well, so it's easy to out-think them. The HECU marine is highly mobile and (relative to the rest of the enemies in the game) highly intelligent. The difference in intelligence and speed becomes clear very quickly in this set piece.

There are two descriptors here at the very beginning that explain the use of cover and terrain. The first is the marine shooting down on the scientists from the catwalk above. This tells the player to use the ceiling and the boxes as cover, and not to run out into the open. Doing this, however, will make it surprisingly difficult to actually kill the marine above as he dodges away.

The necessity of the cover will become clear when a marine with no helmet will start charging and will quickly stick his gun around the large crate at the end and start firing on Freeman from close range. It's very difficult to see him before he's already at close range, and so the easy answer is to shoot the explosive barrels on the right—after all, the player just did this in the last set piece a few minutes earlier. The marine's fire may incidentally detonate these anyway.

The first half of the set piece is about how, even with cover, the intelligence and speed of the marines makes them dangerous enemies at close range. The second half of the set piece is about the difficulty of fighting them at range. This is where the explosive barrels come into play; the explosion does a great job of eliminating the charging marine, but it leaves Freeman totally exposed. It will quickly become clear to the player that the marines are still dangerous at long range, and the lack of cover is a real problem. There's an answer to this, though, in the level design. The left-hand path that had been partially blocked is now open and provides an ideal place to hide from enemy fire.

From the aperture at the end of the left-hand passage, the player can get a very different read on the back half of the set piece. The first thing to notice is that the rear marines are definitely not charging; they're just firing from afar, although they do move laterally. Standing to the side, it's possible to see through the many pillars and boxes and get a few shots off with the element of surprise. This passage

also takes Freeman a lot closer to those mid-range boxes so that he doesn't have to run through enemy fire for a prolonged time. There's no easy way to beat the rear marines—the explosive barrels aren't placed near them—but by avoiding the center firing lane and using the boxes and pillars as cover, Freeman can close the distance and take them out one at a time.

As a historical note, I want to point out how, to players accustomed to *Doom* and *Quake*, this set piece would have been absolutely astonishing. The enemies of *Doom* and *Quake*—and even shooters as far back as *Space Invaders*—never had the combination of intelligence and speed that the HECU marines do. There were plenty of enemies in *Quake* who would move quickly and charge at the player while firing, but none of them ever knew how to use cover. Moreover, this fight features marines with various behaviors. Some of the marines charge, while some fire at long range (although they do draw closer over time). In the days of *Doom*, this would have required two totally different types of enemies, but the HECU marine is more versatile. What's more, it was rare for single-player set pieces to mix up high and low enemies like *Half-Life* does, but it seems completely natural here. Since *Half-Life* came out, all of these things have become common to the point of seeming generic, but back in 1998, this set piece marked the beginning of a series of incredible shooter experiences.

### Set Piece 5-4: Above

For its level design features, this set piece belongs in the cover theme, and yet because of the way it operates (as a large battle with enemy factions fighting each other), it could almost be in the arena theme. There's meaningful cover in several locations, although there isn't a clear descriptor mechanism like a destructible object or an unusually high source of damage to be found. The important feature here is the presence of the barnacles all over the room.



Because the barnacles do not dictate movement or how to use cover, they're not really descriptors. Instead, they serve a different purpose. As you can see, the barnacles can and will kill several marines while they attempt to fire on Freeman. Before *Half-Life*, infighting between unrelated factions was

uncommon in videogames. In fact, one of the common complaints made by reviewers of action games in the 90s was that enemies were not subject to the same rules the player's avatar is. Enemies could walk through lava or move through fields of friendly fire without taking any damage. This set piece shows the player how that's not true for *Half-Life*; enemies are subject to the same damage and physics as Freeman is, and the Xen monsters will fight the HECU troops. The designers never have to explain it; the game simply demonstrates the fact in a clear way.

Once the enemies have thinned each other out, the player still has to be careful about proceeding through the long middle stretches of the level. Even with the infighting, there are usually some marines left roaming around, and they can shoot down on Freeman such that using cover is difficult. This is just another exercise in using the architecture of the level design wisely. The marines here won't throw grenades like they will in the next set piece, so the cover is meaningfully protective. The player can't really fire back until Freeman can get the high ground. Once the player can get to the high catwalk, the catwalk itself will provide all the cover the player needs to finish off any remaining enemies.

### Set Piece 5-5: Below

This set piece opens with an introduction to the astonishingly accurate grenade-tossing skills of the HECU marines. Immediately upon entering, the player will have to run quickly to avoid a barrage of grenades that the marines can launch from below with great accuracy (and at a bizarrely slow speed).

After an attack of grenades that lasts for quite a long time, the set piece proper commences. The defining feature of this set piece is that it reverses the dynamic of the previous two set pieces completely. Whereas the previous two set pieces gave Freeman cover and the enemy the high-ground advantage, this set piece gives Freeman the that position and the enemy most of the cover.

All of the object cover belongs to the enemy, but the architectural cover is usable for Freeman. The support pillars work to deflect fire and can even be used to perform the standard pop out/in maneuver. The catwalk itself can also serve as cover from fire coming from below, although this requires that the enemy is out of grenades, and it is a lot harder to shoot from behind the catwalk than a box. Still, Freeman can basically stand in one place and pick off all of the marines because of the height advantage and the enemy movements.

### Set Piece 7-1: Ladder to Hell

Here, the player takes Freeman up a ladder into a highly deceptive hallway encounter. This set piece is a reversal just like set piece 5-5; the enemies have the advantages of cover this time around. This set piece is much shorter than the previous one in the theme, though, and has a relatively low enemy population. What it lacks in length and numbers, it makes up for in trickery. After climbing the ladder, the player is faced with what appears to be a standard corner turn. The far wall on the left is visible and suggests a dead end with no threat. The hall on the right clearly goes further.

The obvious threat is definitely the two marines on the right who charge right at Freeman. There's not much in the way of object cover; the player has to use the corner to pop and fire. The marines are so close, however, that their aggressive charge will negate this cover pretty quickly. The game has shown this behavior enough by now that the player might know this and simply start strafe-firing. This is where the real trick of this set piece kicks in. That apparent dead end on the left end isn't a dead end at all; it's a hidden-enemy corner. In that corner is a turret that will fire on Freeman from behind while the marines shoot at him from the front.


Hidden-enemy corners are a design trope going all the way back to *Wolfenstein*. To serve their purpose, they need to be surprising, so they're usually placed in an irregular and apparently non-threatening place. This spot is irregular, as the left hallway isn't flush with the right hallway, exposing Freeman to the marines first. It's also apparently non-threatening as the player's first glance suggests that hallway is a dead end. All of that is just a calculated deception. The only thing that keeps this set piece from being totally unfair is that the turret doesn't sweep the whole hallway, only the left side of it (facing down toward the marines), and the angle is such that it can't continue firing on Freeman for very long if he runs through quickly.

### Set Piece 7-2: Behind Every Door

This set piece is one of the most difficult in the game to classify. I consider it to be one set piece, but it could really be two or more. All of the marines in this area come in groups of one or two, and aggro always depends upon a different criterion in each case. There are two locations where most of the fighting takes place, but there's a high degree of variability in how the enemies will approach Freeman when the fighting begins. The overall purpose of this set piece (again, if you can call it that) is instruction in the tactical uses of the laser trip-mine. Trip mines are not very useful if a huge line of enemies is approaching because they only kill the first one or two out of a huge group. On the other hand, they're too useful if, for example, five Vortigaunts all charge together. The piecemeal pairs of marines in this section make sense because they are just right for trip-mine play.

The level design also has some unusual features which make sense for trip-mine placement and little else.

The initiating incident for this section is a novel take on the concept of binary cover. The first marine in the section hides behind sandbags, while Freeman has some aperture cover. Behind Freeman and the marine are explosive crates.

Essentially, these crates work as the opposite of binary cover; instead of shielding Freeman and the enemy from fire the crates put them at much greater risk. By beginning with an explosion, however, the designers have reminded the player that explosions are a very effective way of dispatching marines. The laser trip-mine provided to Freeman just outside the also tells the player what needs to be done: either arm the mine in the doorway or along any of the protruding walls just inside the doorway.

The doorway is narrow and makes for good cover. The hallway beyond the door features several protrusions that also offer decent cover. Whether the player uses mines or starts shooting, there's cover available to do it. The real problem is that enemies are going to come from both the left and right. They don't come all at once, but taking too long to kill any one group will result in Freeman being surrounded. Thus, it's clear the designers intended the player to have at least some

part of this set piece protected by an exploding mine. The time will come later when the player faces a whole segment based around being surrounded, but the game is not there yet. There's no architectural provision (nor appropriate amount of training) for dealing with combat on multiple sides; there are only mines and multiple attempts.

### Set Piece 7-3: Ambush

This set piece reverses set piece 7-2 in that the player starts at the bottom of the elevator shaft and has to fight out against marines who have entered by the same path the player took only moments before. The only surprise the player faces here is the elevator which drops a few marines on Freeman at the beginning of the action.

After that point, everything in this set piece is about as standard as it could possibly be, with Freeman having lots of easy-to-use cover. Indeed, everything that was once an advantage for the enemy is now available to the player.

Although there isn't much to say about this set piece, I want to point out that in every genre, it's important that not every consecutive challenge be bigger and more difficult than the last one. An endless uphill battle is bad for player morale and stamina; Nishikado motion is the core concept of videogames for a reason.

This set piece is an example of the designers scaling back the difficulty to give the player a break.

## Segment Three: Point-to-Point Cover

This segment begins to expand the player's cover discipline abilities by forcing him or her to move from one piece of cover to the next while under fire or threat of fire. Obviously, this segment is not the first to make the player move around to take advantage of cover, but it does increase the complexity and danger of doing so. In the last segment, most of the player's movement was a retreat into or around one or two pieces of cover. When the player goes into the tunnel to get a new angle on the marines in set piece 5-4, that maneuver was still a retreat into very secure cover. When the player backed out of the door to use mines in set piece 7-2, that too was a retreat into safety. In this segment, the player is charging toward enemies and/or across dangerous open spaces to get into the right cover. What makes that cover "right" is that it gives the player the most advantageous angle of fire. Scooting around behind cover won't give the player enough of an angle; Freeman has to move through the dangerous spaces.

The best example of an advantageous angle of fire is the accessory spaces in the second set piece of this segment. Set piece 8-2 starts the segment off by giving the player small rooms on either side of its main corridor.

The player can draw the aggro of the enemies and then duck into these rooms, whose small apertures will protect Freeman from extra fire while he shoots his target. The accessory space is just the most extreme example of a trend that gets progressively more difficult here. Crossing between two pieces of cover on either side of an enemy group is a theme that sees a lot of development.

The player has to do this same motion through several more set pieces immediately after 8-2. In those set pieces, there is no cover descriptor, although each set piece is essentially the same cover discipline puzzle presented in a different way. There are alternating groups of HECU and Vortigaunt squads occupying various passageways in this area. To conserve health and ammo, the player has to find the right cover and best angle to break these groups up into smaller parts, and then deal with those broken pieces from behind cover.

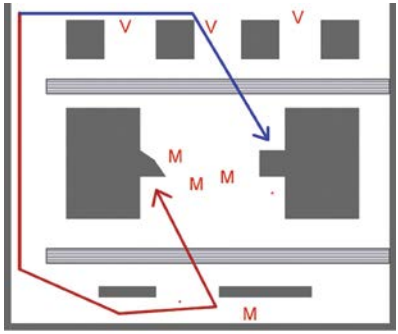
These later set pieces are actually related to each other in a classical cadence style. Each set piece becomes more and more dangerous as the "best angle" cover gets shallower and harder to spot. In set piece 8-3, the accessory spaces disappear, and the dangerous passageways start intersecting in more complex ways. In 8-5, the cover offered by the few nooks in the wall becomes a lot shallower, and the number of enemies goes up. The end of that set piece culminates in two spot-checks with marines firing high-caliber cannons from inside small bunkers.

This is the final test of knowing when and how to zig-zag, and it's considerably more difficult than any of the other iterations because the cannon can kill Freeman quickly. The strategy for all of these set pieces is essentially the same,

however: maintain cover discipline by always choosing the angles that grant safety to Freeman and an angle that reduces the number of enemies that he is firing on at any one time.

### Set Piece 8-1: Parallax

Enemy infighting returns in this set piece and remains a prominent part of the design for the rest of this segment. The next few set pieces are built around three-way fights between Freeman, the HECU troops, and Vortigaunts. Although the number of enemies in this set piece and the next few is high, one important thing to observe is that the enemies don't operate as one herd, and this battle is the largest of them all in terms of enemies on screen at the same time. The set piece is set up as a three-group brawl intersected by two electrified cart tracks.




M = Marine; V = Vortigaunt

The marines don't usually move more than a few steps, and will mostly remain in position and fire at the opposing Vortigaunts. The Vortigaunts also don't cross the cart tracks, but will move around more to get a clear shot off at the marines. There is cover in the set piece, but no clear descriptor about how to use it. The marines and Vortigaunts don't use the cover in an obvious way, and there's no other mechanism (like one enemy more powerful than the others) to show the player where to crouch for pop-in/pop-out firing. That's not to say that the set piece has no flow; it does. It's much better for the player to pick one faction to destroy first, whether starting from the back and killing all of the marines or starting from the front and killing all of the Vortigaunts. Either way, it's a bad idea to get caught in the middle of the two factions. They will shoot Freeman to death quickly since the cover can only block shots from one side. This isn't technically a descriptor though, as knowing this fact involves seeing the entire set piece. Descriptors are only useful when they are able to communicate the flow of a set piece at a glance. If the player has to see the whole battle to understand it, as in this set piece, the purpose of a descriptor is lost.

With this in mind, there's still a lot to know about how this set piece works, and how it relates to the numerous set pieces which follow closely on its heels. Although it isn't immediately apparent, this set piece features an hourglass/chokepoint design. On both ends of the conflict, it's possible to move around a lot, but the middle is quite confined.

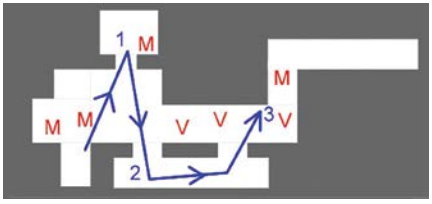
Not only is the middle platform narrower than the outer platforms, it features object cover on both sides, so that the player can strafe to get the best firing angle, especially on the Vortigaunts who are spread out behind the pillars on the opposite side. You can see on the map how this would work. The set piece is much easier for players who are trying to go back to front, killing the marines first, and the flow makes a lot more sense. Dashing between the two central pieces of cover is not only more useful when fighting Vortigaunts, but also safer. The Vortigaunts aren't good at firing around cover, and they never have grenades. No matter which way the player chooses to approach the set piece, however, it's clear how the flow of the action works, despite the lack of a cover descriptor.

### Set Piece 8-2: Zig

This set piece looks at the same problem as the previous one with a slightly different setup and fewer enemies. At first, maps of these two set pieces look entirely different, but the way the action works is actually quite similar. In each segment of this hallway there's a new set of enemies that is unattached to the other enemies in other segments.

The big addition here is the two accessory spaces in each segment of the room. These are surprisingly similar to the accessory spaces we saw in set piece 4-3—even to the point where the player is facing Vortigaunts again. There are some marines mixed in as well; this can be seen as an evolution of the Vortigaunt-only ancestor. The accessory spaces are perfect for luring in Vortigaunts, and adequate for luring in marines. To complicate things, the first accessory space actually has a marine camped out in it, and he'll stay there even with gunfire blaring outside his room. The second room doesn't have this problem and is quite a bit bigger. Like the earlier accessory spaces, these rooms also double as troves for loot crates.

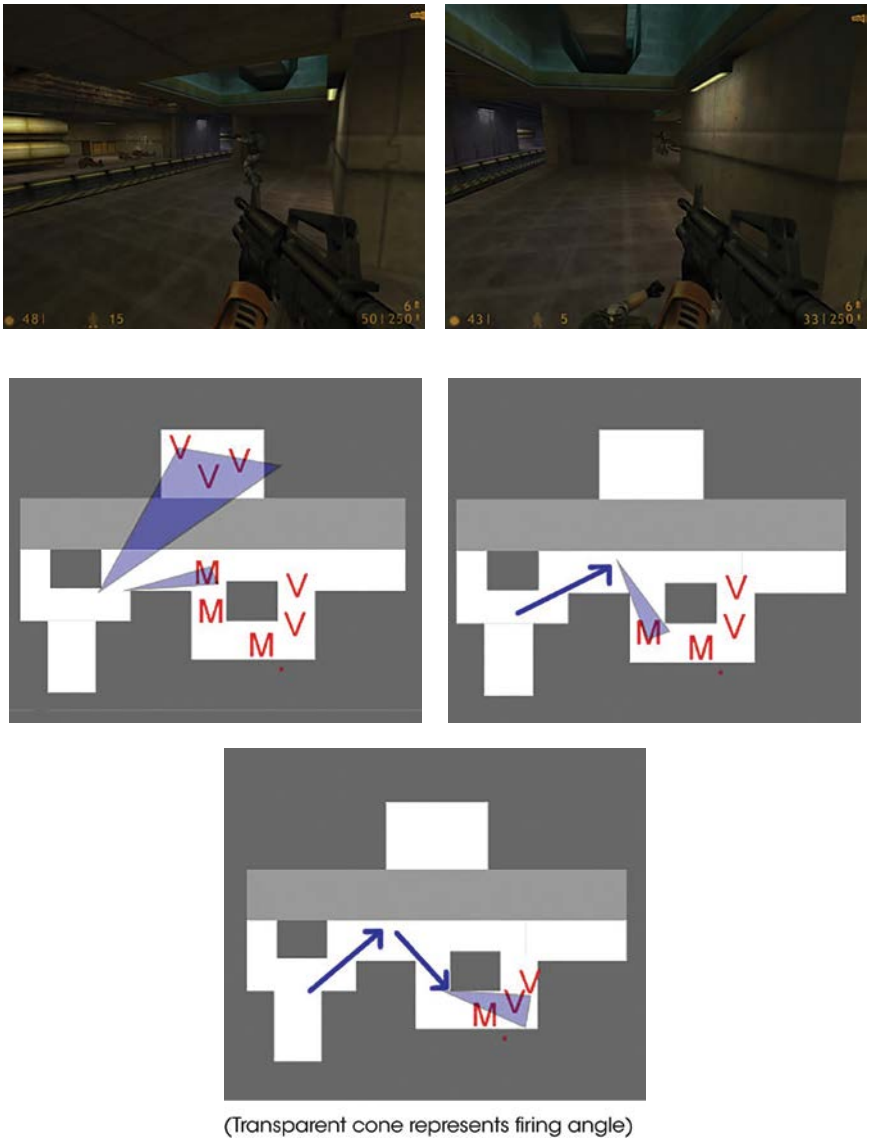
Looking at the overall map flow shows us something familiar here, though: the same kind of forward-and-across motion that we saw in the last set piece. Really, this can be seen as an evolution of that previous set piece, in terms of space.




What was once a quick motion across a chokepoint is now a larger motion across an open corridor with accessory spaces attached. The player has to create the chokepoint by luring the enemies into the apertures of the accessory spaces. That's a qualitative evolution for sure, although it also has a corresponding drop in the number of enemies to offset the increased complexity.

### Set Piece 8-3: Zag

This set piece features a fairly obvious evolution: there are two different pathways occupied by groups of enemies, and they intersect. Like set piece 8-2, there's more than one way to go about dissecting the groups; the player can loop up around to knock out the distant Vortigaunts, or can lure the marines beyond into a three-way firefight, although starting such a fight is actually much harder than it sounds.




(Transparent cone represents firing angle)

No matter how the player disposes of the first two groups, the third group in the back/right is best engaged from the jutting corners in the hallway. These corners are actually a bit shallower than in the previous set pieces, which is a kind of expansion challenge (the "expansion by contraction"). The contraction of cover is a form of quantitative change in an already-established design idea that makes this set piece harder than its parent; thus, it's an expansion. Like in the last set piece, though, there aren't too many enemies, so it's not a huge problem.

Once the player has neutralized the group of Vortigaunts on the left, it's a fairly straightforward fight.

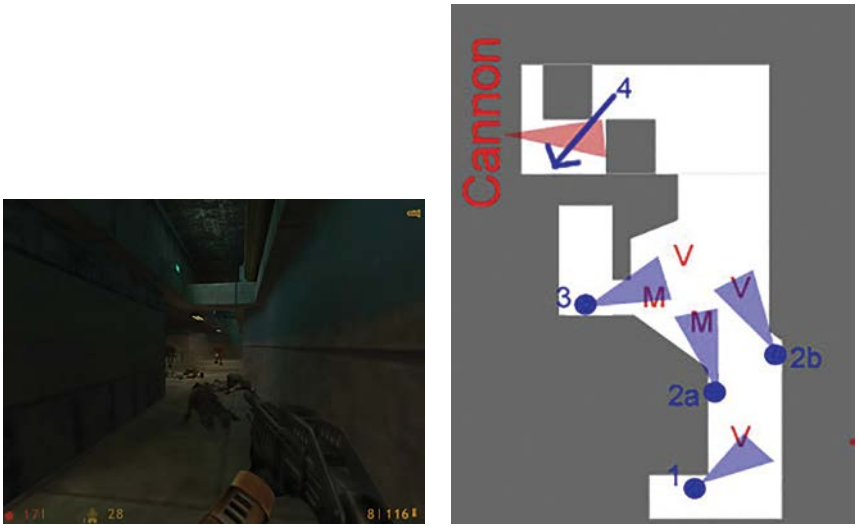
### Set Piece 8-4: Three Sentries

Whether the player has the foresight to get off the cart before hitting the end or not, this set piece starts off with a difficult angle; the three marines have a height and numbers advantage in addition to their possible surprise advantage. Hiding behind the cart works somewhat well. Running into the tunnel to the right will actually put Freeman in a new set piece, which vastly increases the overall danger, and so is not really an option.

Players who are quickly shredded by the overlapping fire zones of the marines may try to stop the cart and approach on foot. The angle on the marines at the beginning is still quite tricky; there's no jutting wall to protect Freeman, and the three marines will always aggro at the same time. Moreover, the elevation of the platform where those marines are standing makes it very hard to find a good angle of fire, as the enemies have an increased ability to fire from their advantageous height. The only advantage the player has is that there's only one stairway, and the three marines will sometimes stack themselves up if the player hides in the tunnel after aggro. This is similar to the earlier accessory-space trick, although the player may well have to spend a few deaths and replays in order to pull it off. Although this is not objectively the most challenging set piece in this segment, it is the least transparent in terms of player strategy.

### Set Piece 8-5: Deadly Corridor

Because the previous set piece lasts long enough to be considered extended, and because it shares no aggro triggers with this set piece, I consider them separate. One could certainly make the case that set pieces 8-4 and 8-5 are one large entity, but I think the two parts of them are also different enough that studying them separately reveals more about them than studying them together. This set piece is another corridor with jutting walls that allow the player to go point-to-point again to get the angle on the marines and Vortigaunts.




(Blue circles and cones show player firing areas, while the red cone shows the cannon's area of fire.)

Each bit of alcove cover is quite shallow now, which continues the trend of expanding-by-contraction that has lasted since set piece 8-2. This expansion is reiterated on the back half of this set piece when the player has to make short dashes between boxes as a high-powered turret fires on Freeman.

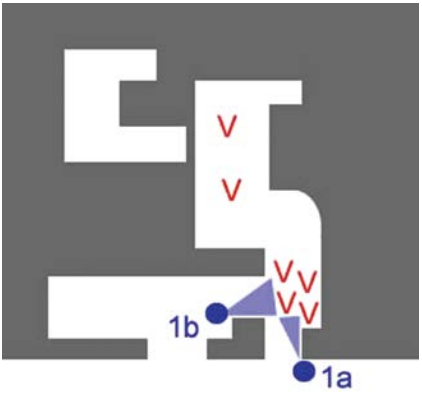
Here the damage has expanded while the alcove size stays the same. (A change in alcove sizes doesn't really matter against a stationary enemy who can't charge around that corner.) Much like the turrets of segment one, this cannon emplacement has a slight delay in firing, but it deals so much damage that unless the player is an absolute artist with grenades, Freeman is going to take substantial

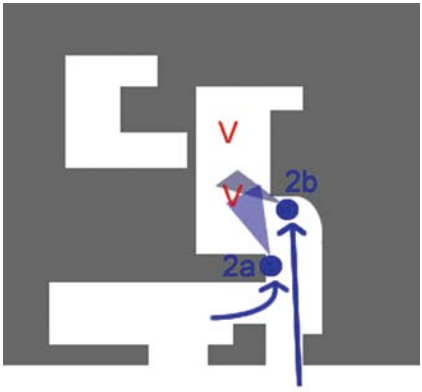
damage. By making the fastest possible dash from cover to cover to flank, though, the player can get through without having Freeman die.

