

# CHAPTER THIRTEEN

## Game Mechanics Must Be in *Balance*

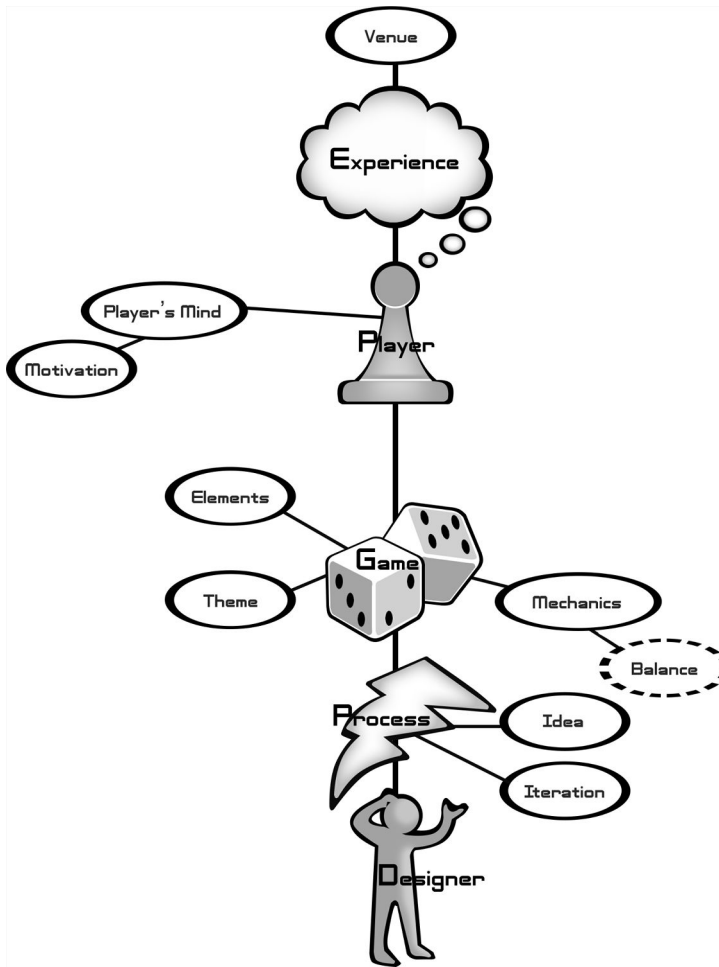


FIGURE 13.1

*A false balance is an abomination to the Lord.*

—Proverbs 11:1

Have you ever looked forward to playing a game that you were certain was going to be incredibly fun, only to be terribly disappointed? This game had a story that sounded interesting, the kind of gameplay action that is your favorite, cutting-edge technology, and beautiful artwork—but somehow the play was monotonous, confusing, and frustrating. This is a game that is out of balance.

To novice designers, the business of balancing a game seems quite mysterious—but really, balancing a game is nothing more than adjusting the elements of the game until they deliver the experience you want. Balancing a game is far from a science; in fact, despite the simple mathematics that is often involved, it is generally considered the most artful part of game design, for it is all about understanding subtle nuances in the relationships between the elements of your game and knowing which ones to alter, how much to alter them, and which ones to leave alone.

Part of what makes game balancing so difficult is that no two games are alike and every game has many different factors that need to be in balance. As a designer, you must discern what elements in your game need to be balanced and then experiment with changing them until you have them generating exactly the experience you want your players to have.

Think of it like creating a new recipe—it is one thing to determine the ingredients you need, but another is to decide how much of each to use and how they should be combined. Some of the decisions you make will be based on hard mathematics (1.5 teaspoons of baking powder leavens 1 cup of flour), but others, like how much sugar to use, are often a matter of personal taste. A skilled chef can make the simplest of recipes a delight to eat for the same reason a skilled game designer can make the simplest of games a delight to play—they both know how to balance the ingredients.

Game balancing can come in a variety of forms, because every different game has different things that must be brought into balance. Still, there are some patterns of balance that occur over and over again. Balancing a game is all about examining it carefully, so this chapter will be rich with many lenses.

## The Twelve Most Common Types of Game Balance

### *Balance Type #1: Fairness*

*There is no joy in an unequal battle.*

—Mrs. Cavour

## Symmetrical Games

One quality that players universally seek in games is fairness. Players want to feel that the forces working against them do not have an advantage that will make them impossible to defeat. One of the simplest ways to ensure this is to make your game **symmetrical**, that is, to give equal resources and powers to all players. Most traditional board games (such as checkers, chess, and Monopoly) and almost all sports use this method to be sure that no player has an unfair advantage over another. If you want to put players in direct competition with each other and you expect them to have roughly equal levels of skill, symmetrical games are a great choice. They are particularly good systems for determining which player is the best, since all things in the game are equal but for the skill and strategy that the individual players bring to the game. In these games, perfect symmetry is not always possible as there is often some minor issue such as “who goes first?” or “who starts with the ball?” that gives one side a small advantage over the other. Generally, random selection, such as a coin toss or die roll, is the solution. Though it gives one player a small advantage, over many games, the advantage is distributed evenly. In some cases, the way this asymmetry is remedied is by giving the advantage to the player with the least skill—such as “youngest player goes first.” This is an elegant way to use the natural imbalance of the game to help balance the skill levels of the players.

## Asymmetrical Games

It is also possible, and often desirable, to give opponents different resources and abilities. If you do, be aware that you have a significant balancing task ahead of you! Here are some of the reasons you might create an asymmetrical game:

1. **To simulate a real-world situation:** If the point of your game is to simulate the battle between Axis and Allied forces during World War II, a symmetrical game does not make sense, since the real-world conflict was not symmetrical.
2. **To give players another way to explore the game space:** Exploration is one of the great pleasures of gameplay. Players often enjoy exploring the possibilities of playing the same game with different powers and resources. In a fighting game, for example, if two players have ten different fighters to choose from, each with different powers, there are ten times ten different pairings, each of which requires different strategies, and effectively you have turned one game into one hundred games.
3. **Personalization:** Different players bring different skills to a game—if you give the players a choice of powers and resources that best match their own skills, it makes them feel powerful—they have been able to shape the game to emphasize the thing they are best at.
4. **To level the playing field:** Sometimes, your opponents have radically different skill levels. This is especially true if you have opponents that are computer

controlled. Consider the game of *Pac-Man*. It would be more symmetrical if there were just one ghost chasing *Pac-Man*, not four. But if that was the case, the player would win easily for a human can easily outwit a computer when it comes to navigating a maze. But to outwit four computer-controlled opponents at once brings the game into balance and gives the computer a fair chance of defeating the player. Some games are customizable in this regard—a golf handicap, for instance, lets players of different levels compete at the challenge levels they will both enjoy. Whether to introduce this kind of balancing depends on whether your game is meant to be a standard measure of player's skill or whether the goal is to provide challenge to all players.

5. **To create interesting situations:** In the infinite space of all the games that can be created, many more of them are asymmetrical than are symmetrical. Pitting asymmetrical forces against each other can often be interesting and thought provoking for the players, since it is not always obvious what the right strategies will be to win the game. Players become naturally curious about whether one side or another has an advantage, and they will often spend a great deal of time and thought to try to decide whether the game is truly fair. The game of *Bhag-Chal* (the official board game of Nepal) is an excellent example of this. In this game, not only do the players have unequal forces, they also have different goals! One player controls five tigers, while the other controls twenty goats. The tiger player wins by eating five goats, and the goat player wins by positioning the goats so that no tiger can move. Though it is generally acknowledged by experienced players that the game is balanced, novices to the game spend a great deal of time discussing whether one side or the other has particular advantage and playing the game over and over trying to determine the best strategies and counter strategies.

It can be quite difficult to properly adjust the resources and powers in an asymmetrical game to make them feel evenly matched. The most common method of doing so is to assign a value to each resource or power and make sure that the sum of the values is equal for both sides. See the following section for an example.

