

Balancing Multiplayer Competitive Games

David Sirlin, Game Developer's Conference 2009

Why Care About Balance?

An oversight in a single player game that makes the game too easy to win might only affect 1% of players. A balance oversight in a competitive multiplayer game can *ruin the entire development effort*. An unfair tactic will travel quickly throughout the playerbase like a virus and ruin the experience for everyone. Game balance is a potential "single point of failure" for the entire project, so get it right.

Second, we'd like our games to last as long as possible. Good balance means they won't fall apart and be abandoned instantly, while good depth means they remain interesting to play for years.

Defining Terms

Definition: What is Depth?

A multiplayer game is deep if it is still strategically interesting to play after expert players have studied and practiced it for years, decades, or centuries.

Definition: What Is Balance?

A multiplayer game is balanced if a reasonably large number of options available to the player are viable--especially, but not limited to, during high-level play by expert players.

There are two types of player-choices we have to make viable, each with different requirements: choices made **during a game** and **before the game starts**.

Viable Options (during a game)

The player must have many meaningful choices throughout a game. The choices must be materially different from each other, not worthless, and not dominated by other choices. To make the game deeper, the choices should not be exactly equal in value at all times.

Fairness (options before a game starts)

Players of equal skill should have an equal chance at winning even though they might start the game with different sets of options / moves / characters / resources / etc.

Notice how different the above two requirements are. During a game, some moves might have only an occasional use, some strategies are only good at countering other specific strategies, and some weapons might be generally weaker than others. But starting options are held to a much higher standard: it should be equally viable to play any character in a fighting game, any race in real-time strategy, and there should at least be a large number of equally viable decks in customizable card game.

We have to care about making many viable options in any game, but we only have to care about the additional stringent requirement of fairness in starting options if we give the player a choice of different starting options. While this makes our jobs harder, it makes the game more interesting to many players.

Definition: Symmetric Games and. Asymmetric Games

In symmetric games, all players start with the same sets of options. In asymmetric games, players start the game with different sets of options. Think of these terms as a spectrum, rather than merely two buckets.



Casual vs. Hardcore: A False Dichotomy

First satisfy the hardcore with deep and balanced gameplay. They are the center of the bullseye and have more demands. Second, make the game more accessible. If the hardcore community abandons the game, word spreads to everyone and it's hard to maintain any community at all.

Blizzard understands this. Is World of Warcraft for hardcore raiders and pvpers or for casual players? Answer: it's for everyone.

Symmetric Games

Chess, Go, Backgammon, Monopoly
Tetris
Quake
Team Fortress 2 (you can switch classes any time)

Slightly Asymmetric Games

Counter-Strike (two sides)
Warcraft2 (two sides)
StarCraft (three sides)

Highly Asymmetric Games

Magic: the Gathering (~8 playable decks per format)
*Puzzle Fighter (~10 characters)
*Yomi: Fighting Card Game (16 decks)
*Street Fighter (~20 characters)
*Kongai (dozens of tournament viable decks)
Warcraft 3: DOTA (~90 characters)

* = designed/balanced by Sirlin

Viability Options

To ensure many viable options during gameplay, remove dominant moves, build-in systems of counters, consider using double-blind mechanisms, fully explore the design space, and remove the chaff from the wheat.

Pitfall: Dominant Moves and Strategies

You're in danger of instantly losing all your game's viable options if there is a dominant move (or weapon, character, unit, whatever). A dominant move isn't merely powerful—it is strictly better than any other you could do, so its very existence reduces the strategy of the game.

Yomi Layer 3 and Built-in Counters

Yomi is the Japanese word for "reading," as in reading the mind of the opponent. Ensure that if the player knows what the opponent will do, he can counter it. If you have a powerful move and use it against an unskilled opponent, I call that Yomi Layer 0, meaning neither player is even bothering with trying to know what the opponent will do. At Layer 1, your opponent does the counter to your move because he expects it. At Layer 2, you do the counter to his counter. At Layer 3, he does the counter to that.