### Set Piece 8-7: Rest Stop

This set piece actually offers two paths of ingress, both of which offer decent solutions for getting the cover angle which will give the player a tactical advantage. One of the paths requires moving past the line of the Vortigaunts' fire, but this is usually done while on the rail cart, whose speed minimizes Freeman's exposure.

The player can even lure the Vortigaunts around the pillar in a loop, picking the best angles at the best times.




After the first encounter with its two paths, the rest of the set piece straightens out somewhat blandly. There's another corner with some more Vortigaunts to draw into a cover trap. Still, the most interesting part of this set piece is definitely its front half, where the two different approaches give the player some room to be creative.

### Set Piece 8-8: End of the Line

The cover descriptor returns in force for this location. In this incarnation, the descriptor takes the form of a powerful cannon set directly in the path that Freeman needs to take. To some degree, the raised walkway also acts as a descriptor, shaping the player's movements, but it's the cannon that really shows the player that they can't simply walk in and shoot freely.

This set piece also does a number of other interesting things. The first thing to notice is the return of object cover—and plenty of it. This is the first set piece in a long time to provide so much of it, although all of it belongs to the enemy, unless the player can get Freeman up the ladder without dying. The second thing to notice is that the marines in this set piece is that they are scripted to only move around behind the cover. Indeed, this set piece is a total inversion of the current segment theme. The enemies are executing point-to-point cover maneuvers. Accordingly, the player has two options: the first is to engage from the aperture, ducking in and out and spending lots of ammo to destroy the crates and the marines behind them. The other option is to duck under the lip of the walkway for cover. In a sense, this is the inverse of what has been going on in this segment so far. Instead of gaining the best angle on the enemy, the player can simply negate the enemy's angle on Freeman. This gives the player a chance to use grenades to disable the heavy cannon on the right before charging into

the cover to battle the marines from a shorter distance. Both of these options are difficult and expensive (in terms of health/ammo) relative to the rest of the set pieces in Chapter 8, but they're both definitely viable strategies.

### Set Piece 8-10: Two Cannons

This appears to be an exceptionally short set piece, but because of how slowly the player has to proceed through it (or how many deaths and reloads it requires), I think it passes the "extended" criterion just fine. The player faces another gun emplacement, this time accompanied by one of the elite helmetless marines. The elite marine is more aggressive than the normal marine and uses the grenade launcher on his assault rifle fairly often, but no marine in the game is more likely to use the grenade launcher than this individual soldier.

Although both guns could easily destroy the cover available here, they won't do so. Thus, the player is free to slowly dash between pieces of cover to get the best angle, or even slowly slide some of the crates forward until Freeman is close enough to make a devastating attack of his own. Either way, the cannon emplacement is difficult to damage and both it and the elite marine are very deadly, and so this set piece takes much longer than it looks like it should. For all this difficulty, however, it serves as a good final challenge to the point-to-point cover segment.

## Segment Four: Deceptions

This segment, although short, does a good job of preparing the player for the climax of the cover theme that comes in Chapters 11 through 13. One of the lessons we learned in *Reverse Design: Super Mario World* is that one of the most important things a tutorial can do is to condition the player to accurately sense danger. In any action genre, novice players can overreact to new stimuli and unnecessarily put themselves in even more danger. A good tutorial will condition

the player to sense danger and take action appropriately, which is the first thing a player needs to be able to do in order to succeed at and enjoy a game. *Half-Life* does a fine job of this in its early stages and first cover segment, teaching the player about the speed and behavior of enemies as well as teaching cover discipline. The point of this segment, on the other hand, is to refine that cover discipline—to take it to a more nuanced level.

Before this segment, the player was mostly safe to wait in cover. In the previous segment, the player had to cross dangerous open spaces to get to cover, but it was fairly clear where the safe places were. In this segment, cover is still a safe place, it's just that what the player thinks will be cover isn't always actually cover. Take the first set piece from the segment as an example: this cage looks safe, but it's actually going to drop into the water where an Ichythyosaur is waiting.

As it turns out, the cage isn't what the player was expecting in terms of cover. There's another plunge in set piece 9-2, in which an apparently safe box-top is not a platform but in fact cover from the two Vortigaunts that teleport in.

The player ends up in a cover-based set piece totally by surprise and has to figure out what to do with that cover once already there. Set piece 9-5, meanwhile, is not built upon total surprise as much as it is upon misdirection. The freezer's global damage effect makes it obvious that the player has to get through this set piece quickly.

Again, there's plenty of cover; it's just that the set piece deceives the player about its use. This trend ultimately culminates in the introduction of the black-ops assassin in set piece 9-7. Here, the high mobility of this new enemy makes it difficult to know what is and isn't cover.

There's plenty of excellent cover everywhere in this set piece, but it's quite hard to determine which parts of it are useful because the enemies here follow unusual behavior patterns and move frequently.

The goal of all these deceptions is to cause the player to think more critically about the use of cover—to think a step further into the future about cover and the disposition of enemies. In segment one, the player saw the cover descriptor

and followed it to the relevant cover, from which point Freeman could fire at the enemies in relative safety. Segment three introduced significant amounts of movement between described covers. This set piece gets the player to keep thinking after entering cover, and it does so by giving the player plenty of cover but then subverting its typical use. This is all to prepare the player for the climax of the cover theme (temporary cover and multi-front combat), in which the player will always have to stay on the lookout for the next piece of cover and the next tactical move.

### Set Piece 9-1: Ichythyosaur

This set piece offers a simple but effective deception. Coming upon the crossbow, the player will naturally expect to enter the cage and use the crossbow to fire safely down at the Ichythyosaur below. The setup seems like an obvious way to introduce a new weapon and offers the ultimate cover: the enemy can't even reach Freeman where he stands in the cage.

The cage plunges into the water, forcing the player to make a quick decision (which is the point of this segment). Does the player use the cage to shoot the Ichythyosaur to death quickly, or does the player try to get back to the surface before fighting? The cage is still effective cover, and it's actually easier to aim at the giant creature from beneath the water. Either way, the decision has to be quick and calculated. The only real problem with this set piece is that it's impossible to tell how much HP the Ichythyosaur has, and how many shots will bring it down. For players opting to use the underwater cover, this is a confounding element that simply doesn't need to be there. In other circumstances, the unknown HP would not be a problem, but underwater, it's just an unfair design decision.

### Set Piece 9-2: A Baited Trap

The deception in this set piece is small but central. The center box looks like a great shortcut across a room full of barnacles. Instead of wasting ammo killing barnacles, the player can actually gain ammo by jumping onto the crate.

Making this jump, however, will cause the crate to collapse and two Vortigaunts to teleport in, blocking both exits. The box also obscures the player's view, but it doesn't hide the sound of those two Vortigaunts warping in. Just like the Headcrabs blocking the side-paths in the next set piece, this is a type of deception. There isn't much real danger here because the two Vortigaunts don't have great firing angles on the whole room.

It's easy enough to use the walkway or remains of the box to shield Freeman from fire. The thing the player doesn't want to do is panic and start firing blindly or run into one of the barnacle tentacles while fleeing. As long as the player doesn't buy into the deception, the set piece is easy, which is the whole point.

### Set Piece 9-5: Frostbite

This set piece brings back the forced haste of set piece 9-1, but this time around that haste takes a form that resembles this game's *Quake* heritage. Rarely does the player have to truly "run and gun" in *Half-Life* as one would in *Doom* or *Quake*. Extensive cover, accessory spaces, laser trip-mines, and enemy infighting are all alternatives to the kind of hasty strafing that made sense in earlier FPS games. *Half-Life* is a more methodical game. This set piece takes that away by having an ambient damage condition; Freeman will take damage from the extreme cold of the freezer.

The ambient "cold damage" acts as the cover descriptor. Before this set piece, the best way to engage a Vortigaunt is to hide until it fires, then take advantage of its cooldown period, but there isn't time for that. The player will naturally try to run around the enemies instead, using the pillars as cover. This is where the Headcrabs come in, as they block the near-side alley behind the cover. They don't do much damage, but they're not supposed to. Just like in set piece 5-1, the purpose of the Headcrabs is to cause the player to panic. This is a simple and brief (but incredibly effective) deception that shakes up what the player has learned about cover up to this point in the game.

The only problem I have with this set piece is that this wonderful inversion of the typical uses for cover isn't developed more fully. It would have been nice to see a few more set pieces that involved a global damage constraint which forced the player to use typical cover in non-typical ways. Later on in Chapter 17, this problem emerges again when there are two set pieces with incredible potential that never see any development at all. There is no perfect game, however, and the biggest imperfection in most games is that they could have done more with the designers' best ideas. This is one of those cases.

### Set Piece 9-6: Caterpillar Hallway

This is a short set piece, but one that advances the use of cover in a startlingly clear way. The setup seems simple at first; there are two Vortigaunts at the end of a hallway, and the cover is so clearly designed that it describes its own use.

The player can easily close the gap between Freeman and the Vortigaunts by ducking into any of the several niches that line the hallway. This is where the deception comes in. After the first two Vortigaunts are dead, two more will teleport in. One of them will be in front of Freeman and present little or no challenge, but the other Vortigaunt is directly behind him.

As was the case in the previous set piece, this trick is designed to make the player panic. The cover works exactly the same way for the last two Vortigaunts as it does for the first two—that's the beauty of all that segmented cover. The player merely has to duck into cover to evade shots from two angles rather than one, which will become the norm in segment six. The linear structure of the hallway and heaps of cover (and absence of alien grunts) keep it from being quite as difficult as those later set pieces.

### Set Piece 9-7: Devil's Playground

This set piece combines the primary design idea of segment three (cover-to-cover dashes in large areas) with the deception aspects of segment four.

The black ops assassins here are unlike anything the player has seen, and their behavior includes an important deception. Most enemies in the game charge at Freeman or stay stationary to fire at him. The black ops assassin is highly mobile, but also flees from Freeman whenever he gets close, making spectacular flips between different heights in the terrain. It's this fleeing behavior that accounts for the central deception of the set piece. The high mobility and slender frame of the black ops assassins makes them hard to hit at range. Charging up onto the

elevated area ought to pin them down for easier fire, but the ability of the assassins to simply jump away means that all the health the player sacrificed while charging in was wasted, negating that strategy.

The evasiveness of the assassins makes the set piece and all the cover it provides considerably more interesting. This set piece might actually have the most cover of any in the game, in terms of the number of objects, with at least 25 pieces of individual cover, depending on how you count certain containing walls. The amount of cover is especially curious considering that the map is organized into a slightly irregular grid—it's almost laid out like a modern city.



What tends to happen is that the player will sight and fire on one assassin, that assassin will evade, and one of the other two assassins will do twenty points of damage or so to Freeman. How is the player supposed to manage this set piece without having to merely fire grenades and bullets everywhere? The answer lies in the lessons of the first two segments. The lesson of segment one is to find the right cover to survive by using a descriptor. This set piece has a descriptor—it's the sniper shot that kills the guard. The long range of the assassins' weapons, and their hiding behavior are demonstrated by this shot, telling the player that Freeman should definitely be hiding behind something tall and solid rather than charging. The lesson of the second and third segments is to not merely hide, but to use cover and level architecture to dictate the terms of an engagement. In this set piece, the mobility, range, and peculiar behavior of the assassins make it much more complicated than merely picking one or two angles. The player has to steer Freeman from cover to cover every few seconds as the assassins change their angles. This is why there's so much cover, and why it's organized in such an orderly way; the player doesn't have time to worry about running into a surprise wall. The player's concentration is taken up entirely with hunting the assassins around every corner, making sure to change angles all the time and never being cornered.

## Interlude: Irregular Set Pieces

In Chapters 11 and 12 there are a few set pieces that don't fit a larger pattern in the design segments. When the designers were creating *Half-Life*, they probably did not intentionally create design themes and segments; these things evolved naturally. Some set pieces felt "right" when placed next to other set pieces, or the designers saw obvious connections between a few of them. Moreover, I doubt very much that all the set pieces were created in order; that would belie many of the things we know about set piece production. Even teams with exceptional communication, time and creative freedom (like the Valve staff had) would be hard-pressed to plan everything in their game out before making set pieces. Thus, thematically extraneous set pieces appear, and we have to account for them.

### Set Piece 11-3: B-Teams

This set piece punctuates the otherwise arena-oriented Chapter 11 with an expansion/evolution of set pieces 4-3 and 8-2. Accessory spaces are back, and they're more numerous and more robust. The laser "puzzle" which follows this set piece provides cover for the many wandering enemies in these hallways.

One of the interesting things about this set piece is its high variability. It's almost like an arena dynamic except that there's so much cover everywhere. The infighting between Bullsquids and marines which roam the halls can have very different results from encounter to encounter and varies especially between difficulty levels. That said, it doesn't really matter who or what Freeman is facing; the same accessory-space strategy applies if the player is looking to avoid damage. The cover in each of the office alcoves makes up for the fact that the apertures are wider than in either of this set piece's ancestors. The width of the apertures can be problematic, though, if Freeman is on the outside of a room facing an enemy within it, although this isn't as common as the reverse.

## Set Piece 12-2: Chopper One

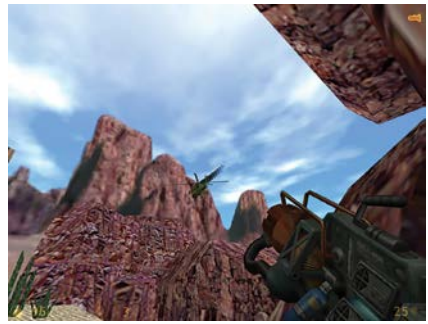
This set piece seems like it almost might belong in the arena theme, but I don't include it there because it doesn't operate like an arena set piece. At first it seems like there's no cover, and there's definitely not the typical *Half-Life* kind of cover. The only thing that qualifies as cover is the large wall that can be used to obscure the distant gun emplacement.

That bit of wall cover is completely essential, however, and very useful. The player can easily be shredded by the combined firepower of the gun and the helicopter, but with the wall allowing for some pop-and-shoot play against the gun while obscuring half of the helicopter's flight pattern, it's much easier. This is the kind of "cover" we might have seen in *Doom*, and it serves the same purpose. Replace the heavy gun and marines with some type of techno-demon, and this set piece might fit in an older game.

The only other thing worth mentioning here is that this set piece suffers especially from the big flaw in *Half-Life* bosses: the feedback when attacking the helicopter is unclear. The player has a hard time knowing how many hits the helicopter will take before dying. There's sometimes no clear indication that the helicopter is even taking damage when it's hit—a thin trail of smoke is the only sign the chopper is nearly dead, and it's often hard to see at a distance. There's no reason for these feedback mechanisms to be unclear; even a few clear sound files and texture changes indicating hits and progressive damage would have been easy to implement to great effect. These things do exist in *Half-Life*, but they're often (as is the case here) too subtle to notice during a firefight.

## Set Piece 12-3: Chopper Two

A direct evolution of the previous set piece, this encounter is much more in line with the kind of cover-based combat seen in the rest of *Half-Life*. The player has to face off against a helicopter, but with the advantage of cover.



Technically, the addition of a new element makes this set piece an evolution of the previous one, but you can see how the cadence structure doesn't apply perfectly to *Half-Life* here. This set piece adds cover more significant than just a wall, which actually makes the child challenge easier than its parent, which is very rare. There is a more typical evolution/expansion here, though: the helicopter's behavior becomes more targeted and aggressive. Instead of merely soaring around in large loops—with only a few seconds of attack per loop—this helicopter fires quite frequently and for longer periods of time, making the cover necessary. Still, this is an easier fight for inexperienced players because they've been trained to use cover, and this set piece provides it.

## Segment Five: Temporary Cover

This segment complicates the player's relationship with cover by forcing the player to move out it on a frequent basis. Each set piece in this segment (from 12-1 to 12-7) forces the player to move from cover to cover rapidly, without an extended period of safe pop-and-shoot gameplay to which the player became accustomed in previous segments. The primary driver for this movement is the enemies' increased reliance on explosive weapons. It's strange to think of explosives as being elegant, but in the context of *Half-Life's* game design, they are. I want to take a moment to define what I mean by elegance in game design. A game's design is elegant if it:

1. Continually increases in complexity and challenge.
2. Doesn't add too many new game mechanics (which would result in "qualitative wildness").
3. Doesn't simply pushing the quantitative difficulty (i.e. simply adding more marines, increasing the damage of bullets, etc.—this results in "quantitative brute force").

This segment of *Half-Life* adheres to these principles well. There are not really any new mechanics; although the player has new weapons to play with (like the tau cannon) these weapons only differ very slightly from the earlier loadout.

Jumping, climbing, running, and ducking are all the same as they ever were. The quantitative aspects of this segment are mostly in line with the rest of the game. The average number of enemies per set piece is not markedly higher than the average from other set pieces. Bullets do not do more damage now than they did before. The only really "new" thing is the several armored vehicles which appear now. They have more HP and do more damage per hit than most enemies, but there is only ever one of them in a set piece. The armored vehicles and their explosive rounds can shred cover, making movement necessary in a hurry, as in set piece 12-7. Similarly, the marines in this segment seem a lot more willing to use grenades, and they also seem to have more of them. Without ceilings or hard corners to stop them, these grenades can land inside cover, meaning that Freeman has to flee when those grenades land, as in 12-6.

There are several reasons why the sudden emphasis on explosive weapons is still elegant. First, explosives have been a part of the game from the very beginning; they player understands them and has lots of experience dealing with enemies who use them. Even though there are more explosives in play now, they are far from being a new mechanic. Although they do more damage than average rounds, it's not a case of numerical brute force because both the tank turrets and grenades are much slower and easier to evade than gunfire. Indeed, it is the act of evading these explosives which makes the cover in this set piece temporary. Although the player is confronted with an enhanced challenge, that challenge is mostly made up of elements already in the game that are cleverly reiterated. That is elegance in game design, and that is why this segment (across Chapters 12 and 13) is probably the best part of *Half-Life*.

### Set Piece 12-1: Warm Welcome

The new segment begins with a clear indication of what's in store for the player in Chapter 12. The layout of the set piece has some familiar elements configured in a new way. The best way to understand it is by looking at a layout of the action because everything in this set piece happens quickly.

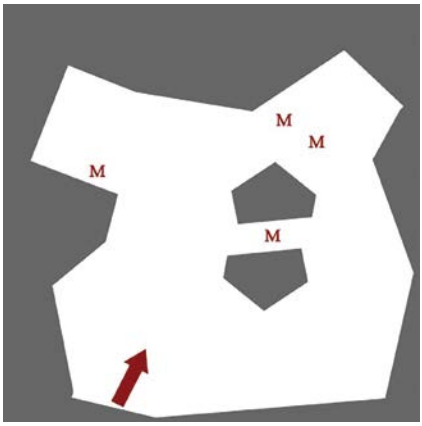
All of the marines are running for the cover in the middle of the area, running toward one of the oldest cover descriptors: explosive barrels. The barrels are on both sides of the sandbag wall, meaning that some of them must be destroyed if the wall is to be usable as cover. This makes either of the retreating marines on the right or left an attractive target; simply time the detonation of the barrels to match their retreat. This frees up a section of wall to be used in defeating the other two marines in the back. Interestingly, because of the other set of explosive barrels, the last marines can also be blown up.

Why are there so many explosive barrels? One of the defining aspects of this segment and chapter is the increase in enemy firepower.


Helicopters, tanks, and large numbers of marines (who use grenades more frequently than in earlier chapters) make it so the player can't sit as safely in cover, nor for long. This set piece is no exception; the marines here, especially the elite one, will launch grenades at Freeman if he stops moving for too long. The explosive barrels are in place to show the player how quickly this segment's set pieces operate. Either the player blows up the enemies, or they blow him up. Cover in this segment is only meant to last for a few seconds. In that regard, the explosives describe the action of both the set piece and the whole segment.

### Set Piece 12-4: Alert

This set piece is built on the same design idea as 12-1, but it's a more subtle and complex implementation. The placement of enemies in this set piece and their aggro radii are configured so that Freeman walks into a trap no matter how he approaches. The marines are all on one side, so the set piece hasn't become a case of fighting while completely surrounded, but it's still a situation that will require careful, tactical movements.




On approach, none of the marines are visible at all. In fact, it doesn't even look like there might be hiding places, so the player's clearest path forward is in between the boulder and the left-hand wall. The impetus for changing cover in this set piece is that the marines can and will move to flank Freeman, and the structure and size of the set piece make that fairly easy for them to do so. The trick to the battle is kicking the marine in the boulder out of his cover, and then using that cover for Freeman. This at least gives the player a chance to use the lessons of segment three and get a favorable angle of fire for a few seconds. That said, the marines don't tend to line up in convenient ways because they have so much room to move around.

There's also the issue of the helicopter overhead, if the player hasn't already defeated it in a previous set piece. The player can use the other sides of the boulder as cover, or even the edges of the cliff, but there's no "clean" spot to isolate each enemy. The player has to keep moving from cover to cover to flank the enemies before their combined fire depletes Freeman's health. The cover spots are also not nearly as obvious as they were back in the previous segments;

all those neat boxes and walls have been replaced by irregularly-shaped cliffs and boulders. The game is challenging the player in new ways, even though it's all based on old skills.

### Set Piece 12-6: Peek-a-Boo

The previous set piece presented the player with temporary cover by means of a charging/collapsing formation of marines. This set piece is, in one sense, more brutal than that. Instead of charging marines firing their assault rifles, what drives the action in this set piece is a huge abundance of explosive weapons. The most obvious problem is the tank that occupies the northeast corner of the set piece and outputs a very high level of damage. Indeed, the tank turret serves as a fairly good cover descriptor. It takes about three seconds to turn 60°, by which time the player ought to have ducked back into the cover of the tunnel system because Freeman won't survive long under its fire.

The tank's gun arm swings slowly and fires in a straight line, so while it is highly damaging, it is also fairly avoidable. The real danger is the grenades which the numerous marines can and will throw. It's not easy to see when the marines are about to throw grenades, and even harder to see the grenades in flight, which is why the movement of the tank turret works as a better cover descriptor. The marines in this set piece seem to throw grenades more quickly, more frequently, and in greater numbers than any other group of marines in the game. What's more, they're fairly accurate with them and can easily land them in whatever cover the player chooses to use. Thus, the player ought to know that every piece of cover in the set piece is temporary because it will be barraged by explosives after a few seconds of use.

The only real refuge is in the underground tunnel system that connects to the surface at four points along the perimeter. This refuge isn't technically cover because the player can't fire usefully while in it, but it does allow for a unique form of movement around what otherwise might have been an arena-style set piece. Each exit of the tunnel system offers a different tactical situation, although

all of the exits come up in the line of sight of the marines who stand along the set piece's outer wall.

Because of the attendant marines at each exit, there's no way to pop up without taking fire and then grenades. The only thing the player can do is pop out and kill enemies quickly from any of the three exits that are in the tank's field of fire. Magnum rounds, assault rifle grenades, or bursts from the tau cannon will all do nicely to accomplish this, and the set piece could proceed quite interestingly as the player moves from temporary cover to temporary cover.

There is a problem with this set piece, though, which obviates what might have been an interesting game of machine gun peek-a-boo. The exit behind the tank has inadvertent advantages that relate to enemy AI programming rather than the structure of the level design. Above, we saw that the back exit does lie in the field of the fire of a marine, so climbing out of the tunnel is the same. Following this, one more marine will also aggro based on the sounds coming from the first gun battle.

Some of the marines in the area ahead of the tank turret are not configured to aggro when Freeman appears behind the tank, even when firing his weapon. At every other location, every single marine (except the one in the back) will aggro.

*Half-Life*, as a whole, doesn't tend to focus on "detective work" approaches to set pieces the way *Goldeneye* or *Deus Ex* do. There is sometimes a choice in how to approach a set piece, like in Chapter 8 when the player can pick which faction to attack first. Normally, though, that choice doesn't revolve around when or how enemies will detect him—especially not in large, open setups such as this one. It seems that the relative security of the area behind the tank might be a mistake, based on what we see in the design. Several marines will charge back there to take Freeman on, and they can definitely kill him. The one back area, however, is significantly easier to get out of safely than any other exit from the sewers. The result of this safe zone is that the player can aggro the remaining marines in a piecemeal fashion and turn the back area into a kind of accessory space like the ones in Chapters 4 and 8. The small aperture created by the tank works perfectly as a place to isolate one or two charging soldiers at a time. The marines are a little less likely to lob grenades in the back area than they are in the front, although they will still throw them.While exploiting this exit may not have been what the designers intended, it's a good example of how a cleverly designed encounter can go wrong when one or two variables are forgotten.