### Biplane Battle

Imagine a game of biplane dogfight combat. Each player gets to choose one of the following planes:

Plane	Speed	Maneuverability	Firepower
Piranha	Medium	Medium	Medium
Revenger	High	High	Low
Sopwith Camel	Low	Low	Medium

Are these planes equally balanced? It is hard to say. At first glance, though, we might evaluate all three categories as low = 1, medium = 2, and high = 3. This gives us new information:

Plane	Speed	Maneuverability	Firepower	Totals
Piranha	Medium (2)	Medium (2)	Medium (2)	6
Revenger	High (3)	High (3)	Low (1)	7
Sopwith Camel	Low (1)	Low (1)	Medium (2)	4

Looked at from this point of view, the player with the Revenger seems to have an unfair advantage over the others. And that may be the case. But after playing the game a little, maybe we notice that the Piranha and the Revenger seem evenly matched but players who fly the Sopwith Camel generally lose. This might lead us to speculate that Firepower is more valuable than the other categories—maybe twice as valuable. In other words, for the Firepower column, low = 2, medium = 4, and high = 6. This gives us a new table:

Plane	Speed	Maneuverability	Firepower	Totals
Piranha	Medium (2)	Medium (2)	Medium (4)	8
Revenger	High (3)	High (3)	Low (2)	8
Sopwith Camel	Low (1)	Low (1)	Medium (4)	6

This gives us totals that match our observation of the game in action. We may now have a model that shows us how to balance the game to make it fair. To test our theory, we might change the Firepower for the Sopwith Camel to be high (6), giving us a new table:

Plane	Speed	Maneuverability	Firepower	Totals
Piranha	Medium (2)	Medium (2)	Medium (4)	8
Revenger	High (3)	High (3)	Low (2)	8
Sopwith Camel	Low (1)	Low (1)	High (6)	8

It would appear that if our model is correct, these three planes are equally balanced. But that's only a theory. The way we find out is by playtesting the game. If we play and determine that gameplay feels roughly fair no matter which plane you use, then our model is correct. But what if we play and realize that the Sopwith Camel is still losing battles? In that case, we will have to make a new speculation, change our model, rebalance, and try playing again.

It is important to note that the act of balancing and developing a model of how to balance go hand in hand. As you balance, you learn more about relationships in the

game, and you can make a better mathematical model that represents these relationships. And as you change the model, you learn more about the right way to balance your game. The model informs the balance, and the balancing informs the model.

Also note that balancing a game can only really begin once the game is playable. Many a game has suffered in the marketplace because all the time in the schedule got used up just getting the game to work, and not enough time was allotted to balance the game before it needed to go to market. There is an old rule of thumb that it takes six months to balance your game after you have a completely working version, but this varies a great deal depending on the type and scope of your game. The rule I personally use is that half the development time should be spent balancing the game. Certainly, the more new gameplay elements you have, the longer it will take you to balance it properly.

### Rock, Paper, Scissors

One simple way to balance elements for fairness is to make sure that whenever something in your game has an advantage over something else, yet another thing has an advantage over that! The iconic example of this is the game of Rock, Paper, Scissors where

- Rock breaks scissors
- Scissors cut paper
- Paper covers rock

None of the elements can be supreme, because there is always another that can defeat it. It is a simple way to ensure that every game element has both strengths and weaknesses. Fighting games particularly like to use this technique to help ensure none of the warriors a player might choose are undefeatable.

Balancing your game to make it feel fair is one of the most fundamental types of game balancing. You will surely want to use the Lens of Fairness on any game you create.

### *Lens #37: The Lens of Fairness*

To use the Lens of Fairness, think carefully about the game from each player's point of view. Taking into account each player's skill level, find a way to give each player a chance of winning that each will consider to be fair.

Ask yourself these questions:

- Should my game be symmetrical? Why?
- Should my game be asymmetrical? Why?

- Which is more important: that my game is a reliable measure of who has the most skill or that it provide an interesting challenge to all players?
- If I want players of different skill levels to play together, what means will I use to make the game interesting and challenging for everyone?

Fairness can be a slippery subject. There are some cases where one side has an advantage over the other and the game still seems fair. Sometimes this is so that players of unequal skill can play together, but there can be other reasons. In the game *Alien vs. Predator*, for example, it is generally recognized that in multiplayer mode, Predators have a significant advantage over the Aliens. Players do not consider it to be unfair, however, because it is in keeping with the *Alien vs. Predator* story world, and they accept that if they play as an Alien, they will be at a disadvantage and will need to compensate for that with extra skill. It is a badge of pride among players to be able to win the game when playing as an Alien.

## Balance Type #2: Challenge vs. Success

Let us revisit this diagram from Chapter 10, “Player’s Mind.”

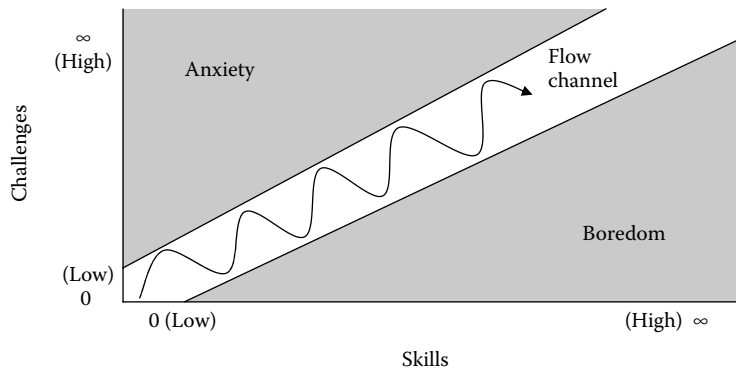


FIGURE  
13.2

We know that keeping the player in the flow channel is desirable. If play is too challenging, the player becomes frustrated. But if the player succeeds too easily, they can become bored. Keeping the player on the middle path means keeping the experiences of challenge and success in proper balance. This can be particularly difficult since players may have all different levels of skill. What one player finds

boring, another may find challenging, and yet another may find frustrating. Some common techniques for striking a proper balance include the following:

- **Increase difficulty with each success:** This is a very common pattern in videogames—each level is harder than the last. Players build their skill until they can complete a level, only to be presented with one that challenges them yet again. Don't forget, of course, to use the tense and release pattern shown earlier.
- **Let players get through easy parts fast:** Assuming your game has some method of gradually increasing the difficulty, you do yourself a service by allowing skilled players to finish a level quickly if they can easily master it. This way, skilled players will blow through easy levels, quickly getting to a challenge that is more interesting to them, while less skilled players will be challenged by the early levels. This lets every player quickly get to the part of the game that is a challenge. If you arrange it differently, such that each level takes one hour to play, regardless of skill level, skilled players may quickly grow bored from lack of challenge.
- **Create “layers of challenge”:** A popular pattern in games is to give a grade, or some number of stars, at the end of each level or mission. If you get a “D” or “F,” you must repeat the level, but if you get a “C” or better, you can continue. This creates a situation with a lot of flexibility in how you can play it. Novice players are thrilled to get a “C” and unlock the next level. As they gain experience and have unlocked all the levels, they may set themselves a new challenge—to earn an “A” (or even “A+”!) on earlier levels.
- **Let players choose the difficulty level:** A tried and true method is to let players choose to play on “easy, medium, or hard” modes. Some games (e.g., many Atari 2600 games) even let you change the difficulty-level midgame. The upside of this is that players can quickly find the appropriate challenge level for their skill level. The downside is that you have to create and balance multiple versions of your game. Also, it can detract from the “reality” of your game—players will argue over which version is the “real” one or be left feeling unsure whether any of them are “real.”
- **Playtest with a variety of players:** Many designers fall into a trap of only testing with people who are constantly exposed to the game and end up designing a game that is too frustrating for novices. Others fall into the opposite trap and only test their game with people who have never played before. They end up designing a game that experienced players quickly grow bored with. Wise designers playtest with a mix of skilled and novice players, to be sure that their game is fun at first, fun after a while, and fun much, much later.
- **Give the losers a break:** *Mario Kart* is famous for its unusual system of giving out power-ups. Players who are ahead in the race get meager power-ups, while players who are far behind get the good stuff, allowing them to race ahead. This is a



great system for that game because it feels more fair and keeps everyone engaged: players who are behind need to pay attention because a game-changing power-up could come at any second, and players who are ahead cannot afford to rest on their laurels because that “blue shell” could hit them at any time. This tricky system does a great job at nudging all players to the center of the flow channel.

One of the toughest challenges in game balancing is deciding how difficult the game should get over time. Many designers are so afraid of players beating their game too easily that they make later levels so fiendishly difficult to win that 90% of players eventually give up on the game in frustration. These designers hope that the increased challenge will extend the play time—and there is something to that—if you have expended forty hours to get through level nine, you will probably be willing to work pretty hard to defeat level ten. But in truth, there are so many competing games to play that many players just give up in frustration. On the other hand, with a free to play game, this late-game frustration might be just what you want, to spur players to pay money and move toward completion. As a designer, it makes sense to ask yourself, “What percentage of players do I want to be able to complete this game?” and then design for that.

And don’t forget: just learning to play a game at all is a challenge! For this reason, the first level or two of a game is often incredibly simplistic—the player is so challenged just trying to understand the “controls and goals” that any additional challenge might push them right into frustration. Not to mention the fact that a few early successes can do a lot to build a player’s confidence—a confident player will give up less easily on a game.

Challenge is a core element of gameplay and can be so difficult to balance that it merits its own lens.

### *Lens #38: The Lens of Challenge*

Challenge is at the core of almost all gameplay. You could even say that a game is defined by its goals and its challenges. When examining the challenges in your game, ask yourself these questions:

- What are the challenges in my game?
- Are they too easy, too hard, or just right?
- Can my challenges accommodate a wide variety of skill levels?
- How does the level of challenge increase as the player succeeds?
- Is there enough variety in the challenges?
- What is the maximum level of challenge in my game?

### *Balance Type #3: Meaningful Choices*

There are many different ways to give a player choices in a game. Meaningful choices for a player lead them to ask themselves questions, such as the following:

- Where should I go?
- How should I spend my resources?
- What should I practice and try to perfect?
- How should I dress my character?
- Should I try to get through the game quickly or carefully?
- Should I focus on offense or defense?
- What strategy should I use in this situation?
- Which power should I choose?
- Should I play it safe or take a big risk?

*A good game gives the player meaningful choices.* Not just any choices but choices that will have a real impact on what happens next and how the game turns out. Many designers fall into the trap of offering the player meaningless choices; for example, in a racing game, you might have 50 vehicles to choose from, but if they all drive the same way, it is like having no choice at all. Other designers fall into a different trap—offering choices that no one would want. You might offer a soldier ten guns, all different, but if one of them is clearly better than the rest, again it is like having no choice at all.

When choices are offered to a player, but one of them is clearly better than the rest, this is called a **dominant strategy**. Once a dominant strategy is discovered, the game is no longer fun, because the puzzle of the game has been solved—there are no more choices to make. When you discover that a game you are working on has a dominant strategy, you must change the rules (balance things) so that this strategy no longer dominates and meaningful choice can be restored to the game. The previous Biplane Battle example is an example of just that—a designer trying to balance a game to remove a dominant strategy and restore meaningful choice to the players. Hidden dominant strategies that are discovered by players are often referred to as “exploits,” since they can be exploited by players to take a shortcut to success that the designer never intended.

In early development of a game, dominant strategies abound. As the game continues development, these strategies start to get properly balanced. Paradoxically, this often throws novice designers into a panic: “Yesterday, I understood the right way to play this game—but with these new changes, I’m not sure about the right way to play it!” They feel like they have lost their handle on their own game. But in reality, the game has just taken a big step forward! It no longer has a dominant strategy, and now there are meaningful choices to be made. Instead of fearing this moment, you

should cherish it and take the opportunity to see if you can understand why the current configuration of rules and values is putting your game into balance.

But this leads to another question: how many meaningful choices should we give to a player? Michael Mateas points out that the number of choices a player seeks is dependent on the number of things they desire:

- If choices > desires, then the player is overwhelmed.
- If choices < desires, the player is frustrated.
- If choices = desires, the player has a feeling of freedom and fulfillment.

So, to properly determine the number of choices, you need to figure out the types and number of things the player would like to do. In some situations, the player wants only a small number of meaningful choices (choosing to take the left or right fork in the road is interesting—choosing to take one of thirty side roads is overwhelming). Other times, a huge number of choices are desired (e.g., a clothes shopping interface in the Sims).

Meaningful choices are the heart of interactivity, and having a lens to examine them is quite useful.

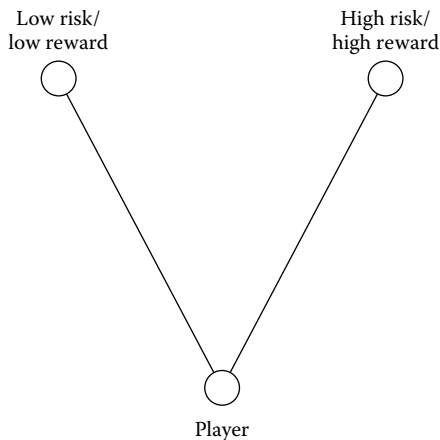
### *Lens #39: The Lens of Meaningful Choices*

When we make meaningful choices, it lets us feel like the things we do matter. To use this lens, ask yourself these questions:

- What choices am I asking the player to make?
- Are they meaningful? How?
- Am I giving the player the right number of choices? Would more make them feel more powerful? Would less make the game clearer?
- Are there any dominant strategies in my game?

### **Triangularity**

One of the most exciting and interesting choices for a player to make is whether to play it safe and go for a small reward or take a big risk to try for a big reward. This is a hard decision to make, if the game is balanced properly. I find that about eight out of ten times someone comes to me asking for help on a game prototype that “just isn’t fun”; the game is missing this kind of meaningful choice. You could call this “balanced asymmetric risk,” since you are balancing a low risk with low reward against a high risk for high reward, but that is kind of a mouthful. This relationship comes up so often, and is so important, that I like to give it a shorter name: **triangularity**. The player is one point of the triangle, the low-risk choice is the second point, and the high-risk choice is the third.

FIGURE  
13.3

An example of a game that has good triangularity is *Space Invaders*. Most of the time in the game you are shooting at low point aliens near your ship worth 10, 20, and 30 points. They are slow moving and easy to shoot, and shooting them makes you safer because it stops them from dropping bombs on you. Every once in a while, however, a little red flying saucer flies across the top of the screen. It poses no threat, and it is quite difficult and dangerous to shoot. It is difficult because it is moving and far away, and it is dangerous because to properly aim at it, you have to take your eyes off your ship to look at it, and you risk getting hit by a bomb. However, it is worth between 100 and 300 points! Without the flying saucer, *Space Invaders* gets quite tedious, because your choices are few—you just shoot and shoot and shoot. With the flying saucer, you occasionally have a very difficult, meaningful choice to make—should you play it safe or take a risk and go for the big points? Triangularity is so important that it gets its own lens.

### *Lens #40: The Lens of Triangularity*

Giving a player the choice to play it safe for a low reward or to take a risk for a big reward is a great way to make your game interesting and exciting. To use the Lens of Triangularity, ask yourself these questions:

- Do I have triangularity now? If not, how can I get it?
- Is my attempt at triangularity balanced? That is, are the rewards commensurate with the risks?

Once you start looking for triangularity in games, you will see it everywhere. A dull, monotonous game can quickly become exciting and rewarding when you add a dash of triangularity.

A classic example of triangularity appears in the book *Hackers* by Steven Levy. An MIT engineer hacked a vending machine giving each user a choice: get your snack from the vending machine for normal price as usual or take a chance. A digital coin could be flipped, resulting in your snack either costing double or being completely free.

A good way to make sure your triangularity is balanced is to use Lens #35, *Expected Value*. The arcade game *Qix* provides an interesting example of balancing with expected values. In it, you try to draw rectangular shapes to surround territory on a blank game board. While you do this, a blob of lines, called the Qix, floats around the board at random. If the Qix touches one of your rectangles before you finish drawing it, you die. But if you finish drawing the rectangle, then you claim that area of the board. When you have covered 75% of the board, you win the level.

The designers of the game give the player a very explicit choice—each time he draws a rectangle, he can either move quickly (drawing a blue rectangle) or at half speed (drawing an orange rectangle). Since moving at half speed is twice as dangerous, rectangles drawn at half speed are given double the points. This works because if we assume that the chance of successfully drawing a fast, blue rectangle is 20% and it is worth 100 points, then the expected value of attempting to draw one is  $100 \text{ points} \times 20\% = 20 \text{ points}$ . We also know that drawing a rectangle at half speed has half the chance of succeeding, so we get a table that looks like this:

Speed	Chance of Success (%)	Points	Expected Value
Fast (blue)	20	100	20
Slow (orange)	10	?	20

We want the game to be balanced, so we keep the expected value constant. It is pretty easy to see that if we want the game to be balanced, the point value should be 200 points for the same size slow rectangle. The difficult part with this kind of thing is figuring out the chance of success—we often have to estimate—but this is another case where the model informs the prototype and testing the prototype informs the model, creating a virtuous circle where eventually the model is correct and the game is balanced.

*Mario Kart* is a symphony of triangularity. Again and again, it brings you high-risk/low-risk choices with appropriate payoffs. Examples include the following:

- **Manual or automatic?** Manual requires more skill to use, but when used well, it gives you more speed boosts.

- **Kart or bike?** Karts have a faster base speed—but if you do a wheelie on a bike (which is risky because you can't turn during a wheelie), you go faster than the karts do.
- **Grab power-ups?** (risking a crash) or ignore them?
- **Use power-ups?** (risk breaking your concentration) or ignore them?
- **Keep the power-up you've got?** or dump it in favor of a new one?
- **Use speed boost pads?** They speed you up but tend to be in dangerous locations.
- **Hit the gas early?** If you hit the gas early at the starting line, you get a speed boost if you time it right, and a frustrating delay if you time it wrong.
- **Left or right?** Many tracks include forking tracks that have a low-risk and high-risk path—and of course the high-risk path has more speed boosts.

### *Balancing Type #4: Skill vs. Chance*

In Chapter 12, we talked in detail about the mechanics of skill and chance. In a real sense, these are two opposing forces in any game design. Too much chance negates the effects of player skill and vice versa. There is no easy answer for this one—some players prefer games with as few elements of chance as possible, and other players prefer the opposite. Games of skill tend to be more like athletic contests—systems of judgment that determine which player is the best. Games of chance often have a more relaxed, casual nature—after all, much of the outcome is up to fate. To strike the balance, you must use Lens #19, *The Player*, to understand how much skill and how much chance will be the right amount for the audience of your game. Differences in preference are sometimes determined by age or gender, and sometimes even by culture; for example, German board game players seem to prefer games that minimize the effects of chance more so than, say, American players.