### Set Piece 12-7: In and Out

After the last two long and grueling set pieces, this one is a nice change of pace, and it keeps with the theme of temporary cover well. The APC at the end of the passage dominates this set piece, firing rockets at Freeman even when he is behind cover. All of the cover in the immediate area is destructible, and the rockets will break it in one or two shots.

Some of the cover is even explosive, augmenting the destructive power of the APC's rockets. It's obvious to the player that what cover exists here is only meant to absorb one or two shots before Freeman has to move on. In the previous two set pieces, the player had access to rocket ammunition. If the player has any of that remaining, he or she can blast the APC at a distance. This is no easy task; the player has not had much enforced practice with the rocket launcher and has never faced return rocket fire. Steering the player's rockets toward a small target

is a moderately difficult task and dodging the enemy's rockets is also a moderately difficult task. Doing those two things together, however, is a lot more challenging, especially at the range this set piece demands. Naturally, it makes sense for players to have another option.

The player does have, on the far right, an exit to an area that is sheltered from the rocket attack. Below a fairly small aperture there are two marines who primarily attack with assault rifles from a lowered position. They are easily dispatched, but what they guard is a large munitions dump which provides explosive ammo. The grenades, satchel charges, and ammunition from this dump give the player a variety of ways to destroy the APC without having to use rockets, which can be difficult since the player has so little exposure to them and not much ammo. Once the player is in cover at close range to the APC, the set piece isn't that hard. Really, the point of this set piece was to punctuate the long, grueling set pieces all around it with a shorter encounter that still maintains the theme of temporary cover.

### Set Piece 12-9: Call in the Cavalry

This set piece is a mutation of 12-7, featuring another armored vehicle parked at a distance that will blast Freeman with explosive rounds. This time, though, there are also two marines as well, one of which is an elite. The previous set piece also had two marines, but they were totally separate from the tank. Here, the marines will emerge alongside the tank and charge Freeman's position, often pinning him against the wall in pursuit.

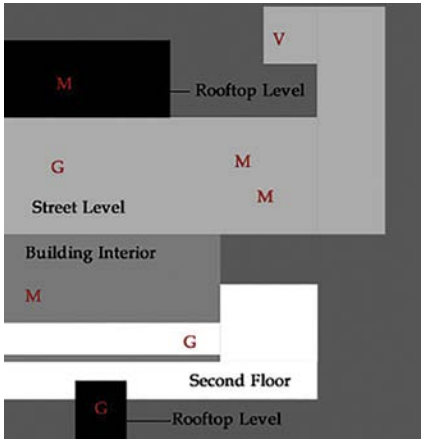

What makes this set piece more of a mutation than an evolution is the permanence of the cover. The corner behind which Freeman can stand isn't destructible, and it isn't subject to irresistible bombardment. This set piece is neutral in difficulty compared to the previous set piece, while still being a close relative of it. That close relation, and the stark contrast it presents, is the reason why I include this set piece

in the temporary cover segment, even though it doesn't involve temporary cover. The contrast is useful.

There is a second part to this set piece which doesn't bear classification well. Below a certain HP threshold, the marine will run from the set piece to alert two other marines who are located inside the building around which the set piece takes place. Those marines will become alerted (although they won't rush out into the set piece proper) and will kill a guard who opens a bonus room full of ammo. It's easy enough to prevent any of these soldiers from closing off the bonus room—if the player knows about it in advance. If the player had some idea of what was at stake and what he or she was supposed to do, then this would have been a good example of an optional (bonus) challenge to the set piece. Without knowing what the marine is doing, where he is going, or what's at stake a lot of the thrill of getting that bonus room is lost.

### Set Piece 12-13: Nooks and Crannies

This set piece begins a transition between segments five and six. Starting with the wall that explodes, the player is faced with a (relatively minor) threat from an unexpected angle. The exploding wall is more or less the same as everything in this segment; it simply ceases to be useful as cover. The rest of the set piece is a little more confusing.




When the alien grunt in the room on the other side of the wall shifts its aggro from the marines to Freeman, the player can no longer use that room to snipe the battle below, but rather has to fight through the unusually small aperture those two rooms share. Finally, the last grunt has to be neutralized from the cover across the yard.

Again, this isn't quite the temporary cover that this segment normally puts forward, but it doesn't quite reach the 360-degree threat of many of the set pieces in the next segment. The small apertures through which the grunts fire and the elevated starting position of Freeman give the player too much of an advantage to consider this part of the next segment. Moreover, the fighting between the marines and the aliens means that the player might have multiple areas of danger to deal with, but often the enemies will be distracted enough that the player can ignore one or other quadrant of the battlefield for a moment.

## Segment Six: Multi-Front Combat

As the last full segment of the cover theme, this segment focuses on situations in which Freeman is surrounded by enemies and has to fight (or evade) on multiple fronts at the same time. Although there have been several set pieces in earlier segments during which the player could accidentally wind up in the middle of a large firefight, this segment forces the player into those situations. The goal of this segment is to evolve the player's cover discipline into its highest form. The previous segment forced Freeman to move from one piece of cover to another quickly, to avoid being blown up. Usually, though, each piece of cover in the previous segment had clear safe/dangerous sides, even if they were only temporarily safe. Even 12-6, in which the player might have to move between pieces of cover a dozen times, at least put a wall behind Freeman's back and the enemy in front of him most of the time. That's going to change in this segment, and it's mostly going to be a product of teleporting enemies.

There have been plenty of examples of enemies teleporting in before this segment, but up until now those teleports mostly happened in front of Freeman or on his flank. In most of the set pieces in this segment, there's going to be at least one dangerous enemy teleporting in directly behind Freeman. What's more, this teleport almost always occurs after the firefight has started. Set piece 13-1 even uses a time-delayed script to surprise the player twice with teleporting Vortigaunts to the rear of the battle. Beyond even that, most of these teleports either come

in groups or warp in a grunt right on top of Freeman's covered position. Earlier teleports, featuring a stray Vortigaunt or Headcrab, tested the player's ability to stay calm and get off a quick shot before the teleporting enemy could aim and fire. The numbers and toughness of the enemies in this segment make that impossible. Grunts have a habit of not chasing Freeman, but when they teleport in either on top of him or behind him, they're a lot more dangerous. Both of those things happen in this segment, and so it's very important for the player to find cover where they can.

This segment is still a part of the cover theme, and cover plays a very important role in it. Much like the previous segment, though, the player rarely gets a chance to be stationary in cover and fire at leisure because there are enemies at several different angles around Freeman. This segment, however, does not reward the kind of haste that the previous segment did. In set pieces 12-1, 12-6, and 12-7, the player had to rush from cover to cover as explosives and other high-damage munitions rained on (and destroyed) that cover. Here, the player has to be quick, but also must maintain extremely tight cover discipline around corners. In set pieces 13-1 through 14-2, rushing around a corner can get Freeman shot to bits very quickly. Thus, the secret to this segment is to maintain the tightest possible cover discipline by using every advantageous angle of every small piece of cover or architecture. This is the evolution of cover discipline that the designers are building for: greater precision, patience, and analytical thinking built on top of the speed that the last segment cultivated.

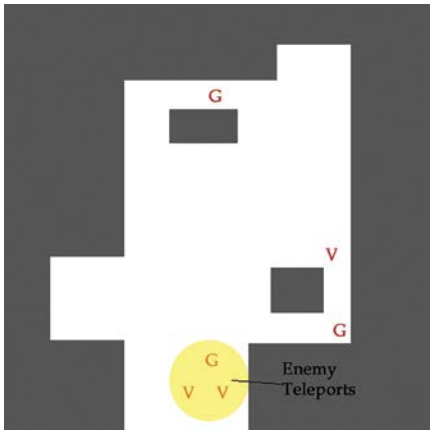
## Set Piece 13-1: Camping Out

This set piece challenges the player with a variety of surprises, but also does a few things to let the player know the kinds of challenges he or she is going to see going forward. Aside from teleporting enemies in directly behind Freeman, there are two key features in this set piece that make it even more deceptive. The most obvious is the architecture of the level.

There are already two grunts and a Vortigaunt in place, but none are visible. Of course, any room like this should look suspicious to the player who has made it this far in the game, but that's where the other part of the deception comes in. There's a guard who will usually follow Freeman up to the encounter. His presence

may not affect every player's approach to the set piece, but in most of the previous escort segments, the player didn't actually bring guards into set pieces at all, so his presence here serves to lower the player's sense of threat a little bit. This is especially true because the guard stands behind Freeman, and so the player is more likely to imagine that even if there are enemies ahead, there are not going to be enemies behind.

The truth of the set piece is that there are enemies in front and behind, and the guard's presence means nothing. Aside from the imposing fact of the two grunts hiding in this set piece, there's another grunt that is going to teleport into the set piece's starting space, along with two Vortigaunts.




Good cover discipline can reduce the number of enemies that Freeman has to face at once. The enemies behind each piece of cover are effectively in isolation as long as the player maintains a good isolating angle. This strategy only mitigates the difficulty a little bit, though because every grunt and Vortigaunt can deal significant damage to Freeman before dying. Note the placement of the right-hand grunt and Vortigaunt, too: they're not both behind the crates.

Instead, they're positioned to push a panicking player back out into the sights of the enemies who have just teleported in. Even if the player doesn't panic, crossing the room to take a different angle on the rearmost grunt will place Freeman in the field of fire of the enemies which have teleported in.

This set piece isn't all cruel surprises, though; once the player is able to understand where all the enemies are, the cover is actually quite good. Both objects in the middle of the room are tall, wide and durable. The grunt and Vortigaunts that teleported in behind will not usually charge, so it's easy to use the middle boxes to snipe them. The cover play in this last part of the engagement is fairly orthodox, but the player has to do everything exactly right in order to earn that cover. There's one last surprise though, in the final Vortigaunt who teleports in on a time delay after the other teleporting enemies are defeated. That one Vortigaunt isn't a huge threat; it's just the developer's way of communicating how unpredictable the upcoming teleport-oriented set pieces are going to be.

As a last note, I want to point out that there is a secret option in this set piece. At the back of the set piece where the teleports happen, there is also a switch to activate a turret.

The problem with this is that the player has to activate this in advance of the whole set piece and then dash through the turret's field of fire in order to gain any benefit from it. First-time players aren't going to figure out how to use this turret until several deaths and reattempts in this set piece, if at all, but it is a nice bonus for veterans coming through the set piece on a higher difficulty.

### Set Piece 13-2: Rear Assault

This set piece, one of the few optional set pieces in the game, is an evolution of 13-1. The big change is that some of the cover is now destructible, so the player has to be careful with what kind of weapons Freeman uses.

The cover is also a little narrower, meaning that the seeking bullets from the enemy weapons will be able to get to Freeman unless the player maintains very tight cover discipline. The final grunt will teleport in behind Freeman once the first two are dead, forcing him around the cover, and turning this into another surrounded fight. The placement of that final grunt is deadly, as it has a great vantage to shoot unaware players. As long as the player doesn't destroy the boxes during the confrontation with the first two grunts, however, the cover should be more than enough to deal with a single grunt. That involves a kind of prescience the game hasn't really been teaching. With so much cover being destroyed in the previous set pieces, it's a little unfair that the designers are asking the player not to destroy cover here.

### Set Piece 13-3: Rock Hole

This set piece recalls the design idea that began in set piece 12-6 (armored vehicles with powerful turrets) and deals with it for the last time. Whereas that set piece was about temporary cover, this set piece has cover that's a little more durable and defensible. Here the player emerges to see another armored vehicle with a powerful gun turret blocking the way forward. There are also a couple of marines to the side.

The marines have a habit of not coming through the chokepoint in between the two boulders, but instead coming around the back side of the boulder farthest from the tank. Back in those other set pieces, this would put Freeman on the move. The tank turret will kill everything beyond the two boulders, however, and so the cover discipline here is a little finer than those earlier set pieces. All in all, the emphasis on control instead of speed here means that this plays a little more like the segment it's in (multi-front combat) than the earlier versions which were clearly about temporary cover. The player has to defeat those marines first in order to get the time and proper angle to take on the tank looming behind the cover.

### Set Piece 13-5: T-Junction

This set piece is laid out simply, and in its simplicity, it's a great example of elegant design. The whole set piece is a T-junction of hallways that would not be out of place in *Wolfenstein 3D*. The interesting part of the set piece is the enemy complement and their positions. There are grunts on either end of the hallway and the rare alien turret appears as well. There is a cover descriptor too: the collapsing wall.

The collapsing wall forces the player to back up behind into the connecting hallway; doing so will obscure the grunts and the turret. Ducking back into the connecting hallway—out of sight of the enemies—will remind the player that grunts don't always charge like marines do. Thus, the set piece has to be played by ducking in and out of the grunts' lines of fire multiple times. Several things make this play more interesting than typical pop-in/pop-out cover mechanics. The first is that having enemies on both ends means that there's still a fight on two fronts. The second is that the grunts only fire homing rounds, meaning that Freeman can't just hide behind the very edge of a corner, or else the homing rounds will find him. The player has to duck Freeman far back into the connecting hallway in order to dodge those homing shots.

The player must also perform significantly more of these pop-out maneuvers than in earlier set pieces because the grunts have more HP than marines do. Finally, the alien turret puts out a huge amount of damage, so every pop-out maneuver carries a greater-than-normal amount of risk.

It's easy, when designing levels, to focus too much on convoluted setups in order to achieve fresh and increasing challenges. This set piece avoids that nicely. With very simple level architecture, the designers were able to create several minutes of high-tension content. That content fits within the theme of multi-front/surrounded combat and involves the same enemies used elsewhere in that theme. The only thing unusual about the set piece is the one alien turret, which makes a rare appearance here, although a very important one. The turret's high damage output holds the entire set piece together by preventing the player from storming out into the open.

### Set Piece 14-1: Get in There!

This set piece pits Freeman against a bunch of Headcrabs and a Buillsquid among a small maze of crates. This set piece is much easier than the previous set pieces in this theme, which serves two purposes. The first purpose is to give the player a break; not every set piece can be harder than the last, or else the game will feel grueling. Even with through content punctuating the set pieces, it's still a good idea to vary the difficulty for the sake of pacing.

The more specific purpose of this setup is to prepare the player for the set piece that comes next. This set piece is a smaller, less dangerous version of the large, complicated room filled with spec-ops assassins. Hunting Headcrabs and dodging the Bullsquid through the many boxes is a fairly neutered version of the surrounded combat the player has been experiencing. It's the same type of setup, however, that the game has used throughout this segment, and it's a good way of preparing the player for what comes next.

### Set Piece 14-2: A Grove of Boxes

Although the previous set piece exists, in part, to prepare the player for this one, this set piece is definitely the child of the final set piece in Chapter 9. The spec-ops assassins return in an evolution/expansion of their appearance in that chapter. This time around the set piece is much larger and the vertical aspect is significantly more dangerous.

The first thing to notice here are the catwalks from which the enemy can fire down on Freeman no matter where he is in the set piece. One of the assassins is always located on the ground level, but more of them can climb to the catwalk level while evading.

This is still a cover set piece, however, and the player can get into some fairly secure locations from which to try and ambush an assassin. Most of the secure cover spots are along the perimeter, and there are a lot of ways to force the assassins into narrow apertures. This won't solve all of the set piece's problems, however, since the assassins are hard to hit and will run or leap away, causing the player to lay another trap. Moreover, there is at least one (assassin on the top floor (others can retreat there) that will not get trapped and must be fought at long range from the catwalks.

### Set Piece 14-3: Grunt Sandwich

This is the final iteration in the succession of three teleporting-grunt set pieces. The big evolution this time is that it's completely impossible to see the first grunt coming, as he stands just behind these doors.


After killing him, the second grunt will spawn behind Freeman, all the way at the other end of the tunnel, while a third grunt will charge in from the room Freeman just opened. The position of the teleporting grunt is another evolution, since he's almost out of the battle and can be hard to even register at first. There is cover: the player can use the narrow aperture or the object on the left side of the tunnel (facing the original direction). No matter what the player does, though, Freeman is vulnerable from one angle. A couple of things keep this set piece from being too hard. First, the grunt in the back is so far away that his seeking bullets sometimes lose their mark. Secondly, the grunt charging from the other side is at a height disadvantage. Thirdly, the triggers in this set piece don't happen that fast; the charge and teleport are not hot on the heels of the first grunt opening the door. While many new players will take considerable damage in this set piece, it doesn't turn into a shooting gallery quite as quickly as some other set pieces in this segment. This is good because the cover here is not particularly robust.

## Segment Seven: Past and Future

This segment is not really linked by a common design theme, but rather is a collection of set pieces that exist after the climax of the cover theme. The design team was not entirely out of ideas, but they may have been out of time and resources to develop them. Thus, two things happen.

1. Most of the set pieces late in the game are arena-style set pieces with a decent amount of platforming mixed in.
2. A couple of really great ideas for cover appear but are never developed.

We'll take a look at each of these things in the following set pieces, but I want to point out that any connection between them—aside from "they don't fit with the rest of the game"—is tenuous at best. Many of these set pieces (especially 17-4 and 17-5) are actually quite fascinating, however, and are still worth examining.

### Set Piece 14-4: Roaming the Halls

This set piece begins the increased simplicity of Chapter 14 sixth segment. After triggering a script by entering the Lambda Core armory, several enemies will appear at different spots in the connecting walkways of the complex. Altogether, it's very simple.

The player can use any of several apertures in the set piece because the halls and doors are narrow enough that they do provide some cover, and the enemies start far enough away that the player can actually take advantage of the cover momentarily. Fighting these scattered enemies in shallow cover is highly reminiscent of *Doom* and *W3D* and is definitely a step back for *Half-Life's* cover theme, although it's clearly not an arena. Another unusual occurrence in this set piece is that the grunt opposite the armory will charge towards Freeman. It's hard to say whether it's the distance and obstructions that cause this or whether this one grunt has an altered behavior script, but the results are the same. The player has to quickly dispatch as many enemies as possible before additional scripts kick in because

after the grunt, more Vortigaunts can appear (although the teleport scripts are not as reliable here as elsewhere).

Besides the fact that many set pieces are like this in Chapter 14, there's also the fact that the player has just obtained a gluon gun and is probably supposed to take advantage of its BFG-like power to melt the grunt in a matter of seconds. Again, though, this would be a throwback to the days of *Doom* and its many ridiculous weapons.

### Set Piece 14-7: Whack-a-Gaunt

Although it is not the first set piece to feature triggered teleports, no set piece in the game recalls the switch-triggered monster closets of *Doom* as much as this one. The set piece begins with only a few scattered Headcrabs running around and one Vortigaunt below the catwalk towards the back.

Trying to shoot the first Vortigaunt will pull Freeman in. It's quite easy to use the catwalk for cover, but passing a point on the catwalk triggers the teleportation of another Vortigaunt on the same level behind Freeman.

This forces the player to finish off the first Vortigaunt and take cover, of which there is a good bit. The machine in the middle of the room serves well as cover because the Vortigaunt on the catwalk isn't able to come down. The player can pop Freeman in and out of cover in the typical way.

The cover is more important than it initially seems because a classic monster closet situation is in order once the player hits the switch on the machine. After hitting the switch that activates the tank/generator setup for this wing of Lambda Core, two more Vortigaunts will teleport in. One of them appears virtually on top of Freeman, and there's no solving that except by shooting it as quickly as possible. This is classic *Doom/Quake*-style design.

The second Vortigaunt teleports on top of the catwalk, meaning that cover is once again available to use in the more typical "*Half-Life*" style.

### Set Piece 14-10: A Series of Unfortunate Grunts

This set piece could easily be divided into three separate set pieces and examined that way, but because the cover play is mostly the same throughout it, I consider it one set piece. Moreover, there's no other content between the beginning of this set piece and the end, suggesting a unity of action that is typical of a set piece. It

takes place in a long hallway with a bend at the end. There is one piece of object cover but several alcoves at intervals down the hallway. Upon entering, the player will be surrounded by a Vortigaunt that teleports in, and two grunts (one of which teleports in) beyond the covering crate.

The Vortigaunt teleports in fairly quickly, meaning that the player doesn't necessarily have to face a surprise multi-front-combat situation. The fight is still dangerous though, because the two grunts on the other side are close by, and their homing shots will wrap around the crate fairly easily. After this segment, all the enemies will only appear in front of Freeman. Down the hall, two more Vortigaunts and a grunt will teleport in once Freeman gets close enough.

The only real cover is the alcoves in the wall that lead to locked doors. Those alcoves are shallow and recall the end of the second segment in Chapter 8, where the player has to run station-to-station between small alcoves of cover.

The only big difference between the first part of this set piece and its predecessors in Chapter 8 is the presence of the steam vents that the player can activate as an added weapon against the enemies. The problem is that Vortigaunts and grunts don't have a strong tendency to charge at Freeman. The steam also does not do that much damage. While the steam can be useful, it's not that useful. The player

is much better off defeating the enemies with weapon fire rather than using the steam as a trap. The last part of the set piece is almost like something out of *W3D*. After the second set of enemies, the player will round a corner right into two grunts who were waiting there during the firefight.

This situation, in which the player opens a door or rounds a corner to be surprised by an enemy standing only a few feet in front of their character, is a staple of Doom and *W3D*. Why it makes an appearance in this set piece isn't clear or consistent with the rest of the game, but it is extremely effective as a surprise. After fighting the second group of enemies only a short distance away from the third, very few first-time players are going to be expecting that third group to be standing there so patiently.

### Set Pieces 17-4 and 17-5: Moving Cover & Dangerous Cover

These two set pieces, both of which are quite brief, are fantastic examples of paths that the developers could have taken with more time, but that didn't end up happening. Set piece 17-4 puts Freeman in front of an aperture through which numerous enemies come pouring out. This would be a very typical and uninteresting set piece except that the cover is moving.

At regular intervals, grunt barrels move through the set piece. The cover is moving, and it moves at a speed that means the player can temporarily use it to get a good angle or to dodge incoming fire. Moreover, the pieces of cover are fully periodic, so the interruption of the moving cover is entirely predictable. I think the designers could easily have done more with moving cover; it's an idea that could have had its own segment. Perhaps the technology didn't allow for that development, or the time constraints did not permit it. Whatever the reason, it's a fascinating idea that didn't get the development it deserved. The second set piece, 17-5 does another interesting thing with cover by making that cover dangerous. The whole point of cover is for it to protect the player, and these barrels do that, but they also place limits on what Freeman can do.

The Vortigaunts and alien overseers in the back of the room are hidden in alcoves that give them a huge firing advantage on Freeman once he crosses into their sights. The player can't get around this by using explosives as he or she normally would. Explosives turn those containers into an army of grunts that will almost instantly deplete Freeman's health with their combined firepower. This idea would probably have been harder to develop into a segment than the previous set piece, but nevertheless there are lots of ways that dangerous cover could have been turned into puzzle-style set pieces.

# 3

# The Platform Theme



## Mechanics

Before getting to the level-design developments that *Half-Life* uses, I want to talk briefly about the platforming mechanics at play in the game. Jumping and momentum are—relative to the traditional platformers this game borrows from—a little wonky in *Half-Life*. On the one hand, the conservation of momentum in *Half-Life* makes for some fairly realistic interactions (at least by 1998 standards) when making jumps with multiple vectors in 3D space or firing the tau cannon. On the other hand, most platformers are utterly unrealistic. The biggest problem with platforming in this game is that Freeman's momentum can easily carry him over the edge of his target. Mario games after 1990—even those in 3D—typically allowed Mario to stop on a proverbial dime even at maximum speed. Even *Sonic the Hedgehog* titles gave the player a totally unrealistic level of control over Sonic's momentum. The player can divert a very large amount of momentum in Sonic games in a fairly short space. *Half-Life* does not provide that level of precision in movement control; even when trying to walk precisely, players will often step farther than they want and careen off a cliff. While I would not accuse *Half-Life* of having sloppy or inconsistent controls, I would say that

anyone who is comfortable with pure platformers will have to make a significant adjustment for the platforming in this game. The difference is not game-breaking, but I can think of no compelling reason for the designers to put it in. Later, in *Half-Life 2* and *Portal*, the insistence on realistic physics makes sense because those physics permeate everything in the game. In this game, however, it seems like the developers set up momentum the way it is just for the fun of doing it and not for the fun of playing it. What's more, all of these other problems happen through a first-person camera, making every platformer action more difficult—a problem we'll see numerous times throughout this theme.