One very common method of balancing these is to alternate the use of chance and skill in a game. For example, dealing out a hand of cards is pure chance—but choosing how to play them is pure skill. Rolling a die to see how far you move is pure chance—deciding where to move your piece is pure skill. This can create an alternating pattern of tension and relaxation that can be very pleasing to players.

Designer David Perry advises that the key to addictive game design is designing your game such that players are doing three things at all times: exercising a skill, taking risks, and working a strategy. And it is certainly true that any time players are taking risks, they are up against chance, in some way.

Choosing how to balance skill and chance will determine the character of your game. Examine it closely with this lens.

## Lens #41: The Lens of Skill vs. Chance

To help determine how to balance skill and chance in your game, ask yourself these questions:

- Are my players here to be judged (skill) or to take risks (chance)?
- Skill tends to be more serious than chance: is my game serious or casual?
- Are parts of my game tedious? If so, will adding elements of chance enliven them?
- Do parts of my game feel too random? If so, will replacing elements of chance with elements of skill or strategy make the players feel more in control?

## Balancing Type #5: Head vs. Hands

This type of balancing is quite straightforward: how much of the game should involve doing a challenging physical activity (be it steering, throwing, or pushing buttons dexterously), and how much of it should involve thinking? These two things are not as separate as they might seem on the surface—many games involve constant strategizing and puzzle solving while simultaneously pulling off feats of speed and dexterity. Other games alternate the two types of gameplay for variety. Consider the “action platform” game genre—you work your way through a level, dexterously guiding your avatar to jump over obstacles, and maybe shooting at enemies, occasionally pausing to solve some small puzzle that prevents you from clearing the level. Often, the intensity is increased at the end of a level by a “boss monster,” who can only be defeated through a mix of puzzle solving (“Oh! I have to jump on his tail, and that makes him drop his shield for a second!”) and dexterity (“I only have a second to shoot an arrow into that narrow gap!”).

It is important, though, to understand what your target market prefers in a game—more thinking or more dexterity? And it is equally important that your game clearly communicate what balance you have chosen to put into it. Consider the very unusual game *Pac-Man 2: The New Adventures* for the Sega Genesis. The name suggested that it would be a game of action and a little strategy, like the original Pac-Man. But a quick glance at the box told another story—this appeared to be a 2D platform game, like *Super Mario Brothers* or *Sonic the Hedgehog*, which meant action plus a little puzzle solving. But actually playing the game revealed something completely different! Though it visually looked like an action platform game, it was really a game of strange psychological puzzles, where you subtly guided Pac-Man into different emotional states to get him to get past various obstacles. Players expecting mostly action and little thinking were disappointed—players looking for a game about puzzle solving generally didn’t play the game, rejecting it based on its “action-based” appearance.

When *Games Magazine* reviews a videogame, they give it a ranking on a sliding scale where one end is “fingers” and the other end is “brain.” It can be easy to forget that a game with a lot of button pushing can still involve a lot of thought and strategy. Use Lens #34, *Skill*, to understand the different skills in your game, and then use this lens to balance those skills.

### *Lens #42: The Lens of Head and Hands*

Yogi Berra once said, “Baseball is 90% mental. The other half is physical.” To make sure your game has a more realistic balance of mental and physical elements, use the Lens of Head and Hands. Ask yourself these questions:

- Are my players looking for mindless action or an intellectual challenge?
- Would adding more places that involve puzzle solving in my game make it more interesting?
- Are there places where the player can relax their brain and just play the game without thinking?
- Can I give the player a choice—succeed either by exercising a high level of dexterity or by finding a clever strategy that works with a minimum of physical skill?
- If “1” means all physical and “10” means all mental, what number would my game get?

This lens works particularly well when used in conjunction with Lens #19, *The Player*.

### *Balance Type #6: Competition vs. Cooperation*

Competition and cooperation are basic, animal urges. All higher animals are driven to compete against others partly for survival and partly to establish their status in the community. Opposite of that, there is also a basic instinct to cooperate with others, since a team, with its many eyes and hands and its diverse abilities, is always more powerful than an individual. Competition and cooperation are so important to our survival that we need to experiment with them—partly to get better at them and partly to learn about our friends and family—so we get a better sense of who is good at what and how we can work together. Games provide a very socially safe way to explore how the people around us behave in stressful situations—this is a secret reason we like to play games together.

When it comes to games, competitive games are more common than cooperative ones, though some very interesting cooperative games have been created. *Cookie and Cream* for the PlayStation 2 is an action platform puzzle game where two



players play side by side on parallel paths trying to get through a level. And Reiner Knizia's *Lord of the Rings* board game is a fascinating example of a game where the players do not compete at all, but instead coordinate their efforts in an attempt to win the game together.

Some games find interesting ways to blend competition and cooperation. The arcade game *Joust* can be played solo, where a player competes against many computer-controlled enemies, or it can be played in a two-player mode, where both players compete against enemies together in the same arena. There is a tension between competition and cooperation in *Joust* that is very interesting: On the competitive side, the players get points based on how many enemies they defeat, and they can battle each other if they choose. But on the cooperative side, players can get higher scores overall if they coordinate their attacks and protect each other. It is up to the players to decide whether they are trying to beat each other (getting the highest relative score) or trying to beat the game (trying to get the highest absolute score). The game plays up this tension: some levels are designated "Team Wave"—if both players can survive the level, they each get 3000 bonus points. Other levels are designated "Gladiator Wave"—the first player who defeats another gets 3000 bonus points. This interesting alternation between cooperation and competition gives the game a lot of variety and lets players explore whether their partner is more interested in cooperation or competition.

And while competition and cooperation are polar opposites, they can be quite conveniently combined into a situation where you get the best of both. How? Through team competition! Common in athletic sports, the rise of networked gaming has allowed team competition to grow and thrive in the world of videogames.

Competition and cooperation are so important that we need three lenses to examine them properly.

### *Lens #43: The Lens of Competition*

Determining who is most skilled at something is a basic human urge. Games of competition can satisfy that urge. Use this lens to be sure your competitive game makes people want to win it. Ask yourself these questions:

- Does my game give a fair measurement of player skill?
- Do people want to win my game? Why?
- Is winning this game something people can be proud of? Why?
- Can novices meaningfully compete at my game?
- Can experts meaningfully compete at my game?
- Can experts generally be sure they will defeat novices?

### *Lens #44: The Lens of Cooperation*

Collaborating and succeeding as a team is a special pleasure that can create lasting social bonds. Use this lens to study the cooperative aspects of your game. Ask these questions:

- Cooperation requires communication. Do my players have enough opportunity to communicate? How could communication be enhanced?
- Are my players friends already, or are they strangers? If they are strangers, can I help them break the ice?
- Is there synergy ( $2 + 2 = 5$ ) or antergy ( $2 + 2 = 3$ ) when the players work together? Why?
- Do all the players have the same role, or do they have special jobs?
- Cooperation is greatly enhanced when there is no way an individual can do a task alone. Does my game have tasks like that?
- Tasks that force communication inspire cooperation. Do any of my tasks force communication?

### *Lens #45: The Lens of Competition vs. Cooperation*

Balancing competition and cooperation can be done in many interesting ways. Use this lens to decide whether they are balanced properly in your game. Ask these questions:

- If “1” is competition and “10” is cooperation, what number should my game get?
- Can I give players a choice whether to play cooperatively or competitively?
- Does my audience prefer competition, cooperation, or a mix?
- Is team competition something that makes sense for my game? Is my game more fun with team competition or with solo competition?

As more and more games go online, more opportunities for different types of competition and collaboration become available, from casual multiplayer games of chess between two people to competing guilds of thousands of players in MMORPGs. But the psychological forces that drive us to enjoy competition and cooperation have not changed—the better you can understand and balance these forces, the stronger your game will become.

## Balance Type #7: Short vs. Long

One important thing to balance in every game is the length of the gameplay. If the game is too short, players may not get a chance to develop and execute meaningful strategies. But if the game goes on too long, players may grow bored, or they may avoid the game because playing it requires too much of a time commitment.

The things that determine the length of a game are often subtle. The game of Monopoly, for example, when played by the official rules, often ends in about ninety minutes. But many players find these rules too harsh and modify them to give out cash jackpots and ease the restrictions on when you must purchase properties, which as a side effect makes the game last much longer, typically three hours, or even more.