## Content

The first thing I have to explain about the content of the platformer theme is that it does not fit the definition of a set piece very well because it doesn't really have the self-containment factor. Platformer content is more like through content, but I have selected some of the longer and more intricate platformer situations for this theme because *Half-Life* does some interesting things with them. Aside from that proviso, the platform theme in *Half-Life* consists of a fairly classical development that takes place across the course of the game. By development, I mean that the game starts with a few simple ideas and elaborates upon them, mixing and matching different ideas that come out of those elaborations. By classical, I mean that the development of design ideas in *Half-Life's* platformer sections follows the overall development pattern set forth by 2D platformers of the 90s, although it does so in an abbreviated fashion because the game's focus is primarily on shooting. *Half-Life* begins with simple jumps that establish the game's platformer mechanics in Chapter 3. The complexity and length of platforming sections stays more or less flat until Chapter 10. Interestingly, Chapter 10 is almost entirely made up of platforming content, and it does more for the development of platformer content than any other chapter. In Chapter 10, there are examples of almost every kind of platform design technique that the previous *Reverse Design found in Super Mario World*. Those ideas aren't explored as thoroughly as they would be in a Mario game, but they're quite robust for a game that is primarily a shooter.

This brings me to a very important point about *Half-Life's* overall design, and platforming's place in it. *Half-Life* is a very long game for a shooter; it was long for its time and it's still among the longer shooters today. Platforming is what makes this length tenable. In the introduction to this book, I wrote about game design history and how *Half-Life* straddles the composite and set piece eras. The shift from shooter to platformer in Chapter 10 is one of the all-time greatest examples of composite design. *Half-Life* does not follow the typical pattern of composite flow; there isn't a 1:1 ratio of shooter content to platform content. In making Chapter 10 a full-on platformer level, however, the game does a great job of breaking up the shooter content so that the player can enjoy that content more.

Chapters 5 through 9 are a long series of increasingly elaborate and occasionally laborious shooter set pieces. Chapters 11 through 14 are the climax for the game's best shooter content. Chapter 10 breaks them up nicely and gives the player a nice "breather level" that makes the upcoming shooter content seem fresh and distinct. This perfectly-timed switch between genres is one of the most applicable lessons of *Half-Life*. All of the shooter elements in *Half-Life* were eventually explored more deeply by one of its descendants, but it's hard to think of any game that so perfectly swerved between genres at just the right time.

Notably absent from everything I wrote above is the content from Xen. The Xen levels feature a great deal of platforming content, but that content is just as problematic as everything else in Xen, if not more so. The biggest problem is the sudden change in physics. If sudden changes in physics were a good idea, full-time platformers would feature them frequently, but they don't. Even when there are changes in physics in a platformer, such changes are usually limited to a very small part of a level, and only a few levels at most. Because *Half-Life's* platforming was imprecise from the very beginning, the Xen jumps are even worse. We'll go over each individual set piece/series of challenges, but one overarching problem is that almost all of Xen's big jumps kill Freeman if he fails to make a jump. Earlier in the game, Freeman might take damage from failing a jump, but just as often they simply had to try again. While *Half-Life* was ahead of its time in the use of auto-saves and checkpoints, the number of quick-loads that players have to make here is still too many because of the deadly newness of the jumps in Xen.

## Early Set Pieces and Their Relationship

As we have already gone over the fact that many of the platforming sections in this game are not necessarily in line with the definition of a set piece, I'll begin by saying that the first few set pieces in the game share a very cadence-like relationship. This isn't true for the rest of the game. Beginning with set piece 3–2, however, we can see how the platforming sections develop in a logical and largely traditional way.

This is a short and fairly easy task of hugging the wall. There are a few necessary jumps, but they're all easy. Set piece 3–3 changes things up a bit by featuring harder (and less intuitive) jumping situations.

The water negates a falling penalty, although the many barnacles add an element of danger. This is a common practice in the design of platformers; the penalty for failure goes down when the player encounters something new for the first time, like jumping on a moving box. Of course, the player can simply go around the whole set piece and take the ladder at the bottom of the canal, but that means having to deal with the barnacles that provide no reward.

The next two platforming sections are where things get interesting, although in two very different ways. Set piece 3–4 introduces the first section that really looks like a pure 3D platformer. These hanging boxes would not be way be out of place in a late-90 s Mario or *Crash Bandicoot* level.

The cable in the middle of the boxes would be a little strange for those other platformers, but in this game it actually serves a purpose beautifully. Because the platforming and movement control mechanics in this game aren't as tight as they would be in a pure platformer, the cables help the player to not over-jump the hanging boxes. As soon as Freeman collides with them, his motion stops. This is a nice touch because the penalty for failure in this section is high. The other

nice touch is that while this game is built around set pieces rather than cadences, this section actually has a kind of mini-cadence. You can see in the screenshot above and right how each platform jump gets successively further apart and with less surface area available per jump. That's a classic expansion-by-contraction of available safe space, right out of the platformer vocabulary of the day.

Set piece 4–1, on the other hand, is a classic example of an evolution. In 4–1, the floor is electrified so that Freeman will take damage while he stands on it. While the past three set pieces have presented platforms of typical size, shape, and orientation, this set piece uses a much different kind of architecture.

This is one of the best instances of the convergence of fiction and level design for which *Half-Life* is so famous. Everything in this room would be totally appropriate for an office, and yet it also all works as good platformer content as well. The platform/counter is narrow but not too narrow; its shape offers clear directions on where to go, and the penalty for falling off is not too high. Everything is laid out perfectly without overdoing it, which is exactly how many of *Half-Life's* best moments are done.

### Set Piece 4-4: In the Fridge

This set piece is one of the longer platform sections of the first half of the game. The player starts on a long ledge leading all around the interior of a giant refrigerator.

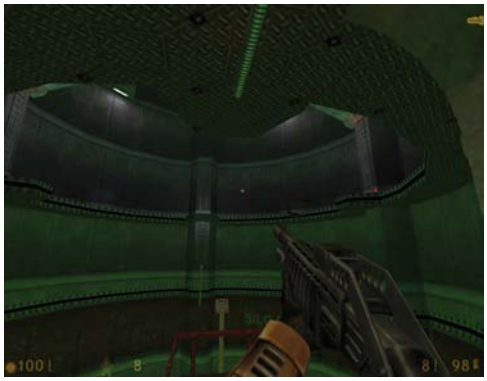
The real challenge is getting off the ledge and onto a moving platform that bridges the gap between the ledge and the exit. It's a fairly simple moving platform puzzle and it doesn't even require a jump, merely a well-timed step. The only real obstacle is that the player can glance off the boxes on the platform, and so needs to bash them in. This challenge seems like it requires speed at first, but really calls for precision and proper timing, as many moving platform challenges do.

The second part of the set piece is similar in that it asks the player to slow down and be precise rather than trying to use speed and momentum. The platforming itself isn't terribly hard, although the landing areas are very small. The ladder is also a red herring, and much more difficult to use than the bends in the piping as platforms.

The real problem is not rushing into one of the dark corners where the barnacles wait. With patience they're not hard to see, but any player moving around at full speed might collide with one and not even know it until taking damage; the ceiling is relatively low and the barnacles do not have to extend their tongues very far. Again, it's not a high level of danger (which would be inappropriate for this chapter and this theme), but the designers did have a few tricks to keep the platformer content interesting.

### Set Piece 6-3: The Generator

This set piece features a variety of platformer challenges that all serve the purpose of turning on a generator. The first task is to jump to the emergency ladder on the side. This is a common enough task, but the angle of the surrounding walls makes it seem a little trickier than it really is. After that, the player has to pass a periodic enemy that swings in high-speed circles around the ledge that surrounds the generator. There are safe spaces by the bulges in the walls, but getting hit by the moving platform can damage Freeman or even knock him off the ledge.



Although the malfunctioning platform moves quite fast, its loop is so large that the period the player has to work with is more than long enough to travel the whole ledge in two passes. This is followed by another low-difficulty challenge, wherein the player needs to hit the generator activation buttons and then jump off the connecting arm before two rods prevent it.

This is another fairly easy, low-tension task; all of these jumps are simple and obvious. The point of this set piece, and platforming content in general, is to break up the tension and/or monotony of shooter set pieces. The encounter with the tentacles is definitely one of the tensest encounters in the game because of the player's powerlessness to kill the creature. Thus, the ease of this set piece and the other platforming content around this section helps to break up the tension.

### Set Piece 6-4: Iridescent River

Like the set piece that immediately precedes it, this is really just another way of breaking the tension created by the encounter with the tentacles. There are a few precise drop-jumps here onto relatively wide landing areas.

These drops are followed by a max-height/crouch-jump. The player has just had to do a couple of these in the process of reactivating the rocket chamber mechanism, and they were fairly easy. In this case, there's no space to run, so it's a little tougher. Finally, this section ends with the game's largest pit-jump to this point.

All of the jumps, including this last long one, are essentially fatal if failed. Most of them are fairly easy. The last jump is a little more difficult because the fractured pipe makes it tough to tell where the jumping and landing points are, but nothing here is that difficult or that advanced, it's just more focused and linear than other platformer content in the game.

### Set Piece 8-9: Tripwire

This is a short set piece that asks the player to do something they've never done before—or die. The jump in question is a dismount from a ladder over a turret-activation beam. This is really the first time that the player has had to do anything special involving a dismount off a ladder. There are plenty of instances of jumping onto a ladder, and that task is easy and unremarkable. This is different.

The second set of trip mines is totally in line with what the game has already introduced, but the laser just below the ladder is lethal and new. It probably wasn't meant to be especially deadly, but the turrets can easily deplete Freeman's health or even blow up the adjacent mines. There are plenty of instances of a new task being introduced above a damage hazard. Here, the player has to execute a new action or die. This isn't a hard jump, but still, designers normally train players on the methods of a new jump without killing them at first. The thing that makes this forgivable is that this trip-laser is obvious. Because it's clearly visible as the player descends the ladder, the player has time to save his or her game before attempting it. While *Half-Life's* checkpoint system isn't uniformly robust by modern standards, an obvious warning of lethality like this one accomplishes the same effect as a nearby checkpoint would.

### Set Piece 8-11: Box Jump

This set piece gives us one of *Half-Life's* better platforming puzzles, one that puts more emphasis on problem solving than on hand-eye coordination. Because this room takes many attempts to pass, and because the solution to the puzzle is unconventional in the context of *Half-Life*, I've included it in the platforming theme rather than as through content. This content is clearly a part of the series of laser/platform puzzles, rather than a piece of pacing content. The room is loaded with a massive amount of explosives, so that any failure results in certain death. The laser beams for the explosives are placed so that ordinary jumps can't surmount them, and the highest beam is also too close to the stairs for a crouch-walk to work, either.

The real trick is to move the two metal crates to the right of the stairs so that Freeman can jump up them and over the laser beam. This presents us with one of *Half-Life's* occasional problems of extension. In several other places, I've noted that *Half-Life* asks players to make a leap in skill or intuition, and that the leap is sometimes too much. I don't think the intuitive leap here is too far, but rather that it's badly placed. If the player had completed some box-moving and/or platformer tasks in the recent past, the player's intuition would be primed to do exactly this. So while this is not really a stretch for the player's intuitive abilities, those abilities are cold right at this moment in the game. And it's never a good idea to exercise a cold muscle, so to speak.

### Set Piece 9-3: Slippery When Wet

This set piece is, on its surface, very much like a classical platformer challenge. There are some important differences that stand out upon further investigation. The setup is a catwalk that wraps around a pool of water; the pool contains an Ichythyosaur.


A series of hazardous platforms above a deadly fish is a setup straight out of the *Mario* series. The problem is that this set piece pays no heed to platformer orthodoxy, whereas most of the platformer content in this game actually tries to do so. The biggest problem is the cartoonish physics that suddenly come into play. Each of the "wet spots" on the catwalk is slippery, but their slipperiness is strangely out of line with Freeman's momentum. Whereas in a pure platformer the player character's drift on a slippery surface is directly proportional to the momentum the character has, here the drift seems to almost have no relation to Freeman's initial momentum at all. Those physics are fine if the player has been trained to expect it, but this hasn't happened in *Half-Life*. There have only been two examples of jumping on wet surfaces, and one of them was several chapters ago. That's not the worst offense, however. There is also a catwalk which falls away, dumping the player in the water. This misses the point of a falling platform entirely. The point of a falling platform is to force the player to make a jump, not to prevent them from making one.

This walkway, and the spawn that occurs beyond it, accomplish the latter rather than the former.

The final jump does a much better job of staying within the bounds of platformer orthodoxy while also adding a twist idiosyncratic to *Half-Life*. The last jump requires that the player make a slightly longer-than-normal jump through a smaller-than-normal aperture.

The player has had several opportunities to use and practice the jump/crouch maneuver, but each of those jumps was made in order to gain extra height. Here, the point of the crouching jump is to shrink the size of Freeman's collision box so that he'll fit through the aperture. This is a classic evolution by inversion of the parameters of a normal jump, which is a staple of platformer orthodoxy.

### Set Piece 9-4: Smashers

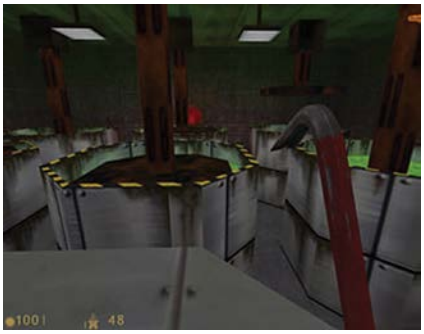
This is a short set piece featuring three platforms made from smashing industrial pistons. The set piece begins with a couple of scattered Bullsquids that the player

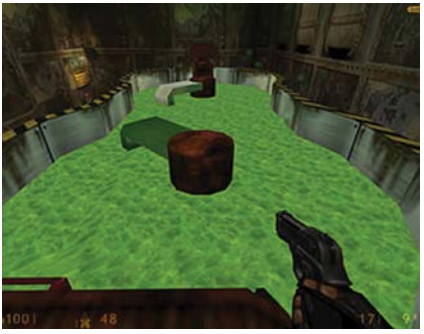
has to snipe at long range, although neither of them is as challenging as the jumps to come. Once the player activates the mechanism, it becomes possible to get Freeman across by some well-timed platforming.

The jumps appear much easier than they really are because of the most common problem in first-person platformers: it's hard to see them. Early in the days of 3D platforming, there were plenty of jumps that were difficult because of odd shapes, wonky mechanics or bad camera angles. This set of jumps is beset by the latter two problems. The first person viewpoint makes it hard to see the lip of the platforms as Freeman leaps off them and also makes it difficult to sense when Freeman is in danger of being crushed by the top portion of the piston. The mechanics are no looser than anywhere else in the game, but the small size of the platforms and the haste necessary to complete the task without dying mean that the whole operation feels ambiguous. On the other hand, the timing of this set piece is quite good; it breaks up a chapter otherwise entirely in the shooter genre and prefigures the challenges of Chapter 10. Many of Chapter 10's challenges are similarly structured (although most of them are better executed than this one), but this still works as a lead-in or warm-up for that chapter.

### Chapter 10

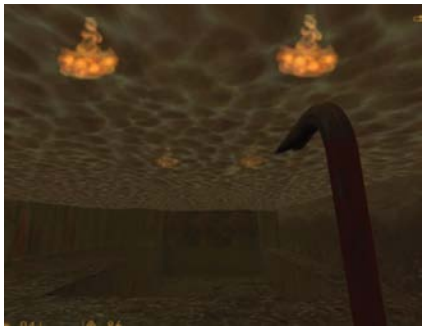
As mentioned in the introduction to this section, this whole chapter operates more like a platformer level than it does a series of set pieces. If you were confused about what the cadence of a level is from the brief coverage given to it in the introduction to this book, this section will actually make things much clearer through its examples. The important thing is to see the relationship between each challenge, rather than looking at the challenges themselves, as brief as they are. The first section of the cadence consists of these three jumps.





In the first set of jumps, the landing areas are small but totally stationary. A few precise jumps like the ones from set piece 4–1 will make this quick work. It's important to recognize that the jump to the pipe itself is actually the hardest jump of them all because of the landing area's deceptive narrowness and extra collision objects. In the second screenshot, we have a classic evolution in which there has been a qualitative increase in difficulty. The stationary platforms of the first challenge are now moving platforms; jumping at the wrong time can kill Freeman. The platforms have gotten a lot bigger to compensate for the limited timing window, which is a very common move for a first evolution in a platformer. The third screenshot, meanwhile, is an expansion and evolution of the second screenshot/challenge. In the third challenge, the simple up/down motion of the platforms has been transformed into circular motion, and the platform sizes have shrunk noticeably.

The moving platforms are interrupted by a swimming section and some fights with Bullsquids. *Half-Life* does a variety of things with its swimming sections, and while some of them are very annoying, this one is brief. Swimming can often be a lot like platforming. While suspended in water (at least in a videogame), the player is essentially in a jump that never ends and can move Freeman up or down at will. There's only a few real "challenges" here, though.



The player has to swim under these obstacles quickly and surface before running out of air. It's a lot easier than the other platforming action of the level, but that's a good thing. Levels can't always get harder in linear fashion, or else the game will fall victim to all the weaknesses of the arcade era. For difficulty, though, there are several fights with various Bullsquids in the wings of this section, and they serve to keep the tension at a necessary minimum. The player has barely any ammo, and so while these fights aren't terribly dangerous, there is a palpable sense of risk.

These fights are also interesting in that they're especially *Quake*-like. The long hallways with medium-sized apertures and no object cover—that's all stuff more typical of *Quake* than *Half-Life*.

The second half of the level develops a variety of challenges based on conveyor belts. Although this section doesn't involve jumping, it's straight out of the platformer classics. The smashing pylons that move in regular cycles are periodic enemies, like the Whomp or Chomp of *Super Mario World*. The challenges begin with a button-and-sprint combo to get onto the conveyor belt before the smashing pylons resume their impenetrable barrage.

The next gauntlet features side-to-side smashing pylons that don't strike quickly and telegraph their movement. What's more, Freeman can "rest" against them while they're fully extended, breaking his conveyor-belt momentum. The second set of smashing pylons is more interesting; they've evolved (progressed qualitatively) so that they smash from above, a position that makes it a little harder to work out their timings because the player can't lean Freeman against the side of the smashing object while he waits.

There are subtler evolutions in each pylon, however. The first pylon does a "double tap" motion, the second pylon stays in the extended position for a longer time (breaking up any sprint the player might try), and the third pylon makes a false retraction—followed by another killing extension—before actually retracting. Each pylon is an evolution in itself, in addition to being part of an evolution as a unit.

In between the two platformer sections there is what would properly be called a crossover challenge. A crossover challenge is (in the context of *Half-Life*) a shooter challenge occurring in the middle of a platformer cadence as a kind of break to keep the platforming from getting too monotonous. The Bullsquids also served this purpose, but here the crossover happens while Freeman is still on

the conveyor belts. The conveyor belts take Freeman into another nondescript junction, except that this junction is filled with laser trip mines.

I repeat myself when I say that surprising the player with instant death like this is not a great idea. *Half-Life* and its checkpoint system would have seemed very forgiving for its time, but there's just no reason to hide these mines in the dark the way the designers do. The thrill of this challenge isn't in knowing that the mines are there, it's in blowing them up from afar by jumping backwards against the movement of the conveyor belt. If the player can simply see the mines coming and then blow them up before the conveyor belt drags Freeman to his death, that thrill is still in play. The surprise death is superfluous.

The conveyor belt idea receives a final evolution, although it doesn't build upon the previous smashing pylon idea, but rather adds jumping and removes periodic enemies. If the conveyor belt is the parent idea, the jumping and periodic enemies sections are diverging branches of the family tree. This part of the level starts as a simple drop-jump and ends as a series of fairly precise forced-momentum jumps.

Jumping downwards tends to be the easiest kind of jump in a platformer, but *Half-Life* often makes it hard by obscuring the target below, especially in Xen. (This is a common problem in early 3D platformers, generally.) Fortunately, this jump is fairly

easy to see because the platform is so long. Jumps between long conveyor belts are neither dangerous in terms of penalty because a safe floor is just below. The second set of jumps between the parallel conveyor belts isn't especially deadly either (there's no reason they should be if this is a breather level), but they are a bit more difficult because of the narrower landing area. The jumps in the parallel belts are a little more rapid, too, but the clear field of view means that the player can at least quickly predict all the jumps Freeman will need to make in order to get through the entire section.

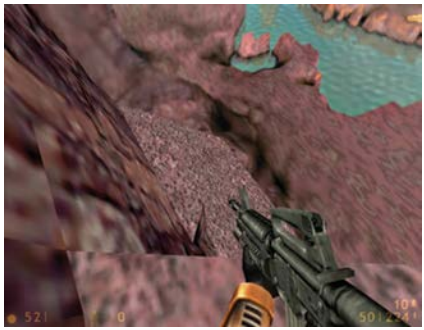
The momentum Freeman gains from the conveyor belts is conserved when he jumps, and this momentum can easily fling him into the objects he's trying to avoid, or cause him to miss the conveyor belt altogether. This is, in my opinion, the best use of physics in the game, because it's fairly easy for the player to take this momentum into his or her mental equations when reattempting this sequence.

The chapter ends with another periodic enemy challenge: a chomping grate over the exit. This is a very minor challenge, but it's a good example of composite-style design.

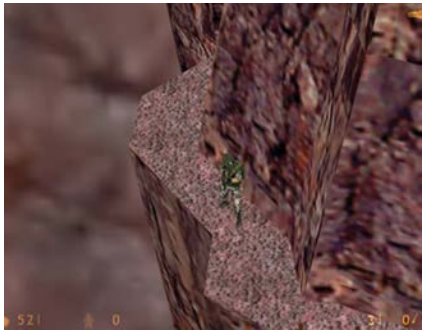
This is a good example of an A+B evolution, in which a normal periodic/smashing obstacle has some enemies (Headcrabs) added to it. Again, it's not a very dangerous evolution, but this is not a very difficult level and wasn't meant to be.

### Set Piece 12-5: Cliffs of Insanity

Except for one positive and one negative aspect, this set piece is very traditional in its application of platforming design ideas. The negative aspect, to get it out of the way, is the difficulty in seeing many of the platforms that the player has to drop to. The first two in particular involve some edge-hugging.



My own opinion on platforms is that it should always be easy to see them. The difficulty should be in execution, not visibility. Neither of these jumps is terribly difficult to execute, but they can be a bit hard to see because of the angle. That's just not necessary. On the other hand, the positive aspect that isn't totally traditional for platformers is the presence of sniping enemies along the cliffs.



These enemies can easily surprise the player, but none are instantly fatal because they come one at a time. Although plenty of games had mixed platforming and shooting before 1998, *Half-Life* does it in its own unique way. Each of those sniping enemies is tucked away in places that the player won't notice at first, but which are easy to see once the fight starts. As you might recall from the introduction, this tendency to hide enemies in slightly unexpected places is an important development in the history of the FPS, and it's something the player has seen a lot of so far in the game. It's a totally logical step for the designers to combine the hidden-enemy corner with platforming in an A+B evolution, and the designers do so.

Those two things aside, the platforming in this section is fairly standard. The jump distance gradually expands across jumps and the size of the landing area gradually decreases.

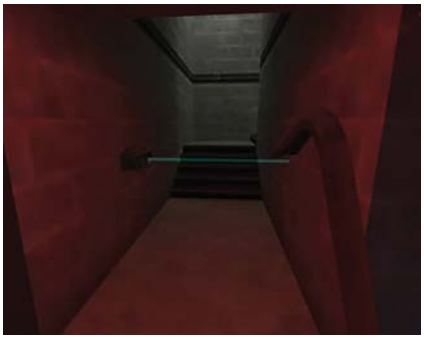
The last jump is a little bit deceptive, in that the nearest slice of landing area it presents isn't really viable. Trying to land on the thin triangle highlighted above is nearly impossible because it's too easy to bounce off the cliff-side. Instead, the player needs to over-jump it and land on the farther, wider area. It's the only real deception in the platforming here, but it's a good one.

As a last note, the bridge at the end of this section falls away and kills the player without warning.

Do not repeat this in your own game; it is unfair, un-fun, and unnecessary. Falling platforms are fine and have well-established precedents, but they need to fall at an escapable rate and with clear warning signs.

### Set Piece 12-8: Chain Reaction

There are few universal rules about the design of videogames because the value of any single design idea is heavily dependent upon its context. It's true that the game should never bore the player; it can excite, frustrate, please, enrage, frighten, or even cause laughter, but it should never bore the player. It can even do many of those different things in the same game, as is the case in this moment in *Half-Life*. This set piece is a jumping puzzle, with heavy emphasis on the puzzle aspect. The building in which this takes place is rigged all over with laser trip mines, such that any mistake will mean instant death.



The reason that instant death is acceptable here is that this set piece is clearly a puzzle, and because when the player makes a mistake, it's obvious what that mistake was. The puzzle is made up of a maze of lasers, and the means to navigate that maze is platforming and deductive skills. Many of the lasers are easy to avoid, requiring only a simple jump or crawl to pass. There's a little unnecessary tension in some of those easy ones, though, especially in this one where it's not entirely clear if crouching will get Freeman under the beam.

Aside from that fairly minor problem (quicksave, trial and error will clear it up very quickly) the puzzle is very satisfying in its design, being neither too hard nor too easy. There are many instances where Freeman will be obliterated because of the player's hasty or unthinking actions. Several boxes cannot be destroyed or else they will set off the bombs, although it may be hard to tell which boxes this is true for, at first.

Another good example of unusual puzzle elements that the player can quickly learn is this elevator trap. Raising the elevator without destroying the box will result in a huge chain reaction that kills Freeman. Like all the other deaths available in the room, it's pretty obvious to the player what he or she needs to do next time around. The first detonation following a mistake is always obvious, and so the player will notice it before the whole room is engulfed. With every death, the player learns an obvious solution to the problem just encountered. That kind of "aha!" moment is the essence of the puzzle context, and the reason why so many deaths are tolerable in such a context.

The real key to the whole puzzle is the fact that the player can break the front and back panels of the box below without destroying the whole thing.

In one sense, this is unfair because the rest of the boxes in this game don't actually behave this way, so the player may never think to try it. This inconsistency was the very same problem I cited in the falling bridge of the previous set piece. In this context, however, it's not that unfair because the whole puzzle relies on careful

examination. The appearance of the special box is in place to show players that there are unusual properties to objects in this set piece. In the previous set piece, the player had to worry about enemies firing on Freeman and bumping off the irregular edges of cliffs. In this set piece, there's plenty of time, space, and calmness to allow for trial and error. The player knows to slow down, quicksave and try various methods of solving the puzzle because the designers have communicated that message well.

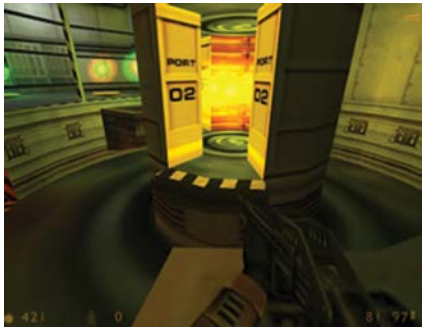
### Set Piece 14-9: The Core

Although this set piece looks flashy, it's actually a very simple, very orthodox platforming challenge. The first thing you might think when reading the preceding sentence is that there is no jumping here, so how could this be a platforming challenge? Climbing ladders has been, from *Donkey Kong* onward, a big part of the classical platformer formula. Moreover, this set piece is really "about" another important design idea to come out of the platforming genre: periodic enemies. In this case, the enemies aren't really "enemies," but rather beams of energy.

The first type of beam pictured above and left rotates in a circular fashion around the central pillar of the room. The second type, pictured above and right, toggles on and off on a timer. The first ladder challenge has only a rotating energy arc to deal with, whereas the second (an evolution) has both kinds of arcs threatening the player. The trick is to make sure to pick a time when Freeman can get up the ladders without either the rotating beams or the on/off beams hitting him. It wouldn't be that hard, except for the common problem facing *Half-Life*: the first-person disadvantage. Once on the ladder (in the ready position), it's hard to track the rotating beam's progress, meaning that it's hard to know when to shoot the gap in the two periods. A challenging, syncopated set of timings is part of the orthodox platformer vocabulary. In most platformers, it's a failure in the player's internal timing and coordination that kills the player character, rather than a failure to see the danger. A see-through catwalk or any of a dozen other design ideas could have mitigated this effect.

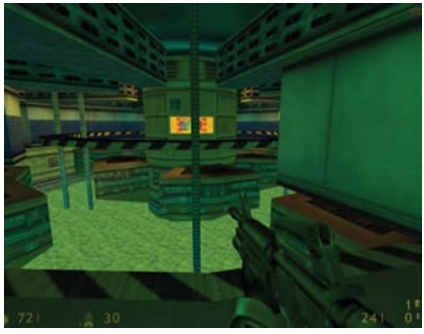
## Set Piece 14-11: Radi-Go-Round

This section has a lot of different kinds of content in it through its teleportation/exploration mechanics, rather like the Nihilanth fight which it prefigures. The shooter and maze content are unremarkable. The platformer content is interesting in the context of the rest of the game. One of the big problems we've seen all throughout the platformer theme is the difficulty presented by a first-person viewpoint. It's difficult to land in the right place when the player can't see the character they control. It's difficult to make a series of jumps when the player can't see more than one platform ahead. The beginning of this set piece gets around that nicely, though, in that it separates timing from precision.



The player has to make an abstract jump—a jump that involves dropping down onto a higher object via teleportation. To do this, he or she must time the movement of distant platforms to coincide with Freeman's movement into the portal that connects them. Discovering the nature of this puzzle is a little unfair ("what does this portal do?"), but the timing jump itself is straightforward and the penalty for failure is low. The second jump has a small evolution included in that the player has to make Freeman duck shortly after landing to avoid being knocked off by a bar that isn't present on the first level.

The second platform challenge is a lot more typical, although it doesn't look like it at first. This carousel structure can be solved with just a few fairly easy jumps.



All of those platforms are moving slowly and, despite its narrow appearance, the middle ring is easy to land on. The only challenging jump is the one into the core of the machine itself, as it requires more precise timing and a quick ducking motion to get inside, but the designers have required crouch-jumping of the player several times now, and so this is a totally appropriate challenge for the skills the player ought to know.

### Set Piece 15-1: Orbits

This book observes that almost everything in Xen is inconsistent and a problematic, and the first set piece in that world is no exception. Xen features gravity physics that allow for longer jumps. The designers are cognizant enough to give the player time to adapt to this upon arriving in the world, with two particularly long jumps.

The long jump mechanic was given to the player only a few minutes ago in game time, and having to practice it now at maximum range and over an instant-death pit is unnecessary. Such a late start in the usage of the long jump, too, is strange in a game that has so methodically developed every other design idea, even in its platforming sections. Nevertheless, these first two jumps are an opportunity to learn the new physics and the new jump technique at once. The second jump even has a small evolution element added in, in which a Vortigaunt and Houndeye appear on the platform after landing.

After the first two jumps, things really fall apart in the game design. The failure of this section isn't the result of a punishingly unfair difficulty, but rather a lack of clarity. That is actually twofold. Firstly, the myriad rotating platforms that make up the descent to Xen's surface are hard to interpret. What is the path here?

Experienced players know how to get through this, but first time players can easily get lost on the wrong platform as there are several here that are superfluous. Superfluous platforms are pretty rare in this game and in platformers generally. The kind of confusion they generate just isn't fun. Moreover, many of these platforms have orbital periods that are way too long. Although it could be helpful for the platforms to move slowly enough for new players to track them, the long period really just ends up boring players who missed their chance to jump on the first loop. A platform can be slow and still have a short period; all the designer has to do is shorten the loop it moves along. That doesn't happen, and the result is an unnecessary wait. As I have said many times, boring the player is the greatest crime a game can commit, and the designers really run the risk of committing it here.

Even as the player starts to progress through the platform puzzle, there's another moment lacking clarity. Many of the best platforms to jump on fall directly under the one that Freeman occupies, resulting in instances like this.

The timing here isn't too hard, but why do the platforms have to fall under one another? There are many, many ways to make platform jumps difficult, but obscuring the player's view of them is just frustrating rather than engaging.

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# 4

# The Arena Theme



The arena theme is made up of a series of set pieces that either don't rely on cover at all, or rely on a much more rudimentary and haphazard form of cover. In the introductory sections of this book, I laid out the history of shooter design leading up to *Half-Life*. For most of that history, shooters used a style of design much closer to the modern arena style than to cover shooters. That is, the player and enemies were frequently thrown into a large room, and the enemies would slowly converge upon the player's position. The player had to respond to these situations with lightning reflexes and constant motion. *Half-Life* and its multiplayer incarnations are, for the most part, not arena shooters. Still, the single-player campaign shows some of its *Quake* lineage through the arena theme. This theme is full of examples of hallways meant for kiting, large rooms meant for circle strafing, and lots of three-way fights that substitute crossfire-based chaos for cover.

There is not much in the way of over-arching organization within this theme. Most of the arena set pieces come after the beginning of Chapter 11, and then with increasing frequency through the end of the game. Once the player reaches Xen, there's little cover but plenty of combat, so naturally that combat has to take place in arenas. If I had to make the case for some kind of organization in the arena theme, I would say that the arenas start to get bigger in size, but only if you start measuring from the beginning of Chapter 14. From that point until the climax of the game, the arenas mostly grow in size (to absurd proportions, eventually), mostly along the x and z axes, but eventually along the y-axis too. None of this is to say that the designers didn't do anything interesting in the arena theme; there are many arenas that are interesting in their own right. Two of my favorites are set pieces 11-2 and 12-10; playing those, you can see where the *Halo* designers got the inspiration for many of their multi-sided set pieces and level designs. Furthermore, the arena theme actually exhibits a lot of the cadence structure that was developed by Nintendo in the early 90s. I don't think the *Half-Life* devs intended this, but I do think it shows another example of cadences in the wild, so to speak. Certainly, it helps to prove that the cadence structure is a natural form of organization in well-designed videogames.

As a last note, I want to say that there are many arena themes with some small amount of cover. For example, set piece 11-2 has a bunch of pillars that can shield Freeman from one angle of fire.

This is not properly cover as we saw it in the cover theme because it doesn't offer Freeman sufficient protection. Any advantage the pillars convey is neutralized by some other angle, or the charge of an enemy from a different direction. Freeman has to move constantly, and that movement is the hallmark of the theme. This is different from the temporary cover segment in which the player has to keep moving to new cover. In that segment, Freeman can maintain cover discipline by switching between objects; the process is predictable if the player knows what to do. In this theme, there might be an aperture to use for cover temporarily, but once the enemy advances, it's back to run-and-gun gameplay.

*Half-Life* is a transitional game. The designers had just invented modern cover, and so the distinction between cover and arena situations is sometimes a little murky. Usually, though, the player's experience of arena set pieces is much different from the cover set pieces, however they may appear.

## Set Piece 3-1: Headcrab Elevator

The arena theme begins with a very simple challenge: Freeman is trapped on a slow-moving elevator as a long stream of Headcrabs descends upon him. Up until this point, the player has been able to run around enemies, avoiding them completely or tactically engaging them in advantageous settings. Now, it's impossible, and there's no sneaking either; as the player is bound to the elevator platform. Of course, like any good early challenge, there's barely any threat. Many of the Headcrabs will simply bounce past the platform, or jump off of it while trying to attack Freeman.

One nice thing about the descent the Headcrabs have to make is that it extends the amount of time the player can use to fire on them or dodge them. In this regard, it's a great way to teach the player about how to deal with Headcrabs generally. The designers didn't have to do anything special; they only had to rely on global physics already in place and drop Headcrabs from a greater distance to achieve this training-wheels effect. Notice that the first arena set piece in this game also looks a lot like *Space Invaders*. The Headcrabs fall in a rate and pattern similar

to the projectiles from the alien ships; this forces the player to move side-to-side while occasionally shooting. All that is missing is the cover.

## Set Piece 5-6: Yard Brawl

A great deal of content separates the first two set pieces in the arena theme. Almost three chapters later, the second arena set piece sees Freeman confronted by a large number of HECU troopers with relatively little usable cover. This is not to say that there isn't anything resembling cover because there's actually a lot of that.

The problem is that the marines are scattered about this area such that any apparent cover will instantly become useless when the marines swing around it and surround Freeman, which they are unusually likely to do in this set piece. Once the battle begins, it's going to be a stand-up/arena-style fight no matter where it takes place. Any "cover" will last only a few seconds.

Before the player obtains aggro on these troops, however, there's an obvious and very necessary health machine on the wall. Once the player does gain the attention of the enemy, the HECU troops will charge right into the room.

Although there is something to hide behind, for an instant, it's not the kind of cover that the player has been afforded recently. What's more, the player may not yet have figured out that the HECUs will charge right around the cover and resume shooting. (Especially for the time, this was not a common feature of AI,

and the HECU troops react and move much faster than most of the units in *Quake* or *Goldeneye*.) This fact makes this set piece a skill-check, where the player is forced into a do-or-die firefight with no options for escape. Because Freeman has just come up on an elevator, there are not even any long paths to use for kiting the enemy. A stand-up fight is the only real option.

For *Half-Life*, this is probably the biggest challenge yet. By this, I mean that the game hasn't exposed Freeman to enemy fire like this before. Up until this point, the player has faced the following:

1. High-damage enemies, but with copious cover available (turrets, marines)
2. Medium-damage enemies that appear suddenly, but move very slowly (zombies)
3. Low-damage enemies that move quickly (headcrabs)
4. Platforming and puzzles

The player's ability to handle this sudden level of exposure is probably dependent on their exposure to other FPS games in which such scenarios were common. Players of *Quake* and *Doom* might actually feel more comfortable with this fight than all the cover-intensive situations that came before it. Circle strafing while taking large amounts of damage was, up until the release *Half-Life*, the norm. Purely within the context of *Half-Life*, this set piece serves as a wake-up call or spot check.

## Set Piece 8-6: Conflict of Interest

For this set piece, I'll assume that the player does activate the trip-lasers in the tunnel that begins the battle. This will activate the two turrets located on either side of the cart track.

The set piece is fairly obvious; there are firing enemies in every quadrant, and Freeman can end up as the target for all of them. Despite being obvious, this setup is very strange. Chapter 8 is dominated by the cover theme, but there's definitely an arena dynamic to this room. There's no real cover, except for the wide aperture of the cart tunnel, so the player has to stop the cart completely in order to not get shot from every quadrant. Because the turrets and Bullsquids can choose

any target, the action of this set piece can vary greatly, and killing the enemies in any one quadrant will greatly affect the overall flow of the set piece from that point onward, just as we will see in the arena set pieces later in Chapter 11 and onward.

## Set Piece 11-1: Patrol

This short set piece serves as a kind of reintroduction to the arena theme, which has been dormant for the past few chapters. There's effectively no cover, although the player can, to some degree, cut the four marines into two groups that fire separately.

The crucial difference between this setup and those in Chapter 8 is the lack of station-to-station cover. The player can hide Freeman around a corner, but the marines start charging as soon as they see Freeman, and there's nowhere to flee except down a long, exposed hallway. The player can use the lip of an aperture as cover, but the apertures are so wide that charging marines can surround and pummel him with fire. This is a great example of *Half-Life* showing its *Quake* lineage, as set pieces that might have been methodically dissected by a player dashing from cover-to-cover are instead turned into fast-paced brawls. Here, precision shooting and evasive movement (run-and-gun tactics) return from the past to show their usefulness in *Half-Life*.

## Set Piece 11-2: Four Pillars

Although the arena hasn't yet become common in *Half-Life* by this point in the game, set piece 11-1 disguises (or combines) its first arena as a puzzle. Freeman enters the arena via a large and normal door with no enemies nearby. The room is filled with laser-mines, which are configured as a minor puzzle.

Because of the emptiness and spaciousness of the room, it's tempting to simply shoot the mines and obviate the jumping puzzle. This is a typical *Half-Life* deception, however, as the detonation queues an attack from both marines and alien grunts.

The arena itself is probably the most *Doom*-like example of level design in the entire game. In *Doom*, a monster closet would open at this point and drop enemies all around the player character, forming a shapeless melee with no clear direction or order. In *Half-Life*, the players will note that there are three ingress points on two sides of the arena, and will be able to apply some of their own structure by using the pillars. In 1998, it was pretty likely that experienced FPS players would have stayed in the arena and fought it out with the grunts and marines. That's what previous FPS games tended to be about, and it's certainly a viable option here. *Half-Life* gives the player a thoughtful alternative to a straight up brawl, though, and in doing so (here and many other places), I think that it inaugurates a strain of new FPS designs typified by *Deus Ex*. (Obviously, *Half-Life* came first, but we tend to see *Deus Ex* as the exemplar of this kind of set piece because it uses them so often, whereas *Half-Life's* focus is elsewhere.) In this strain of FPS game, there is almost always an alternative to direct confrontation—an alternative not immediately apparent to players who rush in. This alternative is frequently more rewarding and less exhausting (in terms of HP and ammo) than direct combat, although it may take away from much of the run-and-gun thrill of the game. It's always important that the designer finds a way to "speak" to the player about these situations, though—to tell the player that the alternative is intentionally designed into the game and ought to be pursued. The three ingress points of the enemies start the process, but the dead marine lying at the end of the back hallway is the real key. Beside him are three mines and beyond him is an overlook.

This setup tells players who run into this alcove exactly what to do; even if they have to figure it out very quickly, it's easy to sense the "suggestion" that the player use the mines and bait the enemies to come charging into them. This kind of communication between designer and player is pretty common in the game as a whole, but I think this is one of the more elegant examples of it.

## Set Piece 12-10: Drop Zone

Chapter 12 gives us the purest arena challenges in the game. This challenge sends three alien grunts rushing out of a door to challenge Freeman. At the same time, a dropship swoops overhead and starts sending down pairs of marines into the fight periodically. Because there isn't really anywhere to hide, this set piece can get very chaotic, but that's a good thing.

The real and present potential for failure is an important part of action games. Indeed, the right kind of failure can make a game more fun, rather than less fun. This set piece manages to be pretty fun while also being deadly, and so we can glean some lessons from it. I'm going to list some characteristics of this set piece and how it kills Freeman when he doesn't succeed.

1. The battle lasts a long time
2. Death doesn't happen suddenly
3. The battle changes every few seconds because of new marines dropping in
4. The AI reacts dynamically, meaning every battle is different

The first two items are important because they mean that each attempt lasts for several minutes. In some cases, this can be a horrible thing; for example SNES and Genesis games tend to have problems with long encounters, for example. Long boss battles, especially those from the 2D era, were often brutal attrition matches that quickly wore out the player's patience. The reason players lost patience was that the boss battle proceeded in the exact same way through every death and repeat, and so the battle quickly grew boring. Moreover, in those battles, it often was the case that the player would lose a life because of one or two "last ditch" attacks right before the boss died. This meant endless repetition followed by sudden defeat which is not just exhausting, but humiliating too. This brings up the second point: in this set piece, death doesn't happen too quickly. Freeman has to take sustained damage from several enemies to actually bring him down, and while that's likely in this set piece, it isn't fast and it isn't certain.

Because the battle will play out for longer than just one horrible moment, each experience of the battle will be different because of the latter two items on the list above. Obviously, the periodic appearance of two more marines will update the battle on a regular schedule. The marines arrive at the same interval over and over again, though, so they're not the principal cause of the dynamism in the fight; they're just a way of keeping that dynamism going. The real reason why the set piece is fresh on each play-through is the AI. The AI of each unit involved in the battle is autonomous and reactive, and as such, no two battles will go the same way. So all of the other things—the length of the battle, the relative survivability despite the total lack of cover, the constantly dropping marines—these things are all in place to support the dynamic AI which will make every play-through of this battle different. That's why it's okay if the player has to retry this battle several times; each time will feel fresh. It doesn't even require specially-programmed AI; it's just the standard AI that exists for these units all of the time. Good encounter design takes full advantage of the resources at its disposal, and this is a shining example of that.

## Set Piece 12-13: Upon a Catwalk

This set piece derives its dynamic quality almost entirely from the composition of the enemies. Although there is a catwalk and it is useful, the set piece becomes really dangerous if either the marines or the aliens who are fighting below get a clear upper hand. The aliens have an advantage at the beginning.



Even with the entrance of more marines via the APC, the grunts are too beefy and put out too much damage for the marines to handle them without cover and explosive munitions. Moreover, the placement of the marines seems to activate their movement jitter in a way that affects them adversely. While the player obviously has no stake in the battle per se, it behooves the player to take advantage of the distraction very quickly to get some shots in before either side is targeting Freeman. Failing to hurry means taking a lot more damage because even the catwalks don't serve as good cover for those heat-seeking grunt bullets. The only real problem I have with this set piece is that it's impossible to know how the arena

dynamic will play out before entering the room, and there aren't many encounters like this one later in the game—that is, there's no time to learn the most obvious lesson this set piece teaches. That said, the increased speed of this arena and the next one help to train the player for their much more chaotic encounters in Xen, even if none of those later arenas have enemy infighting.

## Set Piece 13-4: Upon a Tank

This two-part set piece is quite similar to the last one in terms of enemy composition, and indeed shows some classical evolutions. The initial layout is the same, with Freeman entering from above on a catwalk. This catwalk is shorter and even more exposed than the last one, but it serves well enough as a platform from which to snipe a few enemies at the beginning of the fight. The big evolution comes when the player uses the tank to blow a hole in the far door after killing the initial group of enemies. Immediately after that, enemies start arriving by teleport in staggered waves and varying locations.

Either because of the shape of the arena or because of some unique AI script, these enemies charge extremely aggressively if Freeman hides behind anything. Some cover is present, but it's totally useless. Instead, the player is apparently meant to use the machinegun on top of the tank to quickly eliminate these aggressive enemies, much like in set piece 12-12. The position on top of the tank does leave Freeman exposed, but the only other option is to run through the objects in the arena and waste a lot of ammo taking out the grunt. While arenas are made for movement, and the architecture here suggests it would be possible, this is unusually difficult. The lack of a third faction to draw some fire, combined with the unusually aggressive movements of the enemy aliens, makes the typical run-and-gun strategy inappropriate.

## Set Piece 14-5: High/Low Grunts

This is the first of three set pieces that deal with the same basic layout in different ways. The idea being iterated is a donut-shaped arena with three grunts placed in

it. The arena is quite small, and so putting three alien grunts in it means packing a lot of damage into a small space. In this first iteration, all of the grunts are on one side and out of view. The approach to the room may telegraph the fact that there are enemies in it, but I doubt many first-time players are expecting the barrage that they get.

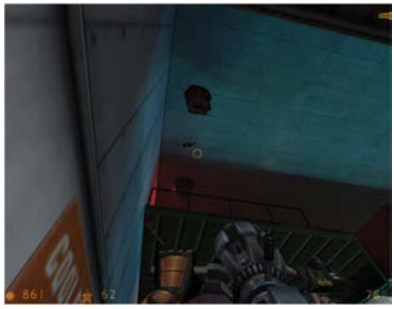
The aggressive movements of the grunts and their ability to fire homing bullets mean that Freeman is going to take a lot of damage very quickly. As before, each individual bullet doesn't do that much damage, but because the grunts have so much HP, they're going to keep firing for a while. In set piece 12-8, the presence of three grunts was mitigated by the presence of the HECU marines who distracted them. In this set piece, there's no such distraction; it's just Freeman and the grunts.

The only consolation is that it is possible to use the walls and catwalks for very slight cover, for one or two seconds. The approach to this set piece isn't really an aperture as much as it is an entire hallway, but the wall and narrow walkway can be used to avoid taking damage from all three grunts at once. The corner also works as a decent chokepoint for explosive munitions or automatic fire, but that's still not really cover in the sense of the term that the game has been developing. It's only a very slight reprieve from one third of the encounter.

Similarly, the player can play cat-and-mouse from below the catwalk with the final, elevated grunt. The whole set piece, and the catwalk section in particular, are strongly reminiscent of *Quake* and *Quake 2*. Some of *Quake's* most idiosyncratic moments in multiplayer come when players are shooting up or down through catwalks at each other; this set piece definitely recaptures the speed and intensity of that kind of encounter.

## Set Piece 14-7: Evolution of High/Low Grunts

This is another iteration of the idea of three grunts in a room. It's also one of the clearest examples of how the CCST structure can be applied to *Half-Life*. In this case, the same type of room (donut arena with a catwalk) is now filled with more enemies and a different encounter design. Technically, this room is an evolution because it introduces a new type of enemy, instead of increasing the number of enemies already established in 14-5.



The two grunts on the ground are more or less the same, although this time around the barnacle tongues can interfere with maneuvering around the narrow walkway of the donut arena. Once again, there no meaningful cover, there are only one-use chokepoints that will lose their utility if the enemy isn't dispatched quickly. The third grunt appears once the player ascends the catwalk, dropping almost on top of the player, and then down to the floor below.

This time around the player has the height advantage, but true to *Quake* form, it's not really an advantage. It is a qualitative change, however, and along with the addition of barnacles, it's clear that this set piece is what we call an example of an A+B evolution. In an A+B evolution, new elements are overlaid on the original idea. It's probably the simplest kind of evolution to see, and that's most of what's going on here. The only real twist is the delayed arrival of the third grunt, which would fall more into the category of a mutation (qualitative change without increased difficulty) if it weren't accompanied by the rest of the evolutions in the set piece.

## Set Piece 14-8: Aux Tank Room

The Aux Tank Room is another iteration of same donut arena idea, although this time the verticality has been removed. Nevertheless, this is an expansion/evolution of set piece 14-5. Because it does something different than the other evolution (14-7), we ought to call it a "sibling" evolution since it has the same parent as the set piece we just discussed. Both set pieces have the same base idea, but their deviations go in different directions from the same starting point. The defining feature of this arena is the teleportation of two (and sometimes, later, two more) alien grunts behind Freeman.