The main factors that determine when a game ends are the win or lose conditions. By altering these conditions, you can dramatically change the length of the game. The designers of the arcade game *Spy Hunter* came up with a very interesting system to balance the length of their game. In *Spy Hunter*, you drive a car that fires machine guns at enemies on a highway. In early prototypes, when your car was destroyed three times, the game was over. The game is very challenging, particularly for novice players, and the designers found that these players were having very short games and feeling frustrated—so they introduced a new rule: For the first ninety seconds of gameplay, the player has an unlimited supply of cars—they cannot lose the game during this time. After that time is up, they only have a few cars, and when they are destroyed, the game is over.

The designers of *Minotaur* (who later went on to make *Halo*) had another interesting method of balancing the length of their game. *Minotaur* was a networked game where up to four players would run around a maze, gathering weapons and spells, and try to destroy the other players in the maze. The game ends when only one player is left alive. The designers saw a problem where a stalemate could result if players don't confront each other and the game would run the risk of becoming boring. One way to solve the problem would be to set a time limit and declare a winner based on a point system, but instead they did something much more elegant. They created a new rule: after twenty minutes, a bell sounds, and "Armageddon" begins; all surviving players are suddenly transported to a small room filled with monsters and other hazards, where no one can survive for long. This way, the game is guaranteed to end in less than twenty five minutes, in a rather dramatic fashion, and one player can still be declared the winner.

## Balance Type #8: Rewards

*A prince should be quick to reward and slow to punish.*

—Ovid

Why is it that people will spend so much time playing a videogame, just to get a good score? We have talked earlier about how games become structures of judgment

and that people want to be judged. But people don't just want any judgment—they want to be judged favorably. Rewards are the way the game tells the player “you have done well.”

There are several common types of rewards that games tend to give. Each is different, but they all have one thing in common—they fulfill the player's desires.

- **Praise:** The simplest of rewards, the game just tells you that you did good work, through either an explicit statement, a special sound effect, or even an in-game character speaking to you. It all amounts to the same thing: the game has judged you, and it approves. Nintendo games are famous for giving players lots of secondary praise via sounds and animations for every reward they get.
- **Points:** In many games, points serve no purpose than a measure of the player's success, be it through skill or luck. Sometimes these points are a gateway to another reward, but often, this measurement of your success is enough—particularly if others can see it on a high score list.
- **Prolonged play:** In many games (pinball, for example), the goal of the game is to risk resources (in pinball, your ball) to rack up as many points as possible without losing what you have put at risk (your ball down the drain). In games with this structure of “lives,” the most valuable reward a player can get is an extra life. Other games that have time limits reward players by adding time to their play session, which really amounts to the same thing. Prolonged play is desirable because it allows for a higher score and a measure of success, but it also taps into our natural human drive for survival. Modern free to play games have a slight twist on this with the “energy” model. Run out of energy, and play is paused until you pay for more or until a certain number of hours pass.
- **A gateway:** While we have a desire to be judged favorably, we also have a desire to explore. Game structures that reward success by moving you to new parts of the game satisfy this basic urge. Anytime you earn access to a new level or win a key to a locked door, you have received a gateway reward.
- **Spectacle:** We like to enjoy beautiful and interesting things. Often, games will play music or show animations as a simple reward. The “intermission” at the end of level 2 in *Pac-Man* was probably the first example of this in a videogame. This kind of reward seldom satisfies players on its own, so it tends to be paired with other types of rewards.
- **Expression:** Many players like to express themselves within a game with special clothes or decorations. Even though these often have nothing to do with a goal in the game, they can be great fun for a player and satisfy a basic urge to make a mark on the world.
- **Powers:** Becoming more powerful is something that everyone desires in real life, and in a game, becoming more powerful is likely to improve the game's judgment of a player's success. These powers can come in many forms: getting “kinged” in checkers, becoming tall in *Super Mario World*, speeding up in *Sonic*

*the Hedgehog*, and getting special weaponry in *Call of Duty*. The thing all powers have in common is that they give you a way to reach your goal more quickly than you could before.

- **Resources:** While casino games and lotteries reward the player with real money, videogames more frequently reward the player with resources they can only use in the game (e.g., food, energy, ammunition, hit points). Some games, instead of giving resources directly, give virtual money that the player can choose how to spend. Usually the things that one can buy with this money are resources, powers, prolonged play, or expression. Free to play games, of course, blur this distinction by letting you spend real money to get virtual money (but almost never the other way around).
- **Status:** High leaderboard rankings, special achievements, or anything else that gives a player higher status in the community of players can be very desirable award, especially to competitive players.
- **Completion:** Completing all the goals in a game gives a special feeling of closure to players that they seldom get from solving problems in real life. In many games, this is the ultimate reward—when you have reached this point, there is often no point in playing the game any further.

Most of the rewards you will encounter in games fall into one or more of the aforementioned categories, though these categories are often combined in interesting ways. Many games reward the player with points, but when the points reach a certain score, the player gets a bonus reward of an extra life (resource, prolonged play). Often, players will get a special item (resource) that lets them do something new (powers). Other games let a player enter their name or draw a picture (expression) if they get a high score (points). Some games show a special animation (spectacle) at the end (completion) if the player unlocks every area in the game (gateway).

But how to balance these rewards? That is, how many should be given out, and which ones? This is a difficult question, and the answer is different for almost every game. Generally, the more types of rewards you can work into your game, the better. Two other reward rules of thumb from the world of psychology include the following:

- People have a tendency to get acclimated to rewards the more they receive them, and what was rewarding an hour ago is no big deal now. One simple method many games use to overcome this is to gradually increase the value of the rewards as the player progresses in the game. In a way, this is a cheesy trick, but it works—even when you know the designer is doing it and why, it still feels very rewarding to suddenly get bigger rewards in conjunction with getting to a new part of a game.
- The power of variable rewards over fixed ones has been proven in thousands of psychological experiments. For example, if every monster you defeat gives you ten points, that gets predictable and boring pretty quickly—but if every monster you defeat has a 2/3 chance of giving you zero points, but a 1/3 chance of giving you thirty points, this stays rewarding for a much longer time, even though you

are giving out the same number of points on average. It's like bringing donuts to work—if you bring them every Friday, people will come to expect them and take them for granted. But if you bring them every now and then on random days, they are a delightful surprise each time. Part of what makes triangularity so interesting to players is its connection to variable reward.

### *Lens #46: The Lens of Reward*

Everyone likes to be told they are doing a good job. Ask these questions to determine if your game is giving out the right rewards in the right amounts at the right times:

- What rewards is my game giving out now? Can it give out others as well?
- Are players excited when they get rewards in my game, or are they bored by them? Why?
- Getting a reward you don't understand is like getting no reward at all. Do my players understand the rewards they are getting?
- Are the rewards my game gives out too regular? Can they be given out in a more variable way?
- How are my rewards related to one another? Is there a way that they could be better connected?
- How are my rewards building? Too fast, too slow, or just right?

Balancing rewards is different for every game. Not only does a designer have to worry about giving out the right ones, but he have to worry about giving them at the right times in the right amounts. This can only be determined through trial and error—even then, it probably won't be right for everyone. When trying to balance rewards, it is hard to be perfect—you often have to settle for “good enough.”

### *Balance Type #9: Punishment*

The idea of a game that punishes the player can seem a little strange—aren't games supposed to be fun? Paradoxically, though, punishment used properly can increase the enjoyment that players get from games. Here are some reasons that a game might punish players:

- **Punishment creates endogenous value:** We've talked about the importance of creating value within a game (Lens #7, *Endogenous Value*). Resources in a game are worth more if there is a chance they can be taken away.

- **Taking risks is exciting:** Particularly if the potential rewards are balanced against the risks! But you can only take risks if there are negative consequences or punishments. Giving players a chance to risk terrible consequences makes success much, much sweeter.
- **Possible punishment increases challenge:** We've discussed the importance of challenging players—when failure means a punishing setback in the game, the challenge of play increases. Increasing the punishment that comes with failure can be one way to increase the challenge.

Here are some common types of punishment used in games. Many of them are simply rewards in reverse.

- **Shaming:** The opposite of praise, this is simply the game telling you that you are doing a bad job. This can happen with explicit messages (e.g., “Missed” or “Defeated!”) or with discouraging animations, sound effects, and music.
- **Loss of points:** Players find this type of punishment so painful that it is relatively rare in videogames or even in traditional games and sports. Maybe it is less an issue of it being painful and more of the fact that when players can lose points, it cheapens the value of the earned points. Points that can't be taken away are very valuable—points that could be subtracted on the next bad move have less endogenous value.
- **Shortened play:** “Losing a life” in a game is an example of this kind of punishment. Some games that work on a timer will shorten play by taking time off the clock.
- **Terminated play:** Game over, man.
- **Setback:** When, after dying, a game returns you to the start of a level, or to the last checkpoint, this is a setback punishment. In games that are all about proceeding to the end, a setback is a very logical punishment. The balancing challenge is to figure out exactly where the checkpoints belong to make the punishments seem meaningful, but not unreasonable.
- **Removal of powers:** The designer must tread carefully here—players greatly treasure the powers they have earned, and to have them taken away may feel unfair to them. In *Ultima Online*, players who were killed in battle turned into ghosts. To come back to life, they had to find their way to a shrine. If they took too long getting there, they would lose valuable skill points that had taken weeks to earn. Many players felt this was too harsh a punishment. One way to remove powers fairly is to take them away temporarily. Some amusement parks feature bumper car battle tanks that shoot tennis balls at each other. The tanks have targets on each side, and if an opponent hits one of your targets with a tennis ball, your tank goes into an uncontrolled spin for five seconds and your gun becomes inoperable during that time.
- **Resource depletion:** Loss of money, goods, ammunition, shields, or hit points fall into this category. This is one of the most common types of game punishment.