Once the player defeats the first two grunts and passes more than halfway into the room, two more grunts will teleport in after a slight delay. The really remarkable thing about this is that while we have seen dozens of teleport-driven monster closets in this game, most of them have occurred to start a set piece. Moreover, most of them have been in the cover theme, where the player's reaction can be to take advantage of cover so as to mitigate the threat of new enemies. There isn't much to hide behind in this set piece, and even less once Freeman advances out of the room's aperture. When those grunts appear, it's one of the most immediate threats in the whole game, at least outside of boss fights. The player is going to have to do a lot of running and gunning, and fire the highest-powered weapons. The whole arena theme owes a lot to its *Doom* and *Quake* heritage, but this set piece stands out in that regard even more.

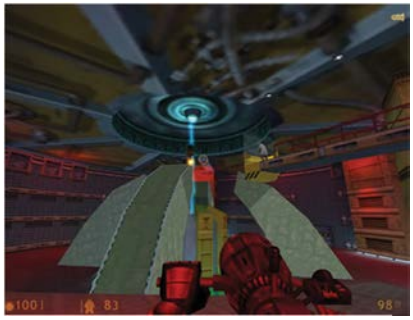
## Set Piece 14-12: Last Call

This set piece is a study in how a good design practice can be overemployed. Climactic set pieces like this one can be problematic when the designer forces the player to do something that they've never had to do before. They can also be anticlimactic when the player has to simply reiterate the same old process all over again. Neither of these is a reliably good option (although there are exceptional cases). One strategy that a game can employ when trying to create a climactic set piece like this one is to implement a "next intuitive step" in design trends. A good—but anachronistic—example of this is the boss battle in *Portal*. In that game, the player has spent the entire game building up the skills to open portals while already falling, or while an object is already falling. The final fight inverts that to some degree; instead of opening portals to fall through, the player is opening portals for the boss's missiles to fly through. The change from falling objects to flying missiles is significant, but it's also completely intuitive. The player is going to miss a few early shots, but all the skills that he or she has built up over the course of the game will translate perfectly to the new task with only a little practice. The new task depends on the same old mechanics to be familiar, but it changes just enough to be fresh.

The problem with the last set piece of Chapter 14 is that it makes the same kind of change seen in *Portal*, but it does it to a greater degree and in too many ways. Firstly, this is an example of arena combat, but it's also a step forward in architecture. The pillars at the center of this arena give the it shape and dynamism—but only for Freeman. The alien overseers who come out are floating above the architecture, giving them an unfair advantage.


This one change is fine by itself; the game should be harder at some points than others, and this set piece isn't impossible by any stretch. This set piece and its architecture even prefigure the fight with Nihilanth rather well. There's still more going on, though. The second problem is the escort quest that occurs in this set piece. The player has to protect the scientist who is opening the portal. This is not the first time the player has had to protect an NPC, but the leap in difficulty is quite large from the last time this happened and from any of the set pieces in

this chapter. The NPC has been moved away from Freeman and is much more vulnerable than Freeman himself is. This set piece also introduces a new enemy type never seen before.



Introducing a new enemy type is a totally orthodox thing to do in any game, even if the player hasn't been at all prepared for the behavior of that enemy. In *Half-Life*, the player has had some recent experience shooting up at grunts on catwalks, and has been shooting at marines in high positions for most of the game. The alien overseers are smaller and faster than those earlier enemies, but the player knows the appropriate mechanics for dealing with them. If it weren't for the presence of the escort quest, the unlimited number of enemies, the long range at which this combat takes place and the change in arena architecture—if not for all of that, the overseers would be a totally fair challenge.

Each of the evolutions listed above are completely orthodox, tried-and-true design practices. The fact that all of those evolutions are suddenly introduced at once in a very high-stakes situation makes it unfair to the player. If each change had been introduced, and then had been combined after their introduction (in an A+B+C evolution), the player would feel more prepared for them. Considering that Valve usually does such a good job of incrementally increasing the complexity of their set pieces in this game and their later titles, it's strange that they would fail to do so here. Properly preparing a player through incremented introductions doesn't make set pieces any more boring, because each progressive evolution is still more complex and (usually) more interesting. Implementing those evolutions one by one simply makes the process fair.

## Set Piece 16-1: Gonarch

The Gonarch battle is essentially a three-arena fight, each arena smaller than the last. That in itself is very simple, but it's the behavior of the Gonarch that makes the fight's design interesting. The behavior of the Gonarch changes in a way that recalls the bosses of early-90s 2D shooters. In the days of the scrolling 2D shooter, boss fights tended to be highly mobile, with all the motion of the fight being dictated by the boss rather than the player. The movement patterns

and firing patterns of those bosses also changed across phases. The fight against Gonarch is one of the best early examples of the same thing taking place in a 3D shooter. All of the iD games were replete with boss fights, but they tended to lack phases and the player often dictated the movement of the battle. That is to say, in 2D scrolling shooters, the boss acted (by executing a predetermined pattern), and the player merely reacted. In 3D shooters until *Half-Life*, the player acted, and the boss reacted by simply tracking the player through 3D space. Although Gonarch doesn't follow the same kind of exactly choreographed pattern that its 2D ancestors did, it does have a cycle in all three encounters. The Gonarch will alternate a charging behavior that heads right for the player with a stationary activity that involves shooting acid and spawning enemies. It's a very simple pattern, but what enriches it is the Gonarch's discretion in its ability to charge. When charging, the Gonarch targets Freeman wherever he is standing, and the charge will terminate in a variable amount of time depending on the distance between Freeman and the monster during the targeting phase. The combination of a predetermined pattern plus some variability gives this fight the best aspects of both its 2D and 3D ancestors.

The fight has flaws, however, and the biggest one is definitely that there's no way to tell how much HP the Gonarch has. Most FPS titles of this era had this problem, but if the designers had already set out to recapture the best aspects of the 2D shooters, it's strange that they didn't find a way to indicate the state of the monster's HP at all. This is more important because the Gonarch has a weak point.


The underhanging gonad (the name seems obvious now doesn't it? Arch-gonad?) is an obvious weak point, but it's not clear if the player can or can't shoot other parts of the monster for moderate damage. It's not entirely clear that bullets affect it, either, even though they do. This is an objection I have raised elsewhere, but it's more troubling in this fight because of the monster's very large pool of HP. Yes, the phases indicate a change, but transparency in any action game is a good thing.

There's not much to say about the three arenas other than to look at the relationship between them. In the first and third arenas, there is some cover. In the second arena, there is essentially no cover, and the player can fall through the

floor in such a way that the fight becomes impossible to finish. To mitigate that last problem, the second phase is usually the shortest in terms of HP to deplete.

The arenas get smaller each time, making it harder to evade the Gonarch. In a truly brutal series of evolutions and expansions, the cover would disappear in the second arena and not reappear in the third. That's exactly the sort of thing that would have happened (and basically does happen) in *Quake* and *Quake 2*. It doesn't happen here, however. The other unique thing to happen here is that the Gonarch stays above Freeman for at least a little while. That one part of the fight is actually quite fascinating, and represents the culmination of all the verticality in the game.

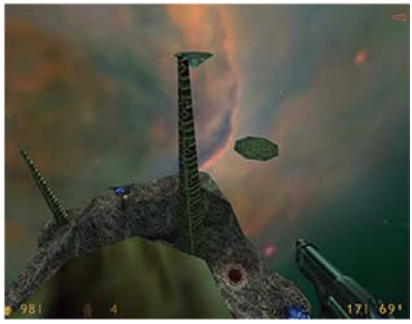
Aside from firing upwards and running around to avoid the tiny crab creatures, there's not much to this part of the fight, but the fact that the designers included a kind of capstone experience to the vertical design elements in the game is still fairly impressive.

With that out of the way, there's an interlude to the arenas in between the first and second that features a problem endemic to boss fights. If the player doesn't race alongside the Gonarch to the second arena, the creature will charge in a very narrow space at the bend in the hall.

This will kill many inexperienced players. Once known, this attack is fairly easy to avoid, but I think this type of difficulty is an indictment rather than a credit to the design. Because the Gonarch doesn't really telegraph its charge, and the darkness of the corridor obscures everything, the player can't always see it to avoid it. The player dies once to learn that the attack is avoidable, but why is such a death necessary? I don't believe that this is a good kind of difficulty; it is, in the oldest sense of the word, artless. Avoiding the Gonarch's charge in the tunnel doesn't suddenly reveal something about the Gonarch that the player can use to defeat it during the other phases; it's simply an unnecessary bottleneck in an otherwise solidly-designed fight.

## Set Piece 17-1: In the Sky

In theory, the combination of platforming action and arena-style shooting could be great, but this isn't. I place this in the arena theme because although there is platforming, the real difficulty in this set piece is fighting the many waves of overseers without cover. Really, the awkwardness of this set piece means it doesn't belong in any organizational structure, but arena is the one that comes closest. If nothing else, this set piece shows how much of a difference there is between the arenas of Xen and those of Black Mesa.



The big problem here isn't just the presence of overseers, but rather that the platforms are not conducive to dodging, and there is no cover. The mismatched orbits of the platforms move slowly through the sky, making it very difficult for the player to rush through them. Moreover, jumping back and forth is incredibly difficult because of the infrequent overlaps between the orbits and the large height differences between the orbiting platforms. Finally, the platforming mechanics of Xen are just as bad in this set piece as they ever were. Presumably, this set piece exists to prepare the player for the Nihilanth fight, but that fight is fair and gives the player plenty of leeway. This fight is a series of tiny aerial arenas, and the whole point of the arena theme is mobility. but the player doesn't have mobility here. It's really a shame because the combination of platforming and shooting works well in the Nihilanth fight, but it's poorly implemented here.

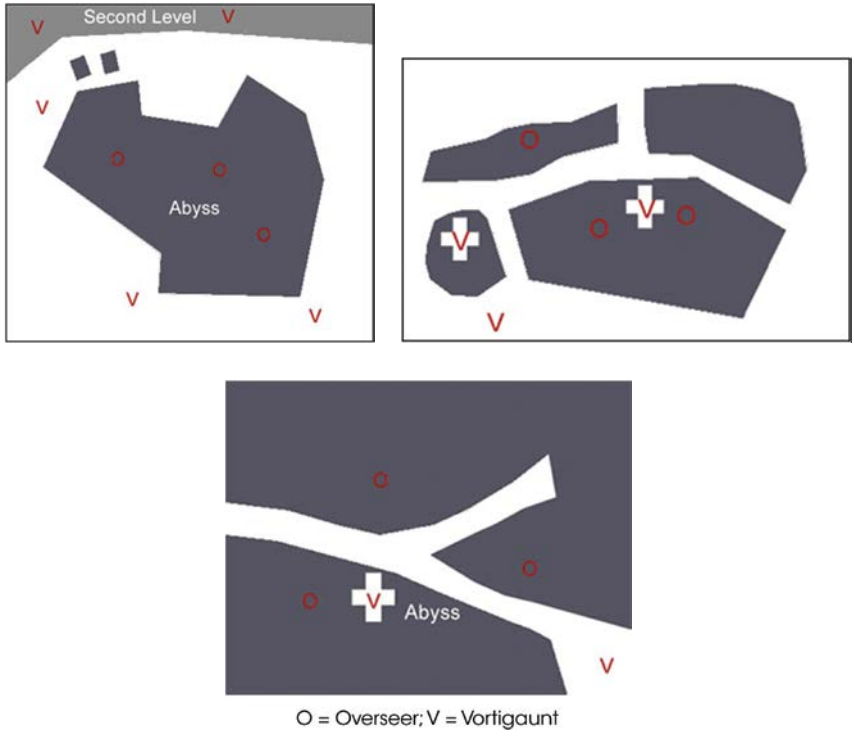
## Set Piece 17-3: Two Guardians

This set piece is an arena version of an earlier cover set piece, 12-4. I like this set piece as an example of the convergence of arena and cover design, where ideas from both themes come together. There are two geological formations that obscure the player's view of two alien grunts. Like set piece 12-4, the enemies here can surround Freeman no matter how he approaches the set piece, if the player is not careful.

Unlike the previous set piece, there isn't anything here that can work as reliable cover. The two mounds are a kind of downgraded version of the boulder that existed in 12-4. They might grant an instant's reprieve from grunt fire, but their only real purpose is to give the arena shape and hide the second grunt. It's sometimes possible to isolate one of the grunts for a moment, but that grunt will always be able to fire back at Freeman with his homing bullets. This is as close as the arena and cover themes can probably come together in the context of *Half-Life* (depending on how you view the Nihilanth fight). As we'll see in the next few set pieces, the cover and arena themes have some serious conflicts when their design ideas overlap.

## Set Pieces 17-6 through 17-9

These set pieces represent variations on a common theme that doesn't make much sense in the context of *Half-Life's* level design, but which would be totally at home in a Quake game. Each of these three set pieces follows the same essential formula: there is an arena-type set piece with a large pit in the middle. In Chapter 14, we saw several set pieces along these lines in the three grunt rooms (14-5, 14-6, and 14-8), but the idea here has become a bit bloated. The set pieces are extremely large, at least double and in the case of 17-6, probably three or four times the size of their ancestors in Chapter 14.

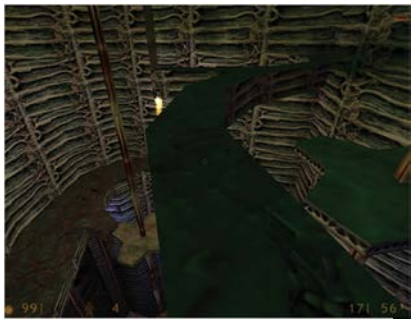


The central challenge of each set piece is the alien overseers that hover over the central pit. I like this as an appropriate use of the alien overseer's flying abilities, and it works as a next-level challenge for the player's shooting abilities, but where are those things supposed to fit in the greater context of *Half-Life*? In the Black Mesa part of the arena theme, this set piece would have been about mobility and quick reactions, but here, the huge size of these set pieces, the terribly small walkways, and the gaping holes in the middle really hurt the player's mobility. Moreover, because of the arena size, the enemies are farther away than normal.

In 17-6, the Vortigaunts along the perimeter can be hard to hit. *Half-Life* has rarely demanded long-range combat before, and definitely never at a sustained distance like this. The weapon loadout offered to the player isn't really up to the task. There is no sniper rifle, and the nearest weapon (the crossbow) has slow-moving shots that are not ideal for this range. It's not impossible to hit the enemies with the magnum, for example, but it's difficult in a way that the game hasn't prepared the player for.

It's easy to see how the set pieces relate to one another, at least. Both of the later iterations of 17-6 contract the size of the arena in a meaningful way and add something new. First, 17-4 adds some perimeter cover, but again that's rather out of place in the context of the larger game.

What is the player supposed to do with this cover except wait for the alien overseers to get in a good position? There's no direction or implication in the cover; it's almost as if the game has reverted all the way back to the kind of dynamic found in *Space Invaders*. This would be pretty funny since Freeman is fighting actual space invaders, but the long range and unclear dynamics of the set piece are unlike the smaller, purposeful set pieces that make up the majority of the game's content. There's too much waiting and sniping while in cover, so it feels like a different game from the tight, tense action of Chapters 3 to 14. Set piece 14-8, meanwhile, has a very interesting evolution in the way it puts Freeman in the middle of the arena, surrounded by two large pits.



Putting the alien overseers on either side of Freeman as he crosses the bridge is a clever way to turn the iterated idea on its head, but that doesn't necessarily excuse it from being unlike everything else in *Half-Life*. There's no cover and very little ground to run on, so the arena's best resource—movement—is diminished terribly. The designers seem to be trying to give the game a sense of climactic grandeur, and the look of the levels certainly accomplishes that. Riding up all those elevators to the giant, hovering teleport pad does create a palpable sense of a coming climax—it's just a shame that the game design doesn't really follow suit.

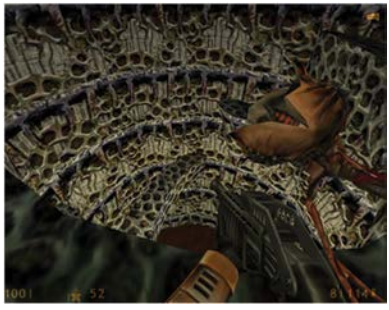
## Set Piece 18-1: Nihilanth

I normally do not say much about a game's boss fights when writing a *Reverse Design*. I am even more hesitant to write about the last boss fight of a game because designers tend to do one of two things that make writing about these fights somewhat pointless. The first option is that designers adhere unswervingly to design trends they've already established in the game, and simply make the boss fights a sustained, slightly more difficult version of what's already been done. I have no objection to this in principle; I think it makes for good games and good boss fights. Sometimes, there's just not much to say about such a fight that isn't better illustrated elsewhere in the game. I do object to this when the last boss fight is padded with pure, unexciting reiteration, although that is not the case here. On the other hand, the last boss fight of a game is frequently very different from the rest of the game. I do object to this,

as it is bad game design. If you, as a designer, are going to spend a whole game teaching a player how to do activity X, why would you want them to do activity Y at the last minute? The best example I can think of is the boss battles in *Super Mario 64*, which depend on a mechanic not used anywhere else at all to deliver the killing blow. *Half-Life*, interestingly, sits halfway in the middle of these two poles.

There are two phases to the battle against Nihilanth, and the first one is full of redundant errands. Nihilanth's arena itself is actually quite standard for the arena theme. The player can hide behind pillars, but it isn't exactly cover. For most of the fight, he can't fire from cover to deplete enemy HP. For part of the middle phase, Freeman can actually use cover, but the rest of the time, it's an arena encounter. The player spends most of the time behind the pillars waiting for Nihilanth to make the first move. This is somewhat disappointing because the game is mostly about cover dynamics.

The teleportation attack is not clearly explained in the game design. Colorblind players and anyone who doesn't put the color pattern together naturally will spend a long time learning not to dodge, assuming that they ever figure it out. The Nihilanth does not move, however, and this is actually somewhat refreshing, as firing into the sky at moving targets has been an unfair and largely un-fun task for enough time already in Xen. The real problem is the layout of the rooms the player is teleported into. I won't get into each room's particulars because they are essentially all just lifted from other parts of the game, but there is one room that stands out in its odiousness. The very tall platform chamber is not only far too large, but it is also far too difficult in the dimension where Xen is the weakest.



I would estimate (after writing an entire book about it) that more than 95% of the game's content is either shooter content or normal-gravity platforming content. Asking the player to make a series of difficult jumps for which they have not been prepared—when all they want to do is kill the last boss—borders on mockery. I credit the design team for not using fall damage to make it even more frustrating, but this section is just entirely out of place. The developers have done such a good job of putting platformer content in the game to break up tension, but who wants to break the tension of a last boss fight?

The two phases of actual combat against the Nihilanth itself are much more in line with the rest of the game than the teleport-rooms. The first phase in particular is almost entirely orthodox arena content, and where it deviates from the norm it does so in keeping with the spirit of the design. Although the pillars aren't really cover, they're quite useful in the way that architecture in the arena theme sometimes is, since the player can successfully hide and still see the creature. Freeman isn't fighting from cover in the first phase—he's running between blasts—but at least the designers have made it possible to do so without taking splash damage.

The other big improvement is that the boss takes visible damage; in the second phase, the boss's energy orbs disappear and ichor leaks from his skin when shot. All of the big enemies of the game, the Gargantua, Helicopter, Ichythyosaur, even the Gonarch—they don't telegraph their remaining HP the way that the Nihilanth does. Sometimes it's hard to even tell that Freeman's shots have hit those enemies in a vulnerable area. The reason it's different this time is probably because if the creature's HP amounts weren't visible, the puzzle involving the healing crystals would be completely indecipherable. I don't know in what order the set pieces of this game were designed, but it seems strange that after designing this fight, the designers didn't go back and add some semblance of HP indicators to other bosses. Nevertheless, the boss's HP and related puzzle are both easily understood, and that's a good thing.

The final phase of the fight isn't quite as clear as the first phase, in that it asks the player to do something new. This new task is defensible because the designers have

spent at least some time preparing the player to do it. The second phase involves jumping over the Nihilanth and firing down into its brain case. On its surface, this is entirely within the realm of skills taught to the player already. The player has done plenty of jumping, and even done quite a bit of jumping in Xen gravity by now. I've already raised my objection to the Xen platforming mechanics, and that objection stands. As far as jumps in Xen go, however, this is a relatively fair one. The jump over Nihilanth's head is combined with a downwards-facing shot. Up until this fight, there has never been an instance where the player had to fire and jump at the same time. There have been plenty of jumps and a fair number of instances of firing downward, however. With that in mind, this is exactly the kind of A+B evolution that designers had been implementing in videogames for years before *Half-Life* came out. I would have liked to see some combination of jumping and shooting before this to really prepare the player, but at least the player has used all the component mechanics before.

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# 5

# Non-Theme Set Pieces and Selected Through Content

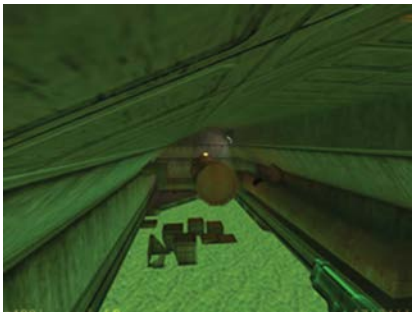


This chapter (of this book) collects various set pieces that meet all the criteria of a set piece, but do not fit into any particular theme. This is something that *Half-Life* has in common with *Super Mario World*. In that game, the majority of set pieces fit into one of the four skill themes, but some did not. There's still a lot to learn from some of these set pieces, which include a few of *Half-Life's* most memorable moments. Additionally, this chapter (of this book) examines some of the best through content in the game. As explained earlier, through content is an important part of pacing in a set piece game. One of *Half-Life's* strengths is that its through content is not merely dull filler material. Many great touches that add to the immersive quality of the game are rendered as through content, and for good reasons that we'll see below.

## Set Piece 6-1: Sho-cart

The introduction of the drivable track cart could be considered through content; certainly, most of the time spent on the cart in Chapter 8 is just that. Its introduction, however, is a self-contained section with a clear beginning and end,

and it definitely lasts long enough to be a set piece. It doesn't fit with any other theme, but I think the designers did a good job finishing this set piece with a bang.



None of the enemies along the length of the track are a real threat because their ability to target Freeman while he moves at cart-speed is poor. Because the area around the track is wide open, however, it's easy enough to fire at and kill them. The memorable thing about this set piece is that it does have a clear end when Freeman is catapulted into the air and flies a hundred feet onto a distant platform.

## Set Piece 6-2: Tentacles

This odd boss encounter plays with numerous videogame conventions, especially those found in the boss fights of *Quake* and *Quake 2*. The encounter is clearly a boss fight, but the player cannot directly attack the enemy. There are encounters in *Quake* like this, in the sense that some bosses were effectively immune to gunfire, but nothing in *Quake* ever approached the level of elaborateness (or made the player so vulnerable) as this encounter. At best, the *Quake* encounters of this type forced the player to solve a very small puzzle, whereas this boss fight manages to involve the exploration of an entire level. The player has to pass through the chamber housing the tentacles at least three times, although only the first pass is really interesting. The tentacles attack loud sounds, meaning that regular running and jumping is extremely dangerous. This would make only for a moderate challenge, as there is a sneak function and it works here, but the designers throw in a clever problem to solve. An exit and a ladder are blocked by destructible crates.

This forces the player to take a risk, which is always good. It also demonstrates the finer points of the noise-seeking mechanic to the player, showing them exactly how to use the grenades to distract the beast. Killing the creature is an unremarkable event that involves merely pressing a button, but sneaking past it is an elegantly designed task. My only real complaint with the sneaking is that it can take a long time because it's not clear what level of noise is dangerous, and the passage by the creature has to be repeated one time too many. The first two times through are good for building tension, but too much repetition just becomes frustrating. If the player overlooks some part of the puzzles beyond and has to backtrack or gets lost, this hurdle becomes annoying in a way that doesn't add anything to the game. Obviously, playing any game the wrong way can cause it to be annoying. The best games account for the potential for player error and take steps to avoid that particular frustration.

## Set Piece 7-4: Gargantua

This fight is similar to the encounter with the tentacles, in that the player has to pass by it several times before defeating the boss, and that the player has to defeat the enemy through means other than a weapon. Like the tentacles, the Gargantua demonstrates its abilities on NPCs.

After reactivating the generator, the player has to cross this room again and race the Gargantua to the electrical nodes. This already presents a huge problem. How does the player know where to go, and if they explored the back room where the power nodes are, how are they supposed to get back out after being trapped by the pursuing Gargantua? The footrace itself is exciting and a nice break from the slow progression through cover-based content. The destination is the problem.

There's no lighting or decals visible from this angle to tell the player where to go. Highlighting the path, even subtly, wouldn't have broken the tension here. The switch that the player is supposed to reach isn't especially clear, either. Moving slowly, a player should figure out that the walkway leads to a switch, but players are going to be panicking here, and might miss it the first two times. This is a low-skill boss fight, and after two or three deaths, unsuccessful players will realize they're just missing something that's supposed to be obvious. The thrill of a fight like this should be in nailing it the first or second time while the feeling of fear is still palpable, and not after the player has become bored with trying to find a switch.

## Set Piece 12-12: Charge of the Vortigaunts

This set piece is a fantastic example of the "reward-by-fun" principle. Chapter 12 is full of difficult set pieces, but the purpose of this one is to give the player something mindlessly fun to do after trudging through the brutal encounters that precede it. The setup is simple: there's a floor-mounted rifle with infinite ammo pointing up a ramp full of Vortigaunts.

After the initial wave, the Vortigaunts teleport in one or two at a time, making it easy to target them one by one. Really, this is like a carnival shooting gallery. The point is not for this to be hard, but to relieve some of the tension that has been building through all of the intense (and deadly) set pieces that surround this one.

## Set Piece 12-14: Marked for Death

This set piece, although it doesn't fit into any particular theme, is one of *Half-Life's* most idiosyncratic moments. There are some curious design decisions here from the perspective of overall game difficulty. The set piece begins with a chase similar to the one in set piece 7-4; a Gargantua pursues Freeman to a device that allows him to kill it. The first strange thing is that this chase is actually a lot easier than its obvious ancestor. The Gargantua will become sidetracked by various enemy soldiers and obstructing cars. The set piece gets interesting once Freeman makes it to the artillery station at the end.

The interface for controlling the artillery is easy to use and the splash radius of its impact make it powerful (and fun). What's the point of this set piece? Where's the challenge? The challenge is not the point. Since Chapter 12 is sufficiently

hard already, it doesn't require a grand challenge at the end. This is another example of reward-by-fun. I find it a little unusual that there are two such set pieces so close together. I will say, however, that Chapter 12 of *Half-Life* is one of the most densely-packed levels in any game that I have ever played, and so I suppose its insistence on breaking the tension with puzzles and other unusual content makes sense.

## Set Piece 17-2: Second-Hand Violence

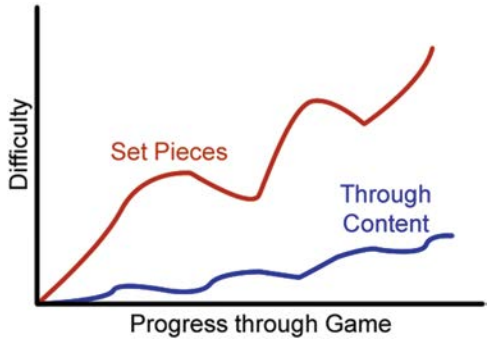
This set piece recalls set pieces 12-14 and 7-4, in that Freeman has to flee from a chasing Gargantua. Like many things in the Xen portion of the game, it's poorly done as compared to what came before. The chase itself is rather short and quite abrupt.

In addition to being short, the goal of the chase is nebulous. First-time players are going to have no idea what they're supposed to do out in the environment seen above. The essential idea is the same as in both of the previous set pieces; the player has to use the environment to kill the Gargantua. How is the player supposed to figure out that it's the tentacles that are the mechanism for killing it? How are they supposed to figure out a good place to stand? Set piece 7-4 had a similar problem in that it wasn't obvious that the generator was the mechanism for killing the Gargantua. Even there, however, there was only one button to press, and there wasn't a large empty space to confuse the player. Finally, shooting the tentacles to kill the creature takes an unnecessarily long time. Confusion can be useful in game design, but only sparingly and not like this. Boredom is to be avoided.

### Selected Through Content

What happens in between set pieces? *Half-Life* is not a series of set pieces lined up one after another with no breaks; often there are significant amounts of content in between set pieces that do not possess the defining properties of a set piece. I call these portions of the game through content. To understand what through content is and how it works, we're going to glance back at the

history of videogame design for a moment. As game design history moved from the composite era into the set piece era, and the set piece replaced the challenge, designers began to need something to replace composite flow. Instead of bouncing back and forth between genres to keep up a good "rhythm" for the game and keep players interested without over-taxing them, the designers of set piece games needed to do something else. Generally, this meant that set piece games returned to the up-and-down motion along the axis of obstacles we originally saw in the arcade era. There are some differences between what we see in the arcade and set piece eras, however. The through content portions of *Half-Life* and later set piece games tend to have a much shallower difficulty curve relative to the steadily increasing difficulty one would expect from sequential challenges in a videogame.




There is more to through content than just a low level of difficulty. Through content is also essentially the opposite of everything that defines a set piece. Through content is usually made up of brief actions; even if there are multiple tasks made up of through content between set pieces, they tend to be varied qualitatively rather than quantitatively. That is, the player may have to perform three different tasks between set pieces, but all three will be of roughly equal difficulty and each will be a different kind of task. For example, in between set pieces 7-2 and 7-3, there is a generator puzzle with a few different kinds of enemies mixed in.

Although the player has to face several types of enemies and solve a puzzle, the difficulty in each of these rooms never really grows. (Interestingly, the Houndeye enemy seen here is almost exclusively used in through content. This seems to indicate that the set piece/through content model of gameplay might be a natural property of games made the way *Half-Life* was made.) With this in mind, we can set out three guidelines for through content as it appears in *Half-Life*.

1. Through content exists at a fraction of the difficulty of the set pieces it punctuates. As set pieces get harder, the through content gets harder as well, but its difficulty does not scale with nearby set pieces. Its level of difficulty is in place to break tension, not add to or reiterate it.
2. Through content does not scale in length with the set pieces it punctuates. The longest set pieces are not broken up by the longest through content. If anything, the reverse seems to be true.
3. Although through content may consist of many small tasks between set pieces, each of those tasks is short and tends to be qualitatively varied.

We're going to take a look at how *Half-Life* uses through content in certain spots in the game. This won't cover every single example of through content in the game, but the best examples contain real lessons, and we'll see what they can teach us about game design.

### *Moving Up and Down: Changes Along the Axis of Obstacles*

One of the observations that most clearly supports the set piece/through content division is that there are enemies that almost exclusively appear in small, short challenges. It would be a tautology to say that through content monsters appear only in through content, but I think the evidence in *Half-Life* speaks for itself in this regard. The Houndeye and Headcrab zombie rarely appear except in the shortest encounters. With a few exceptions, zombies come in groups of one or two. They move slowly and, except when they have the element of surprise, rarely present much of a threat.

If the designers are looking for a task which can punctuate set pieces to relieve tension or simply alter the pace of a level, zombies are perfect for that.

What is true of the Zombie is largely true of the Houndeye as well, although there are some significant differences between the two types of enemies. The Houndeye is less durable than the Headcrab zombie, but it also tends to come in packs and is much faster than the zombie. The speed and numbers mean that the Houndeye might actually damage players who are paying attention. Even on the hardest difficulty setting, however, they don't inflict that much damage when they do strike. Instead, we see Houndeyes appearing in spots that might otherwise have been just a little too boring. Unremarkable corridors and catwalks which wouldn't be appropriate for a full set piece are the habitat of the Houndeye.

Like the zombie, the Houndeye largely disappears at the climax of the cover theme.

The presence of Houndeyes or Zombies frequently means that the designers planned a section as through content, but the presence of enemies like marines or Vortigaunts does not necessarily mean that a bit of content is a set piece. The primary criterion for a set piece, especially in *Half-Life*, is the "extended" aspect of content. Speed-runners may be able to blow through a set piece in a few seconds, but otherwise it tends to take around a minute or more (to say nothing of deaths and re-attempts) to get through a set piece. The appearance of the more challenging

enemies does not, by itself, create an extended content situation; the context has to be right, too. Thus, there are many examples of a few enemies arranged to be dispatched quickly. The best example of this is the scattered marines at the end of Chapter 8.

One grenade will take out these clustered marines, and the player is fairly well-stocked at this point in the game. The important thing about this set piece is how it serves the game's pacing. Chapter 8 is full of long, crowded set pieces and has a huge amount of slow, cart-based through content. The designers, realizing this, allow the player to blow through a few quick encounters by positioning small groups of marines in locations that don't have a lot of cover. It's almost like an example of comic relief in a drama in that it refreshes the viewers/players so that they can fully appreciate the upcoming content.

The above is an example of what I call "almost-but-not-quite set pieces," which serve as variations in difficulty and pace in between set pieces. Another good borderline case is in Chapter 12, in which the player encounters a group of combating aliens and marines. Unlike other set pieces in which the fighting between the factions creates an arena dynamic, the fighting here just reduces each side to virtually nothing.

No matter who survives, a few Snarks or grenades will end the action more or less immediately, so I don't think this passes the "extended" content measure. Freeman's involvement in the battle is extremely limited, unless the player deliberately interrupts the fighting between factions.

I think the most fascinating property of these "almost" set pieces is that they often do a better job breaking the tension than a complete absence of danger would do. In the composite era, designers bounced between genres to break the tension and/or monotony of one genre's challenges slowly getting harder across a game. *Half-Life* does this, too, because it's not a pure set piece game—it's also a composite game. *Half-Life's* platformer content often breaks up the most intense sequences in the game, as we have seen many times. Set piece games go up and down in difficulty to accomplish something similar. It's interesting, though, that the designers of this game felt that relieving the tension around especially hard set pieces required especially flashy through content. In Chapter 12, there's a good example of this.

The player fights a pair of soldiers and then has to blow open a door using a high-explosive cannon. Out of that door, numerous alien grunts come charging (which requires a special script because charging is not normal for them) for the player to pick off. Much like in set piece 12-11, the player has to simply gun them down with the enhanced firepower. This example is much shorter and doesn't really pass the extended criterion, so it makes more sense to see it as part of a chain of through content. The goal is the same as that of its set piece counterpart, though: it's a reward by fun.

Another good example of this is the two mostly oblivious marines in Chapter 5. For most of the game, sneaking up on a marine is quite difficult and requires knowing where that marine is located ahead of time. Veteran players can sometimes get the drop on a marine by shooting a few exposed pixels of the marine's knee, foot, or helmet from around a corner. New players who don't know where to expect enemies can't really do this, except at this one juncture.

Sneaking around the ducts to get the right angle to blow these two to pieces takes some time, but because the player isn't really in danger and there's no clear beginning or end (the player doesn't have to kill them) it doesn't really resemble a set piece. It's just another almost-set piece that breaks up a long string of more intense content with something just a little bit different and, if we can term a simulated double-murder so, something that's just silly fun.

### *Moving Side to Side: Assorted Platformer Content*

One of the things I already wrote about in the platformer theme is that the role of platformer content in *Half-Life* is to break up the otherwise endless series of shooter set pieces. I also mentioned that the platformer content doesn't really fit the definition of a set piece because it lacks the self-containment aspect of one. Nevertheless, it made sense to look at many examples of the longer platformer sections as set pieces to understand how they related to one another and how they fit into the game as a whole. There are many platformer challenges that did not fit into that theme because they were so short, and I want to take a look at some of them here. Ultimately, most of these are no different than their longer counterparts in terms of design or purpose.

The best example of platforming to relieve tension is Chapter 10 because the whole thing is based around platformer content, breaking up several shooter-heavy chapters. The second best example is in Chapter 6. Chapter 6 is built around a boss (the tentacles) that exists in its literal and metaphorical center. Surrounding that boss is a larger amount of platformer content.

Sneaking past the tentacles might be the tensest moment in the entire game because of how exposed Freeman is. All of the content around it, by contrast, is made up of small encounters with isolated monsters and jumping tasks. Whether it's jumping over a broken catwalk or jumping on top of wall fixtures to get past radioactive/electrified puddles, the tasks are relatively simple. The tentacles encounter is tense, slow, and fearful, but it's not particularly complex. The long chains of through content are not especially challenging, either; they're designed to counteract the creeping tension of facing the instant-death drama of the tentacle room.

Not every bit of platformer through content is placed so well, though. Context is important for through content because of what the placement of different types of content can say to the player. For example, at the beginning of Chapter 8, there is an optional excursion into a corridor with a flooded room that requires some very precise jumps.

The second jump pictured here might have the smallest margin of error in the game. The penalty for failure is nothing, but there's also no great reward for completing it—there's no Easter egg or giant ammo cache. The fact that this content comes at the beginning of the chapter makes it seem like Chapter 8 is going to be much more maze-like than it actually is. In reality, there are really

only three places in the whole chapter that require any change of course. (In my opinion, that's three too many, but I understand that the designers didn't want the chapters to all feel the same.) First-time players can easily be misled by this sideshow because it comes first in the chapter before the player gets a proper introduction to what this chapter is really about. The content itself is only mildly problematic, but it's in the wrong spot. It doesn't break up anything; it just gives a strange impression of the chapter to come.

Chapter 8 does actually have some good platformer content, although it doesn't resemble platformer content at first glance. There are two brief sections on the cart in which the player has to drive through some low-hanging boxes that swing by.

Slowing down or ducking at the right time is the key to avoiding being knocked off the cart. This is actually a form of entirely orthodox platformer content. The boxes that swing past are just periodic enemies that knock Freeman off of platforms (in this case, the cart). This doesn't involve jumping, but precisely timed movement is a big part of the platformer form too. In the first instance of this, it's not difficult at all, and the player can simply duck for the entire pass. The second instance is a classic evolution of the first, in which new elements are overlaid on top of the original elements to increase the danger. The lasers mean that if the player gets knocked off the cart, turrets will activate. The addition of two marines means that the player can't just crouch the whole way through, or Freeman won't have a way to fire on them. Thus, the player has to quickly react and kill the marines without getting hit in the head by one of the moving boxes. It's short, but it's a good example of composite design styles appearing in platformer content in the middle of the game to break up long strings of set piece content.

### *Dramatic Flourishes*

As a part of the research for this book, I asked many people what they remembered about *Half-Life*. Most of the answers had nothing to do with the big battles, boss fights, weapons, or mechanics. Rather, the things that stuck out

in the memories of the most nostalgic players were the cinematic flourishes with which the game is filled. These moments were what made it seem like *Half-Life* had a great "story." I put the word story in quotes because I don't believe that *Half-Life* had a good story in the conventional sense of the word, but I agree that there are many moments in the game which have a certain artistic flair to them. A good example of this, and one that I heard about often from other players, is the section in Chapter 12 where two marines shoot holes in the air duct where Freeman is hiding.

The marines detect Freeman (ostensibly) when he bashes the vent screen in and alerts them with the sound. The marines shoot the duct full of holes and then it crashes to the ground. The actual game design causes and results of this event are far different than what the player believes them to be, however. I don't have access to the game code, but I do know from other set pieces that much of what happens here is not a product of intrinsic enemy AI. Instead, what's probably happening is that when Freeman crosses a certain line in the duct, a custom AI script tells the enemies to shoot the duct. This may not even actually happen, either; the player can't see the enemies, and the angle of the bullets doesn't really match the position of the marines once they are visible. It may be that an invisible, custom-generated actor fires the bullets and then de-spawns. This is a convenient trick used in many games across many genres. What's more, the duct here can be shot through while in the rest of the game this is impossible. (Try shooting through solid duct floors! Freeman can't do it.) We know that the designer had to ask the programmers to create a special object that was permeable to bullets. Finally, the designer also had to ask the artists and programmers to create the beams of light that poke through those bullet holes because the lighting engine of *Half-Life* does not support this kind of streaming light anywhere else in the game, as any trip through any other lit drainage pipe or duct will reveal.

I don't know how much time these pieces of content took to make. What I do know is that the level-editor that the Valve designers were using would have

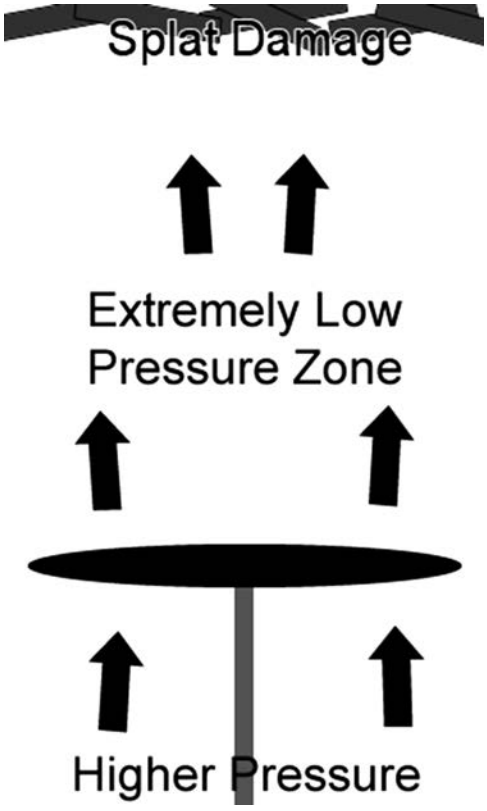
required several modifications and unique objects to make this happen. It's obvious that the Valve team put a lot of effort into moments like these, even if the return on investment was low in terms of minutes of gameplay. This series of scripts takes all of five seconds to play out, whereas a set piece that can be created by a level designer all on his or her own might last five minutes. The ratio of minutes of manpower to gameplay is much higher in a set piece because so much of the work is done ahead of time in the form of the level editor. We'll take a look at several of the best brief moments of content throughout the game and how they are put together.

*Outrunning the Fireball* If we take the notion of a cinematic moment as being something that has happened in movies before it happened in videogames, this bit of through content is the most cinematic set piece of the whole game. Just as the player is about to guide Freeman out of a pipe in Chapter 12, a lone marine tosses a satchel charge into the pipe. I remember reviews of *Half-Life* from the late 90s and early 2000s mentioning this moment as a way of praising the AI of *Half-Life*. This isn't an example of AI in the conventional sense, though. A one-time script tells the marine to drop the satchel when Freeman crosses a certain point in the pipe.

The satchel is not actually that dangerous; its blast radius is fixed and its explosive power is not conserved inside the small space of the tube. A real explosion might have its force redirected out the other end of the tube, resulting in the kind of "outrun the fireball" moment the designers were trying to recapture. The physics of *Half-Life* don't support this, however, and so the designers had to simulate the effect. To do this, they set up several flame jets that had a special "shoot through walls" property, although this was probably the only special asset/programmer request involved in this event. Each of these flame jets was timed to progress as marked on the diagram. The "explosion" isn't really an explosion at all, but rather a series of heat sources (like the flame jets in Chapter 10) activating in sequence.

*Turbofan* The giant fan in Chapter 6 is a memorable moment and a good example of an important property in videogames. The player's task is to turn on the fan and then get above its rotating blades before they start moving too fast to pass.

Succeeding at this will result in the player flying up into a boarded up ceiling, and flying is a lot of fun. Setting aside the plausibility of this flight, there are two major violations of physics here. The first violation is that the pressure difference above and below the fan would cause Freeman to get sucked up into the blades if the player waits too long to get him out, but that does not occur.



The other big violation is that Freeman takes no damage from flying into the ceiling when he ought to take more damage from hitting his head than his feet. There's no obvious deceleration to explain this, either. There are a few ways the designers might have achieved this, and I probably won't cover them all. I want to point out a few things relevant to the design, however.

The first option is a global rule: Freeman's head takes no fall damage. This would mean that the fall damage calculation is separate from the collision/impact calculation of bullets and moving objects. That would probably present a host of bugs during other types of collisions, so I'm guessing that isn't it. Another option would mean that fall damage only occurs with a downward vector and isn't based on the absolute value of Freeman's velocity at all. This would mean that the "Freeman" object has a counter variable in it that measures the uninterrupted changes in Y-axis position and calculates damage based strictly on negative changes in position. This option makes the most sense with what we know of Xen. In Xen, the fall damage scales bizarrely such that jumps that seem safe are often fatal. The designers probably put in a "sudden death" limit or special multiplier on Y-axis position changes in Xen to make their set pieces work. The final option is that there is a unique "no damage" modifier at the top of this shaft. This would actually be the simplest option, and it would work just fine for *Half-Life* because, one, there are no sources of damage at the top of the shaft, and two, there are no other examples of this kind of flight in the game.

That last technique for eliminating damage from ceiling collisions is a good meta-example of what all of these strategies are doing. Defying the real-world rules of physics is fine in a videogame; it often makes the game a lot more fun in the case of a platformer. This is what has been called (in videogames and elsewhere) *acceptable breaks from reality*. The best way to employ an acceptable break from reality is to leave in the obvious and intuitive portion of a mechanic (like a fan causing Freeman to fly) but to take out the deadly minutiae like pressure gradients and collision damage. The last example I listed above, in which there is a special "no damage" zone at the top of the fan shaft, is an in-universe example of an acceptable break from reality. If that is the mechanical trick that the designers employed, it is an example of the designer cancelling the rules of the *Half-Life* universe the same way that *Half-Life* cancels many of the real universe's rules (like, say, the ability to instantly regenerate health) for the sake of gameplay.

*Smaller Flourishes* There are some less-grandiose flourishes in the game, too, that help to reinforce the persuasiveness of the game world and help to keep giving the player surprises. One of these surprises is the ceiling-mounted laboratory gun in Chapter 11.

This weapon seems like a great idea: it's different, and it's located in a point in the game where the player has very little ammo. The problem is that the AI does not cooperate with the player's desire to nuke a room full of enemies. Luring the Headcrabs out of the cages or pulling guards in from the hallway—both of these tasks are clumsy. *Half-Life* is many things, but it is not clumsy. The precision and finesse of *Half-Life* were light years ahead of what else existed in mainstream PC games at the time.

*Killer Rabbits* There are a handful of moments in *Half-Life* in which the player is suddenly killed by a lone enemy or sudden and unexpected fall. I am on record as saying I don't like this as it has little to do with the primary skills of the game like reading cover, reacting to an arena dynamic or jumping precisely. There are games that are about unthinking reactions to sudden stimuli, and *Half-Life* is not

one of them. The best example I can think of is in Chapter 8, when a soldier down a long hallway launches a rocket at Freeman's cart.

The hallway is narrow, the soldier is hard to see, and the blast is fatal. Why does this need to be in the game? There's no cover, there's no arena, there's no platform, and there's no warning sign. All of the organization and thoughtfulness that are packed into *Half-Life* are absent in this instance. Another example, although it is less egregious, is the minefield.

Where does randomly dying in one brutal moment fit into the design scheme of this game? There are plenty of games like that, but *Half-Life* is not one of them. Even if the player can shoot the mines to reveal them, how does wasting tons of ammo make sense in the context of this game? This is just needless. This kind of cheap death would be the same as if one of the level-zero rabbits in a *World of Warcraft* starting zone suddenly killed the player.

The design team did a better job with this idea when they implemented the sniper nest. Several instances of the sniper nest appear late in the game in unexpected spots, yet manage to not be totally unfair. You can see here how the sniper nests are unobtrusive in their high locations, but the solution to them is obvious.

The biggest mitigating factor built into these nests is that they're not instantly fatal. Taking cover is possible; fighting back is possible. The player has options and can use them, and so if Freeman suffers fatal damage, the player is more likely to feel that the death was his or her own fault. It's never good when the player thinks, "the designers are just being jerks here." Instant deaths cause this frustration, but these sniper nests do not.

*Ranger Danger* Although it does not seem that the designers of *Half-Life* were determined to make it so, the game has very few instances of long-range combat. This avoidance may have to do with the design of the game's weapons. Up until the generation of FPS games to which *Half-Life* belongs, projectile weapons in games fired large bullets in perfectly straight lines. In *Half-Life*, there is an element of semi-realistic weapon jitter, and the bullets are quite small compared to past shooters. *Quake* had introduced 3D enemy models with accurate hitboxes, and *Half-Life* preserves that trait. All of these features make long-range combat difficult unless the player is using a specialized weapon. *Half-Life* really only has one weapon that is "made" for long range: the crossbow. The level of specialization is a little lacking, however, as the accuracy made possible by the zoom function is confounded by a slow-moving projectile. The maximum distance at which the crossbow is really useful is the distance we see in Chapter 9.

(Both of these examples are shot through the crossbow's telescope.)

Having just received the crossbow, it makes sense that the designers would allow the player to use it at its most pertinent range and purpose. What's really interesting is that the Bullsquid has been used like this before, several times before the player gets the crossbow. The majority of these earlier instances are in Chapter 6.

In these cases, there's actually not much reason to kill the Bullsquid. It doesn't guard anything terribly useful, and there's plenty of cover to shield Freeman from the flying gobs of acid.