One thing that psychological study has shown is that reward is always a better tool for reinforcement than punishment. Whenever possible, if you need to encourage a player to do something, it is better to use a reward than a punishment, if you can. One great example from Blizzard's game *Diablo* is the business of gathering food in games. Many game designers at one time or another get the idea that they would like to make a game with a "realistic" system of food gathering. That is, if you do not gather food, your character suffers from diminished powers because of hunger. Blizzard implemented this and found that players considered it a nuisance—they must perform a fairly boring activity or suffer a penalty. So, Blizzard turned it around and implemented a system where your player never gets hungry, but if they do eat food, they get a temporary boost in abilities. Players liked this much better. By changing a punishment into a reward, they were able to turn the same activity from a negative to a positive.

When punishment is necessary, however, how much to use is a delicate question. When developing Toontown Online, we had to face the question of what was to be the harshest punishment in a light, fun MMORPG for kids. We ultimately decided on a combination of light punishments for "dying," which in Toontown is called "becoming sad," for the game is so lighthearted that players do not have a life meter, but rather a laff meter, and the enemy's goal is not to kill the player outright, but just to make him sad enough to stop acting like a cartoon character. When your laff meter goes to zero in Toontown, these things happen:

- You are teleported from the battle area back to a playground zone (setback). This setback is very minor—the distance is usually only a minute's walk.
- All the items you are carrying disappear (resource depletion). This is also minor—the items are inexpensive and can be earned again in about 10 minutes of play.
- Your character hangs his or her head sadly (shame).
- For about 30 seconds, your character walks at a painfully slow pace and is unable to leave the playground zone or engage in any meaningful gameplay (temporary removal of powers).
- Your laff meter (hit points) goes to zero (resource depletion), and the player will probably want to wait for it to increase (it increases over time in a playground zone) before exploring again.

This combination of light punishments is just enough to make players use caution in battles. We tried lighter versions, and it made battles boring—there was no risk in them. We tried tougher versions, and it made players too cautious in battles. Eventually we settled on a combination that struck an appropriate balance between encouraging caution and risk in the players.

It is crucial that all punishment in a game is for things that the player is able to understand and prevent. When punishment feels random and unstoppable, it makes the player feel a complete lack of control, which is a very bad feeling, and the



player will quickly label the game “unfair.” Once this happens, a player is seldom willing to engage in a game further.

Players dislike punishment, of course, and you must be thoughtful about whether there are tricky ways that players can avoid your punishment. Richard Garriott’s game *Ultima III*, though greatly beloved, contained very strict punishment. It was a game that took close to hundred hours to complete, and if your four characters perished while you were playing, your game state was completely erased, and you had to begin the game again! Players generally felt this was unfair, and as a result, it was common practice if your characters were near death to shut off the computer before the game had a chance to erase the saved game, effectively dodging the punishment.

It is worth mentioning that there is a certain class of player that lives for games that are insanely challenging and loves games that have strong punishments (cough, *Demon Souls*, cough), because they can feel so proud about having beaten such a difficult game. These players are a fringe group, though, and even they have their limits. They will quickly call a game “unfair” if they cannot see how to prevent punishment.

### *Lens #47: The Lens of Punishment*

Punishment must be used delicately, since after all, players are in a game of their own free will. Balanced appropriately, it will give everything in your game more meaning, and players will have a real sense of pride when they succeed at your game. To examine the punishment in your game, ask yourself these questions:

- What are the punishments in my game?
- Why am I punishing the players? What do I hope to achieve by it?
- Do my punishments seem fair to the players? Why or why not?
- Is there a way to turn these punishments into rewards and get the same or a better effect?
- Are my strong punishments balanced against commensurately strong rewards?

### *Balance Type #10: Freedom vs. Controlled Experience*

Games are interactive, and the point of interactivity is to give the player control, or freedom, over the experience. But how much control? Giving the player control over everything is not only more work for the game developer; it can also be boring for the player! After all, a game isn’t meant to be a simulation of real life, but rather more interesting than real life—this sometimes means cutting out boring, complex, or unnecessary decisions and actions. One simple kind

of game balance that every designer must consider is where to give the player freedom and how much freedom to give.

In *Aladdin's Magic Carpet VR Adventure*, we were faced with a very difficult problem in the final scene within the Cave of Wonders. To make the conflict with Jafar, the villain, be as exciting as possible, we needed to take control of the camera. But we didn't want to compromise the freedom that players felt in the scene. Observing players during playtests, though, they all wanted to do the same thing—fly to the top of the hill where Jafar was standing. After several experiments, we made a bold decision—we would take away freedom from the players in this scene so they could have a perfect flight up the hill to confront Jafar. This was in sharp contrast to the rest of the experience, where players could fly wherever they wanted with no restrictions. In our tests, not a single one of our playtesters noticed we had taken away their freedom, because the game had trained them that they could go wherever they wanted and this scene happened to be arranged such that everyone who viewed it wanted the same thing. We decided that this was a case where the balance should fall on the side of controlled experience instead of freedom, because it made for a better experience for the player.

### *Balance Type #11: Simple vs. Complex*

*It seems that perfection is reached not when there is nothing left to add, but when there is nothing left to take away.*

—Antoine de Saint-Exupery

Simplicity and complexity of game mechanics can seem very paradoxical. Calling a game “simple” can be a criticism, such as “so simple it is boring.” It can also be a compliment: “so simple and elegant!” Complexity can also be a double-edged sword. Games are criticized as “overly complex and confusing” or complimented as “richly and intricately complex.” To make sure your game has the “good simplicity” and the “good complexity,” but not the bad, we need to look at the nature of simplicity and complexity in games and how to strike the right balance between them.

So much praise is heaped on classic games for being ingeniously simple that it might make you think that making a complex game is a bad thing. Let's look at the different kinds of complexity that show up in games:

- **Innate complexity:** When the very rules of the game get very complex, I call this innate complexity. This is the kind of complexity that often gets a bad name. It generally arises either because the designer is trying to simulate a complex real-world situation or because extra rules need to be added to a game in order to balance it. When you see a ruleset with lots of “exception cases,” this is generally a ruleset that is innately complex. Games like this can be hard to learn, but some people really enjoy mastering the complex rulesets.

- **Emergent complexity:** This is the kind of complexity that everyone praises. Just as the simple structure of H<sub>2</sub>O lets myriad complex snowflakes appear, games like *Go* have a very simple rulesets that give rise to billions of intricate, complex game situations. We call this emergent complexity: when games are praised for being simple and complex at the same time, it is the emergent complexity that is being praised.

Emergent complexity can be difficult to achieve, but is worth the effort. Ideally, one can create a simple ruleset out of which emerges the thing every game designer strives for: *balanced surprises*. If you can design a simple game that becomes a factory for a never-ending stream of balanced surprises, people will play your game for centuries to come. The only way to find out whether you have achieved this is to keep playing and changing your game over and over until the surprises start to come. Of course, using Lens #30, *Emergence*, can help, too.

So, if emergent complexity is so great, why would anyone make a game that is innately complex? Well, sometimes you need the innate complexity to simulate a real-world situation, such as re-creating a historical battle. Other times, you add more innate complexity to balance your game a little better. The pawns in chess have movement rules that are innately complex: when they move, they can only move forward one square, into an unoccupied space, *unless* it is their first move, in which case they can move one or two spaces. One exception to this is when they are capturing another piece; in that case, they can only move diagonally forward, but only one square, even if it is their first move.

This rule has some innate complexity (some keywords of innate complexity: “unless,” “except,” “exception,” “but,” and “even if”), but it is one that evolved gradually in an attempt to make sure pawns had a behavior that was well balanced and interesting. And, in fact, it is well worth it, for this small amount of innate complexity blossoms into a great deal more emergent complexity—particularly because the pawns can only move forward but capture diagonally—that leads to fascinatingly complex pawn structures that can form on the board that would never be possible with a simpler ruleset.

### *Lens #48: The Lens of Simplicity/Complexity*

Striking the right balance between simplicity and complexity is difficult and must be done for the right reasons. Use this lens to help your game become one in which meaningful complexity arises out of a simple system. Ask yourself these questions:

- What elements of innate complexity do I have in my game?
- Is there a way this innate complexity could be turned into emergent complexity?
- Do elements of emergent complexity arise from my game? If not, why not?
- Are there elements of my game that are too simple?

## Natural vs. Artificial Balancing

Designers must be careful when adding innate complexity in an attempt to balance a game, however. Adding too many rules to get the behavior you want is sometimes called “artificial balancing” as opposed to the “natural balancing” that can come when a desired effect arises naturally from the interactions in a game. Consider *Space Invaders*: it has a wonderful balance of increasing difficulty that forms very naturally. The invaders adhere to a very simple rule—the fewer there are, the faster they go. From this, some very desirable properties emerge:

1. The game starts slow and speeds up the more the player succeeds.
2. It is easy to hit targets in the beginning, but the more the player succeeds, the harder it is to hit targets.

Those two properties are not the result of innate rules, but rather nicely balanced properties that emerge from a single simple rule.

## Elegance

We call simple systems that perform robustly in complex situations *elegant*. Elegance is one of the most desirable qualities in any game, because it means you have a game that is simple to learn and understand but is full of interesting emergent complexity. And while elegance can seem somewhat ineffable and hard to capture, you can easily rate the elegance of a given game element by counting the number of purposes it has. For example, the dots in *Pac-Man* serve the following purposes:

1. They give the player a short-term goal: “Eat the dots close to me.”
2. They give the player a long-term goal: “Clear all the dots from the board.”
3. They slow the player down slightly when eating them, creating good triangularity (safer to go down a corridor with no dots, riskier to go down one with dots).
4. They give the player points, which are a measure of success.
5. They give the player points, which can earn an extra life.

Five different purposes, just for those simple dots! This makes them very elegant. You can imagine a version of *Pac-Man* where the dots did not do all those things; for example, if the dots didn’t slow the player down and didn’t award points or extra lives, they would have less purpose and be less elegant. There is an old Hollywood rule of thumb: if a line in a script doesn’t serve at least two purposes, it should be cut. Many designers, when they find their game doesn’t feel right, first think, “Hmm... what do I need to add?” Often, a better question is, “What do I need to remove?” One thing I like to do is look for all the things in my game that are only serving one purpose and think about which of them can be combined.

In working on *Pirates of the Caribbean: Battle for the Buccaneer Gold*, we originally planned to have two main characters: a friendly host at the start of the game, whose only job was to explain how to play, and a villain at the end of the game, whose only purpose was to engage in a dramatic final battle. This was a short (five minutes) game for Disneyworld, and it felt strange to have to use up time to introduce both of these two characters, and it was a strain on the budget as well to make them both look good. We started talking about just cutting either the tutorial at the beginning or the battle at the end, but they were both very important for a fulfilling game. Then we hit on an idea: what if the host at the beginning also was the villain at the end? This not only saved us development time but saved game time since we only needed to introduce one character. Further, it made the character seem more interesting and a more credible pirate (since he tricks the player), and it also created a surprising plot twist! By giving this one character several purposes, it made for a game structure we felt was very elegant indeed.

### *Lens #49: The Lens of Elegance*

Most “classic games” are considered to be masterpieces of elegance. Use this lens to make your game as elegant as possible. Ask yourself these questions:

- What are the elements of my game?
- What are the purposes of each element? Count these up to give the element an “elegance rating.”
- For elements with only one or two purposes, can some of these be combined into each other or removed altogether?
- For elements with several purposes, is it possible for them to take on even more?

### **Character**

As important as elegance is, though, there is such a thing as honing a thing down too far. Consider the leaning tower of Pisa. Its significant tilt serves no purpose—it is an accidental flaw. The Lens of Elegance would have us remove its tilt and turn it into the perfectly straight tower of Pisa. But who would want to visit that? It might be elegant, but it would be boring—it would have no *character*. Think of the tokens in Monopoly: a hat, a shoe, a dog, a statue, and a battleship. They have nothing to do with a game about real estate. Arguably, they should be themed as little landlords. But no one would do that, because it would strip Monopoly of its character. Why is Mario a plumber? It has almost nothing to do with what he does or the world he lives in. But this weird inconsistency gives him character.

## *Lens #50: The Lens of Character*

Elegance and character are opposites. They are like miniature versions of simplicity and complexity and must be kept in balance. To make sure your game has lovable, defining quirks, ask yourself these questions:

- Is there anything strange in my game that players talk about excitedly?
- Does my game have funny qualities that make it unique?
- Does my game have flaws that players like?

## *Balance Type #12: Detail vs. Imagination*

As we discussed in Chapter 10, the game is not the experience—games are simply structures that engender mental models in the mind of the player. In doing so, the games provide some level of detail but leave it to the player to fill in the rest. Deciding exactly what details should be provided and which should be left to the player’s imagination is a different but important kind of balance to strike. Here are some tips for how to do it well.

- **Only detail what you can do well:** Players have rich, detailed imaginations. If there is something you need to present that is of lower quality than your players will be able to imagine, don’t do it—let the imagination do the heavy lifting! Let’s say you would like to play recorded dialog for your whole game, but you don’t have the budget for quality voice actors or you don’t have the storage space for all that dialog. An engineer might suggest trying speech synthesis, that is, letting the computer speak for the characters. After all, it is cheap, requires no storage space, and can be tuned somewhat to sound like different characters, right? All that is true—but also, it will make everyone sound like a robot, and unless you are making a game about robots, your players will not be able to take it seriously. An even cheaper alternative is to use subtitles. Some people might claim that this means there is no voice at all! But that isn’t true. The player’s imagination will fill in a voice—a voice far better than the one you will be able to synthesize. This same idea goes for just about everything in the game: scenery, sound effects, characters, animations, and special effects. If you can’t do it well, try to find a way to leave it to the player’s imagination.
- **Give details the imagination can use:** Players have a lot to learn when they come to a new game—any clear details you can give them that make the game easier to understand will be welcome. Consider the game of chess. It is mostly a somewhat abstract game, but some interesting details have been filled in.

The game is set in a medieval era, and the pieces, which easily could have been numbered or just made as abstract shapes, are given the roles of people in a medieval court. It isn't a lot of detail—the kings, for example, don't have names, and we know nothing about their kingdoms or their policies—but none of that matters. In fact, if this were to be a real simulation of an army between two kingdoms, the rules of movement and capture would make no sense at all! What matters about the “kings” in chess is that the tallest of the chess pieces has movements that are slightly evocative of a real king. He is important and must move slowly and must be carefully guarded. Any other details can be left to the imaginations of the players to fill in as they see fit. Similarly, picturing the “knights” as horses helps us remember that they can jump around the board in ways the others cannot. By giving details that help our imaginations better grasp their functionality, the game becomes much more accessible to us.

- **Familiar worlds do not need much detail:** If you are creating a simulation of something that the player is likely to know very well, such as a city street or a house interior, you have little need to simulate every little detail—since the player already knows what these places are like, they will quickly fill them in with imagination, if you give them a few relevant details. If the point of your game, though, is to educate someone about a place they have never been before, imagination will be of little help, and you will find it necessary to fill in a great deal of detail.
- **Use the binocular effect:** When spectators bring binoculars to an opera or a sporting event, they use them mostly at the beginning of the event, to get a close-up view of the different players or performers. Once this close-up view has been put into memory, the glasses can be set aside, for now the imagination goes to work, filling in the close-ups on the tiny distant figures. Videogames replicate this effect all the time, often by showing a close-up of a character at the beginning of the game who is going to be an inch-high sprite for the rest of the experience. It is an easy way to use a little detail to get a lot of imagination.
- **Give details that inspire imagination:** Again, chess is a great example. To be able to control all the members of a royal army is a fantasy that the mind quickly takes to—and of course, it is a fantasy—it only has to be tied to reality by a thin thread. Giving players situations they can easily fantasize about lets their imagination take wing, and all kinds of imaginary details will quickly crystallize around one little detail that the designer provided.

We will talk more about the balance between detail and imagination in Chapter 20, “Characters,” since deciding what to leave to the imagination is a key question when it comes to characters in games. Because the imagination of the player is where the gameplaying experience takes place, the Lens of Imagination is an important tool.

## Lens #51: The Lens of Imagination

All games have some element of imagination and some element of connection to reality. Use this lens to help find the balance between detail and imagination. Ask yourself these questions:

- What must the player understand to play my game?
- Can some element of imagination help them understand that better?
- What high-quality, realistic details can we provide in this game?
- What details would be low quality if we provided them? Can imagination fill the gap instead?
- Can I give details that the imagination will be able to reuse again and again?
- What details I provide inspire imagination?
- What details I provide stifle imagination?

## Game Balancing Methodologies

We have discussed a great number of things that can be balanced within games. Let us now turn our attention to general methods of balancing that can be broadly applied to many types of balancing. You may find you can use some of these together, but others are contradictory—this is because different designers prefer different methods. You must experiment to find the method that is right for you.