The cover and the slow speed of the acid are the point, I think. Most of the projectile weapons in the game hit their target instantly. Explosive weapons don't do this, but they're so dangerous that to strike instantly would be unfair. Of the non-explosive weapons that enemies possess (at least before arriving in Xen), only the hive-hand weapon doesn't strike right after it's fired, but it does fire homing missiles. The long range at which the player engages these Bullsquids gives enough time to dodge the projectiles. The fact that many of these Bullsquids are in completely inaccessible or totally unimportant locations means that the player doesn't need to engage them. Contrast this with the last three set pieces 17; in those set pieces the player has to fight the alien overseer at long range. Like the Bullsquid, the overseer fires a slow-moving projectile. Unlike the Bullsquid,

the player must defeat the overseers in order to survive the trip to the top of the factory in Chapter 17. It makes sense, in theory, that the overseer serves as an evolved (flying) form of the Bullsquid in later chapters, but both evolving the monster and changing its context proves to be too much.

*Introductory Content* I have always found the praise of *Half-Life's* first chapter to be a bizarre artifact of nostalgia. This introduction is one of the most boring parts of any videogame I have ever played. The introduction to *Skyrim*, which is another captive ride through a non-interactive environment, lasts a fraction of the time that the *Half-Life* intro does, and yet it was almost universally panned. Obviously, *Half-Life's* introductory chapter doesn't affect the quality of the game overall, and everyone who plays *Half-Life* will probably overlook the first five minutes of boredom based on the strength of *Half-Life's* reputation. I do find it curious how almost none of the places seen on this trip through Black Mesa ever appear again in the game.


Not only would revisiting some of these places give the game a sense of artistic symmetry, but it would also save a lot of time in level design, as those rooms could be reused, even if they had to be copied and pasted into both levels. For whatever reason, this did not happen. Chapter 2, by contrast, is more defensible. Plenty of RPGs and adventure games begin in a town or town-like area with only minimal action. Some of those towns are more interesting than others, but a period of well-crafted exploration in a persuasive environment is a time-honored technique, and I think that Chapter 2 of *Half-Life* manages to pull it off well.

In Chapter 3, we get to the real meat of the introductory content. Because the designers did such a good job dividing the game into segments of increasing complexity, the introductory content for *Half-Life* is very simple and straightforward. It's also quite cleverly designed in the way it manages to pack in so many lessons into small pieces of through content. After escaping the lab, the first thing the player sees in terms of enemies is a couple of captive Headcrabs. These leap menacingly at the player but cannot escape their glass tubes.

Just after this, there's a mandatory NPC follower that Freeman has to lead to the retinal scan. The absence of enemies is the perfect way of having a no-penalty task to teach the player about NPC behaviors. Following that is a dangerous beam that toggles on and off, but which is almost harder to cross than it is to avoid.

After that, the player faces the first enemy: a lone Headcrab. Following that encounter, the player encounters an evolved form of the toggling beam in the form of lasers.


The cluttered ground and odd angles of the beams make for a good exercise in ducking, jumping, and strafing. My favorite part of this whole section is the placement of the crowbar.


The crowbar, merely by its placement, tells the player that it's possible to break the glass and duck through. This is an old technique, to be sure, but its execution here is elegant. While the crowbar is highly conventional (if very well done), the introduction to Headcrab zombies and the guard NPC is unconventional.

An NPC with this level of agency and power was very uncommon back in 1998. The fact that the designers introduced the zombies and the guard's abilities at the same time is both unusual and efficient. This is reiterated later with the guard shooting two Zombies, though doesn't teach the player anything except that it's a good idea to not panic. The zombies are slow, and bullets will (eventually) work. Shortly after this, Freeman collects his own gun.

Even with teleports, the enemies that appear after acquiring the gun are all easy and appear directly in front of Freeman at all times. There's only one real threat: the Vortigaunt in the doorway just beyond this point. Being in that doorway means that the Vortigaunt doesn't have a great angle of fire, however, and the player can get Freeman out of sight quite easily. The final piece of truly "introductory" material is this teleport after the first set piece.

Although this is not the first teleport, it's the first teleport to actually behave like a monster closet in that it doesn't appear directly in front of Freeman. The Houndeye falls into the box, however, meaning that this is a minimally dangerous way to introduce to the player the concept of out-of-sight teleports, which will be a frequent component of the game. Like everything else in the introductory section, it's a greatly softened version of normal content.

# 6

# *Half-Life* Cover and Multiplayer Level Design



## *Half-Life* Deathmatch

A book about the design of a first-person shooter would be incomplete without an analysis of its multiplayer content. Fortunately, the multiplayer experience of *Half-Life* has an awful lot to do with its single-player design ideas. This book has been, as I noted earlier, primarily about the level design of *Half-Life* because that is where most of its advances take place. Specifically, *Half-Life* advances the use of cover in the FPS genre more than any game before or since. Looking back, it seems strange that that the majority of *Half-Life's* first-party multiplayer maps have very little of the kind of cover seen in the single-player game. This is partly a product of the historical context of *Half-Life*; in 1998, multiplayer maps were mostly of the arena type. Arena shooters are significantly less popular these days than they used to be, but many of you have played some of them. The *Quake* games were all about fast-paced, minimal-cover arena combat. *Unreal Tournament*, which is the arena shooter most current players might have some experience with, was another popular example of a shooter that emphasized the fast-moving virtuoso who roamed the map alone. Some of the maps that came with *Half-Life* were like this.

Crossfire, pictured above, does have cover. You can see how there's an unusually large space between the two emplacements of cover, and how asymmetrical that cover is. Long distances like these appear in Chapter 17 of *Half-Life*, and they're not consistent with the rest of the game. In multiplayer, the longer distance is somewhat forgivable because human players are better at fighting at these ranges than any enemy in the single player campaign. On the other hand, the huge, open platform in the middle of them is still definitely drawn from the arena tradition and not *Half-Life's* cover-based sections. There's also another half of the map not pictured above.

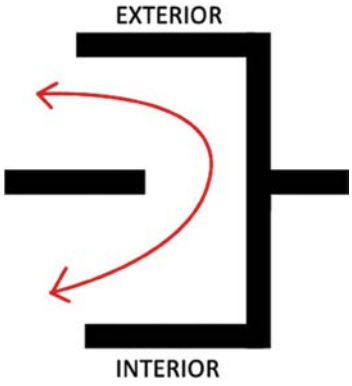
This corridor-and-courtyard portion of the map features much more close-quarters combat and some decent places to shoot from. Still, that courtyard is wide open, and most of the doorways and windows that face each other are also flush so that players can fire a long way into buildings from other buildings or in the courtyard.

Many of the maps retain an arena element while being much smaller than Crossfire. The map Datacore is quite small and has very little in the way of cover. Indeed, the primary characteristic of Datacore is the brutal closeness of its architecture.

Not only is the whole level small, but each room within it is fairly small as well. Yet, with all that closeness in the architecture, the apertures are fairly large. There's very little to stop players from storming in with big guns and turning every battle into a reflex-oriented bloodbath. There's nothing wrong with this style of play; that's what arena maps are all about. The ladders and small crawlspaces which lead directly into the most important rooms reinforce the map's emphasis on sudden, surprising conflicts. The complementary map to Datacore, Rapidcore, is similar but is larger overall with narrower apertures.

The narrow apertures and many turns slow the flow between rooms to some degree, but the fact that players can fire all the way to the back wall of one room from another room without any object-based obstructions means that one player with explosive munitions can suddenly (and relatively easily) kill a group of enemies; the map is still very small and cramped. Again, there's nothing inherently wrong with this style of play. Fast-paced, highly-mobile, risky play is totally orthodox in the arena shooter style. It's just that *Half-Life* spends most of its single-player campaign discouraging the player from playing this way. In some places, it does seem like the designers of the multiplayer maps realized this. The map Bootcamp is very similar to the courtyard portion of Crossfire, except that it changes the way

apertures work. The apertures now have walls that prevent firing in or out of the room, so all combat has to either take place indoors or outdoors. The structure of the doorways also interacts meaningfully with the odd shape of the interior walls. In the diagram on the next page, you can see the how the structure defines the room's flow. The door is almost set up like an airlock so that it cannot admit players without some turning and slowing. These structures are quite similar to something the player would have seen in Chapter 8 (the point-to-point cover segment) of the single-player campaign. Instead of fighting against mostly static enemies, the player is fighting against other players who can use the same strategy.




This is a bit of level design recognizable from the single-player campaign, and it clearly gives attentive players a way to use skills they learned in the campaign. There is a big problem that I failed to mention above, however: much of the point-to-point cover play in this level is disrupted by the shoot-through ceiling above it.

These vertical apertures that allow easy firing upon targets below are totally orthodox for arena shooters, but they're horribly disruptive to an otherwise well-crafted cover setup. As is the case with every other example, this is not wrong because arena shooters are not wrong. I do think, however, that it shows that the

multiplayer map designers didn't always understand how to translate their own cover-based design ideas to a multiplayer level. It doesn't help that some of the maps were made by community members rather than *Half-Life* devs. Even then, cover was so new that it's not surprising that the maps don't display a masterful adaptation of cover play in a multiplayer setting.

There are a couple of levels in the *Half-Life* suite that come much closer to the single-player campaign. Lambda Bunker is pulled from Chapter 13 with only minor modifications to make the level loop around. Naturally, the cover-based set pieces that are present in that part of the level are repeated in the multiplayer. The set piece that best introduces cover into the multiplayer arena is set piece 13-1, which reappears entirely in this map. This replication is an obvious one because it belongs to the multi-front combat segment.

The phrase "multi-front combat" is a pretty good description of deathmatch games in the FPS genre, and so the cover pulled from the surrounded combat segment is appropriate for the multiplayer mode. Pulling multiplayer maps from the single player campaign was actually quite common for the earlier *Quake* games. Indeed, many of the most popular maps of *Quake* were originally drawn from the single-player campaign, so this map isn't surprising.

Lambda Bunker isn't the only example of a map that takes cover seriously. The Stalkyard map also implements cover reminiscent of the single-player campaign

of *Half-Life*. This isn't directly taken from any level, but the resemblance to set pieces from the single-player campaign is obvious. If anything, the cover here is actually an enhanced version of what exists elsewhere. The cover is plentiful, indestructible, and can even be climbed in many cases. The only real problem is that much of the cover leaves the player exposed from behind because the level is constructed in a loop to preserve that essential level flow. Now, most great multiplayer maps have a looping structure, but in Stalkyard, the loops are very short, meaning an enemy can get behind a covering player in just a few seconds from several different directions, negating the tactical advantage of cover a little too quickly to really recapture the essence of *Half-Life*.

## Counter-Strike

I'm going to look at several *Counter-Strike* levels here, which will serve as a good representative sample of the lot of them. I have tried to choose popular levels that are well known and which illustrate the design ideas I want to highlight. There are a great number of levels, though, and it's a certainty that I will leave out many great maps. What we're after here is a set of design principles that explain why *Counter-Strike* maps are closer to *Half-Life's* single-player campaign than *Half-Life's* own maps are. Because this section will be a bit disjointed, I'm going to do it in list format. I have also left off the two-letter prefixes on maps as they are unnecessary for the discussion. The big thing we're going to be looking at here is how these maps have cover features which break the vaunted flow of the level, thereby deviating meaningfully from the conventional wisdom of multiplayer level design up until *Half-Life*.

### Oilrig

Oilrig is an odd map in terms of design principles; its center-piece is a room derived from the arena tradition, but right beside that is a great example of the kind of cover found in *Half-Life*. The obvious heart of the map is the room surrounding the pool of water. This is a huge arena room with multiple vertical levels and a variety of entrances and exits.

Really, one might call it a hyper-arena room because it takes so many arena tropes to the extreme. This is definitely the center of the level, too, into which most of the paths eventually flow.

Immediately adjacent to the central arena is a room that does have substantial object cover, however. It's really only one structure, but its placement is in line with the cover found in *Half-Life*. By sitting more toward the center of the space, these boxes are actually quite disruptive of flow.

In the *Half-Life* deathmatch maps, even the levels with object cover were still set up so that players would flow through rooms easily. This cover is placed to oppose such flow, to create a sticky point that can become a prolonged battle. It's not the greatest example of an extended battle location because players can come around the sides through standard arena corridors and break the siege, but it's still a clear implementation of some *Half-Life* style cover.

### Train

Like Oilrig, Train is meant to funnel enemies into a central arena into which there are many entrances and above which there are many spots to fire. There are some train-cars that seem like they might work as cover, except that players can fire from above, below, and to the side in such a way that the cars are not that useful and don't break the level's flow much at all.

The structure of this main room means that the fight over the bomb site will be a difficult affair with lots of movement, surprises, and deaths on all sides. The best move for both sides is to stay up high and fire down, but that's only a winning strategy for the counter-terrorists.

What's really interesting about this map is that away from the bombing site, there is actually a lot of cover that fits the traditional *Half-Life* format. Some of the hallways in Train could almost be re-skinned excerpts of Chapters 8 and 9, most closely resembling the cover from 8-9 and 9-6.

If these hallways and the object cover in them were closer to the bomb site, or if they represented the only ways into the bomb site room, then this cover might change the dynamic of the map in a significant way. They're placed around the perimeter, however, so they don't really create prolonged or important battles. This doesn't make the map a bad map, but it does make the object cover a little bit superfluous, and overall, it gives the map a more arena-like feel.

### Nuke

Nuke has a lot of the same architectural style as Oilrig with off-set doors and pathways as well as jutting walls and such that provide plenty of places to take cover. What Nuke does more of than either Train or Oilrig, however, is provide tons of object cover.

This cover is prevalent and located more centrally than Train's cover, and thus creates many interesting firefights. In fact, one of the things that Nuke does that many other *Counter-Strike* maps don't do is give both sides of a battle cover in the same location.

The bomb sites in Nuke are a little different, though. One bomb site has essentially no cover at all, and is surrounded by a raised walkway that makes it almost impossible to defend.

The second bomb site (below) has some cover, but it also has several ingress points from several directions, one of which is elevated. So while this is definitely closer to the cover found in *Half-Life* than many of the other maps I've discussed above, it's not all the way there. That is probably what the designers intended, and it makes for an interesting half-cover/half-arena dynamic for the map.

## 747

Reading this list, you may have begun to see that disrupting level flow with cover became a consistently viable level design strategy in *Counter-Strike*. This level, however, proves that there is a point at which diminishing returns for disruptive, copious cover sets in. This was definitely one of the popular *Counter-Strike* maps, but it was not nearly as popular as Dust, and I think the comparison is meaningful.


The area outside of the plane is sparse in terms of cover for a *Counter-Strike* map, but it is obviously not where most of the action was meant to take place. The interior of the plane, on the other hand, is about as full of cover and obstruction as a level can possibly be. The loading area offers cover that could have appeared in *Half-Life*, but it's a small section and, again, not where most of the action will occur.


The seats offer row after row of cover, meaning that a slow crawl to the hostage areas is entirely possible. The closed confines of the plane and risk to the hostages make it so that explosive weapons are not always a great way to counter the copious cover. The biggest obstacles are the tiny, frequent apertures and their closed curtains. If there is a more disruptive level design feature in an FPS (short of outright invincibility), I have not seen it.


It's pretty easy for the terrorists to become entrenched in some of the cabin segments of the plane. This is level disruption at its absolute maximum. There are multiple paths into the plane that allow for flanking maneuvers, but the apertures are small no matter where the counter-terrorists enter, and the cover is so plentiful that every entry can be ambushed, regardless of the skill of the counter-terrorist teams.

None of the above should be taken as derogatory; the designers of this level absolutely accomplished what they set out to do. Of the core canon of *Counter-Strike* maps, this map has the most disruptive cover structure. It wasn't the most popular map, however, so it's clear that at some point, the cover in a map can be too disruptive to the action for the tastes of many players. This is where the comparison to Dust is most poignant: Dust's cover is probably the second-most disruptive of the core *Counter-Strike* maps. Thus, there may be a kind of Goldilocks zone that Dust inhabits that made it so popular.

### Aztec

Many of the design concepts that make Dust 2 so successful also embellish Aztec, but Aztec is inconsistent in the application of these concepts and ends up as a kind of odd hybrid as a result. Nuke and Train were both somewhat binary in their level design—having cover in one section and an arena around the bomb site—but Aztec mixes its parts differently. One of the bomb sites in Aztec is considerably more defensible, with lots of cover for the counter-terrorists to use.

Bomb site B has cover local to its entryways. There are two normal paths of entry for the terrorists, both of which are set up with binary cover. The terrorists and counter-terrorists can become engaged in a cover-based shootout toward which their teams can converge. This is largely what happens in Dust 2 as well. Bomb site A, on the other hand, is considerably more difficult to defend.

This site also has cover, as you can see, but there is an almost ridiculous amount of possible firing angles on the site. Half a dozen terrorists could easily spread themselves out across the long colonnade across from the site and fire at long range while others storm in close. The exposure inherent in this setup defeats the purpose of cover and pushes this half of the map towards the arena style.

Everything underneath the level is essentially one gigantic arena with lines of sight that extend almost the entire length of the map. This part of the map almost puts many *Quake* maps to shame in how large and open it is; in its size it almost prefigures the gigantic open spaces that would make *Halo* maps unique. The bridge here, in particular, is an absolute shooting gallery. It's particularly strange considering that a lot of hard work went into balancing the cover where it does exist in this map. Mere yards away from the bridge, the B bomb site exemplifies the cover that makes *Half-Life* historically important. This hybrid style of map was enjoyable for many players, and I don't mean to disparage it, because there is no right or wrong. This map isn't consistent with anything else, but it was a popular map, and so its uniqueness was clearly part of its charm.

## Dust: Confounding Conventional Wisdom

I do not want anyone reading this to think that there is one supreme method or philosophy for designing multiplayer shooter levels. Although I will make the case that Dust 2 became the most popular *Counter-Strike* map because it recreates the best aspects of *Half-Life's* level design, I do not mean that it represents the pinnacle of FPS design entirely. Dust 2 is not the final achievement of multiplayer design, nor is *Half-Life* the final achievement in the single-player FPS experience. There is no pinnacle of FPS design. The arena shooter has waned in popularity, but that does not mean that something new won't come along to displace the cover shooter, too. All I want to talk about here is how Dust 2 embodied the best design ideas of *Half-Life*, and how that led to its popularity.

The general thesis of this book is that *Half-Life* invented shooter cover and the set piece as we largely understand those things today. It wasn't enough to simply create cover, though; the game also had to teach players how to use it. The brilliance of *Half-Life* is in the way that Chapters 3 through 13 slowly build up the player's ability to use cover by introducing increasingly complex cover and enemy configurations. By the time the player completes the game, they ought to have gained the ability to "read" cover setups to understand how the action around them is supposed to proceed, or else *Half-Life* hasn't done its job. The translation of this cover-reading skill to multiplayer doesn't really appear in *Half-Life's* own deathmatch mode because the levels mostly don't support it. Except in the Bunker level, the kind of cover that appears in *Half-Life's* own maps diverges only slightly from the arena style. Many of the *Counter-Strike* maps do recapture the cover that made up *Half-Life's* level design, but I think that Dust (in both of its forms, but more so Dust 2) does it better than any of them. My reasoning goes back to the thesis of the game—it's not enough to provide cover; the cover has to also speak to the player. Dust 2 is the map that speaks the most clearly.

Better than any other map in the original *Counter-Strike* set, Dust 2 emulates the set piece as it existed in *Half-Life*. A set piece's foremost criteria are extension and self-containment. No shooter that I can think of is able to totally recapture these things in the multiplayer context, but many Counter-Strike maps do a good job of it, and Dust 2 does it the best. Extension is accomplished by the bomb targets/hostage locations and by the disruptive cover found in all of these maps. By halting the flow of players around the map, and especially around the target areas, the teams become embroiled in longer conflicts. Some maps do it better than others, as we have seen above. Dust 2, as we'll see, is on another level when it comes to extended conflicts around a few locations. The self-containment criterion is different. Multiplayer maps cannot offer the kind of bracketing health and ammo caches that single player maps can, but they can still use bracketing architectural design, which is a part of self-containment just as much as health and ammo are. Dust 2 extends and isolates the action in the most important parts of the map by configuring cover to concentrate team combat in three specific areas.

I noted at the beginning of this book that shooter level design is the second-most popular topic in game design writing. Similarly, Dust 2 is the second-most popular level in games writing of all time (only after *Super Mario Bros* 1-1). As such, I'm not going to go into the specific dynamics of how these three spots in the level work in the greater context of the level flow. It's enough to say that these three points see a majority of the combat because they're great places for players to get stuck fighting opposing players. Instead, I aim only to point out how these set pieces are ultimately derived from the design of *Half-Life's* single-player campaign. Let's go through each one. Here are the bombing sites, which aren't perfectly alike, but which have the same general plan.

The terrorists are firing up on a slightly raised section with some boxes and walls that the counter-terrorists can use as cover. The closest parallels are set piece 8-8 (which applies a little more to bomb site B) and set piece 5-3 (which applies a little more to bomb site A). Both set pieces compare pretty well to their predecessors, though, with only a few slight differences in angles and height.

The verticality in these set pieces is reduced to prevent the counter-terrorists from having too great an advantage. It's still present and still gives the defense a better chance to use cover, but it's not as pronounced as in the single-player example. Bomb site A has more usable object cover to make up for its relative lack of elevation, and that's why it compares a little bit better to set piece 5-3 than 8-8, although it has elements of both. Because of the bomb sites, it's easy for both sides to become embroiled in long-drawn out conflicts whose borders are clear. Terrorists enter through a few apertures, all of which are in front of the defenders. The defenders use obvious cover, each piece of which offers a different angle on the fighting. This is as close to a mid-game set piece from *Half-Life* as any *Counter-Strike* map gets.

The whole level is structured so as to facilitate prolonged conflict, but the third-most likely spot for combat in the *Half-Life* mode is the interior section at the level's middle. The point-to-point cover structure could have been taken from several places in Chapter 8.

This is also rather similar to cover setups seen in the levels discussed above. The important difference is that this corridor is centrally located, so that players will actually be using this cover pretty often to get between bomb sites without having to go the long way or having to pass in front of the enemy's line of fire. Thus, players will inevitably confront one another starting from a position of cover, while also facing an enemy in a position of cover. This is really the only location in which the terrorists are on equal footing with the counter-terrorists. That begs the question: how can an asymmetrical—and really, an unbalanced map—be so deep that players are still enjoying it almost twenty years later? The truth is that the imbalance is framed by the structure of a set piece. The fact that all the players can instantly recognize a situation's tactical balance (and their role in it) means that this imbalance makes intuitive sense. This coherence makes it so that the terrorists see their slight disadvantage as a fun challenge rather than a burden. If we know nothing else about games, we know that they should be fun.

# 7

# Conclusion

The whole point of writing this book is to avoid reducing the essence of an important game like *Half-Life* down to a short description. With that in mind, I will try to summarize the lessons that we can learn from it. These lessons are not meant to replace the knowledge found elsewhere in this book, but merely to concisely remind readers of the ideas at work in the game.

1. In a set piece game, organize your set pieces into segments that revolve around a theme. That theme should consist of a series of similar tasks that depend on a similar skill. Obviously, it's important to put those segments in order of ascending complexity, but you don't have to *design* them in order. Most of *Half-Life's* set pieces were probably created out of order and organized after examining which set pieces fit together the best.
2. The principle of self-containment means that set pieces should be clearly separated from one another with some kind of break in between. Not every set piece needs to offer health/ammo afterwards, but restocking the player between set pieces helps the designers as much as it does the player

because it helps the designers to know that set pieces start with the same basic conditions.

3. Bounce between genres in your game to break up the monotony of set piece after set piece. Whether this means having platformer sections, vehicle sections, puzzles, or anything else, it's a good idea to mix in at least a little of something else.
4. Similarly, if your game is quite long, consider an entire level with an emphasis on a genre other than your main one, even if there are a few elements of the primary genre mixed in.
5. Do not kill the player suddenly and without warning, even if your checkpoint system is robust. Games like *Hotline Miami* and *Super Meat Boy* can get away with this, but many games cannot. Choose wisely.
6. Do not make radical changes to your game at the end of it. Changes to mechanics, physics, etc. need to appear early for the player to become comfortable with them. Do not abandon your best design ideas at the end of the game, either. The increase in arena content at the end of *Half-Life* didn't mean that the cover theme had to disappear completely. There isn't anything wrong with the arena theme, but it's a shame that it came into prevalence at the expense of *Half-Life's* best content. Similarly, there is no reason for the jumping mechanics to change.
7. Be careful with scripted scenes. As exciting and persuasive as they can be, the creation of these scenes involves the designers getting lots of extra tools made by non-design-team members. This can consume project resources for a relatively small return in terms of minutes of content.

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