- **Use the Lens of the Problem Statement:** Earlier, we discussed the importance of clearly stating your design problems before jumping to solutions. An out-of-balance game is a problem that will benefit greatly from a clear problem statement. Many designers end up making a mess of their games by jumping in with balancing solutions before they have thought clearly about what the problem really is.
- **Doubling and halving:**

*You never know what is enough unless you know what is more than enough.*

—William Blake, *Proverbs of Hell*



The rule of doubling and halving suggests that when changing values to balance your game, you will waste time by changing them by small amounts. Instead, start by doubling or halving your values in the direction they need to go. For example, if a rocket does 100 points of damage and you think that perhaps that is too much, don't decrease it by 10 or 20, but rather set the damage value to 50 and see how that works. If that is too low, then try a number halfway between 50 and 100. By pushing the values farther than your intuition tells you, the limits of good balance start to become clear more quickly.

This rule is often attributed to designer Brian Reynolds. I contacted him to ask about it, and he had this to say:

*That's indeed a principle I regularly use (and espouse), but the original credit for it goes to none other than the illustrious Sid Meier. I often tell the story of how he took me aside as a young designer (when he caught me repeatedly changing something by 10%, I'm sure) back in the early 90s when we were working on Colonization, and it's probably through the retelling of the story that it got associated with me. The point of the rule is to change something so that you can actually feel the difference right away. That gives you a much clearer idea of the workings of the variable you are changing, and saves you getting lost in the weeds wondering if you have even had an effect (or worse, seeing a change where none has really been accomplished, perhaps because of an unusual series of random numbers).*

- **Train your intuition by guessing exactly:** The more game design you do, the better your intuition will become. You can train your intuition for better game balancing by getting in the practice of guessing exactly. For example, if a projectile in your game is moving at 10 feet per second and you get the feeling that is too slow, concentrate on what the exact number might be. Maybe your intuition tells you that 13 is too low, but 14 is a little too high. "13.7? No... Maybe 13.8. Yes—13.8 just feels right." Once you have arrived at this intuitive guess, plug it in and see. You might find it is too low, or too high, or maybe even exactly right. Regardless, you will have just given your intuition some excellent data for when you guess next time. You can experience the same thing with your microwave oven. It is hard to know exactly what time to put in when reheating leftovers. And if you just make rough guesses, rounded to thirty seconds, you'll never get much better at guessing. But if you guess exactly every time you put food in the microwave (1:40? Too hot... 1:20? Too cold... 1:30? Hmm... No, 1:32 seems right), in a couple months, you will be able to make surprisingly accurate guesses because you will have trained your intuition.
- **Document your model:** You should write down what you think the relationships are between the things you are balancing. This will help clarify your thoughts and give you a framework to record the results of your game balancing experiments.

- **Tune your model as you tune your game:** As was mentioned in the “asymmetrical game” section near the start of this chapter, as you experiment with balancing your game, you will develop a better model about how things are related within the game. With each balancing experiment that you try, you should note not only whether it improved your game but whether the experiment matches your model for how game mechanics are related. Then you should alter your model if it doesn’t match what you expected. Writing down your observations and your model helps a great deal!
- **Plan to balance:** You know you are going to have to balance your game. As you are designing it, you might have a pretty good idea of what aspects of it you will need to balance. Take advantage of that, and put in systems that make it easy to change the values you expect to have to balance. If you can change these values while the game is running, that is even better. Better still is to have a content management system that lets you continue to balance the game even after it ships. The Rule of the Loop is in full force while you are game balancing, and in the modern world of online game distribution, you can (and must!) keep looping well after the game has shipped.
- **Let the players do it:** Every once in a while you will run into a designer who has this bright idea: “Let’s let the players balance the game! That way they can pick the values that are right for them!” This sounds good in theory (who wouldn’t want a game that was custom tailored for a personalized level of challenge?) but tends to fail in practice because players have a conflict of interest. Yes, they want the game to give them a challenge, but at the same time, they want to win the game as easily as they can! And when all the values are set that way (Look at me! I have a million lives!), it is a quick rush of fun that quickly gets boring since there is no challenge left. Worst of all, returning from an overpowered game to a reasonable game balance is a little like trying to kick heroin—the lack of power makes the ordinary game feel limiting and dull. The Monopoly example serves us well again: people who play with the player-created rule that you get a jackpot when you land on free parking complain that the game goes on too long, but if you convince them to play by the official rules (that have no such jackpots), they often complain that it seems less exciting than the old way. There are times when letting the players balance the game is a good idea (usually through difficulty levels), but mostly, balancing the game is better left to the designers.

## Balancing Game Economies

One of the more challenging structures to balance in any game is a “game economy.” The definition of a game economy is simple. We talked earlier about how

to balance meaningful decisions, and that is just what any economy is defined by—two meaningful decisions, namely,

- How will I earn money?
- How will I spend the money I have earned?

Now, “money” in this context can be anything that can be traded for something else. If your game lets players earn skill points and then spend them on different skills, those skill points are money. What is important is that players have the two choices described earlier—that is what makes an economy. What makes for a meaningful economy is the depth and meaning in those two choices. And these two choices are usually in a loop, because usually players spend their money in ways that will help them earn more money, which will give them more opportunities to spend money, and so on. This alternating pattern of earning and spending is very appealing to players and shows up in many guises, a sort of alternating ratchet that moves players forward, like walking on two legs.

Balancing economies, particularly in large online multiplayer games, where players can buy or sell items to each other, can be very difficult, because you are really balancing many of the things we have already discussed at once:

- **Fairness:** Do any players get unfair advantage by buying certain things or earning a certain way?
- **Challenge:** Can players buy something that makes the game too easy for them? Is earning money to buy what they want too hard?
- **Choices:** Do players have enough ways to earn money? To spend money?
- **Chance:** Is earning money more skill based or chance based?
- **Cooperation:** Can players pool their funds in interesting ways? Can they collude in a way that exploits “holes” in the economy?
- **Time:** Does it take too long to earn money, or is it earned too quickly?
- **Rewards:** Is it rewarding to earn money? To spend money?
- **Punishment:** How do punishments affect a player’s ability to earn and spend money?
- **Freedom:** Can players buy what they want and earn the way they want?

There are many different ways to balance economies in games, from controlling how much money is created by the game to controlling the different ways to earn and spend it. But the goals of balancing a game economy are the same as balancing any other game mechanics—to be sure the players can enjoy a fun, challenging game.

## Lens #52: The Lens of Economy

Giving a game an economy can give it surprising depth and a life all its own. But like all living things, it can be difficult to control. Use this lens to keep your economy in balance:

- How can my players earn money? Should there be other ways?
- What can my players buy? Why?
- Is money too easy to get? Too hard? How can I change this?
- Are choices about earning and spending meaningful ones?
- Is a universal currency a good idea in my game, or should there be specialized currencies?

## Dynamic Game Balancing

Dreamy young game designers frequently speak of their desire to create a system that will “adjust to the player’s skill level on the fly.” That is, if the game is too easy or too difficult for a player, the game will detect this and change the difficulty until it is at the right level of challenge for the player. And this is a beautiful dream. But it is a dream that is rife with some surprising problems.

- **It spoils the reality of the world:** Players want to believe, on some level, that the game world they are playing in is real. But if they know that all of their opponents’ abilities are not absolute, but relative to the player’s skill level, it damages the illusion that these opponents are fixed challenges to be met and mastered.
- **It is exploitable:** If players know the game will get easier when they play badly, they may choose to play badly just to make an upcoming part of the game easy to get through, completely defeating the purpose of the self-balancing system.
- **Players improve with practice:** *The Incredible Hulk* for the PlayStation 2 caused some controversy by making the enemies get easier if you were defeated by them more than a certain number of times. Many players felt insulted by this, and others felt disappointed—they wanted to keep practicing until they could master the challenge, and the game took away that pleasure.

This is not to say that dynamic game balancing is a dead end. I only mean to point out that implementing such a system is not so straightforward. I suspect that advances in this area will involve some very clever, counterintuitive ideas.

## The Big Picture

Game balancing is a big topic both in breadth and depth. I have tried to cover as many major points as possible, but each game has unique things that need to be balanced, so it would be impossible to cover everything. Use the Lens of Balance to look for any balancing problems the other lenses might have missed.

### *Lens #53: The Lens of Balance*

There are many types of game balance, and each is important. However, it is easy to get lost in the details and forget the big picture. Use this simple lens to get out of the mire, and ask yourself the only important question:

- Does my game feel right? Why or why not?

## Other Reading to Consider

***Game Mechanics: Advanced Game Design* by Ernest Adams and Joris Dormans.**

I mentioned this in the last chapter, but I'll mention it here again, since so much of it is about practical techniques for game balancing.

***Design in Detail: Changing the Time between Shots for the Sniper Rifle from 0.5 to 0.7 Seconds for Halo 3* by Jaime Griesemer.** This was a talk that Jaime gave at GDC 2010 that deals head on with the fact that balancing tiny values can have a tremendous impact on gameplay.