You have: A good move and a 2nd level counter
Opponent has: A counter to your good move and a counter to your counter

We usually don't need to design Yomi Layer 4 because at that point, the original good move probably beats your opponent's counter-to-the-counter.

Double-Blind Guessing

A guess is double-blind if each player commits to a move without yet knowing which move the other players chose, as in the prisoner's dilemma.

This design pattern is a way to increase the chances that you have many viable moves in your game because it naturally forces players into Yomi Layer 3 counters. Weaker moves become inherently better in a double-blind game because it's easier to get away with doing them without being countered.

Explore the Design Space

If you give the player only very similar options, the system is fragile and in danger of one option dominating all the others.

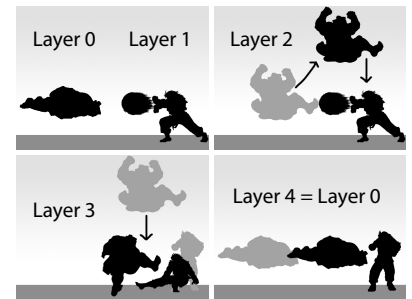
Imagine a fighting game where you only varied the damage of each move, but nothing else. A more resilient design explores the design space by making options as different as possible. In a fighting game, we can vary the damage of a move, the speed, the length of time the hitting frames are active, the priority, the reach, the angle, whether it can be cancelled into other moves, whether it knocks down the opponent, etc.

Wheat from the Chaff (Omit Needless Words...and game elements)

Explore the design space, but omit needless words, mechanics, characters, and choices. Although your primary goal regarding viable options is to make sure you're giving the player enough options, your secondary goal should be to eliminate all the useless ones.

Local vs. Global Balance

We only need overall (global) balance over the course of a whole game, not balance at every possible point during a game. In fact, players should be able to force each other into disadvantageous situations. Even checkmate situations are ok--situations where one player has almost certainly won, even though the game isn't technically over--as long as the final lame-duck portion of the gameplay is over very quickly.



Fireball (layer 1) beats Torpedo. Butt-slam (layer 2) beats fireball. Waiting, then sweeping (layer 3) beats butt-slam. If Ken is waiting, Honda can go back to the original Torpedo move (layer 4 = layer 0).

Fighting games are (secretly) double-blind games because the the moment you commit to a move, you often only know what the opponent did 0.4 seconds ago. It takes your brain time to process information, and timing is precise enough for a fraction of a second to change the outcome.

Real-time strategy games also have this property, but on a much slower scale. They use the fog of war mechanic to create even more double-blind guesses.

Vigorous writing is concise. A sentence should contain no unnecessary words, a paragraph no unnecessary sentences, for the same reason that a drawing should have no unnecessary lines and a machine no unnecessary parts. This requires not that the writer make all his sentences short, or that he avoid all detail and treat his subjects only in outline, but that every word tell.

--The Elements of Style

Fairness of Starting Options

To ensure fairness of starting options, design self-balancing forces and make extensive use of tier lists during playtesting. After tiers are in good shape, fix counter-matches.

Design Self-balancing Forces

Design defensively by creating systems that solve gameplay problems you don't know you have yet. In Magic: the Gathering, each color has built-in weaknesses and counters to other colors, so if any deck becomes too powerful, there will naturally be some counteracting forces. The fighting game Guilty Gear XX has several fail-safe mechanisms to prevent infinite combos:

Guard meter. The more you get hit in a short time, the shorter your hitstun. If an infinite combo did exist, the victim could eventually just block it.

Progressive gravity. The longer you are juggled in the air, the higher the gravity becomes, making infinite juggles impossible.

Green blocking. While blocking, you can spend a bit of super meter to make a green orb around your character. While green blocking, the opponent gets pushed away pretty far, preventing any true "lockdowns" from existing.

Tier Lists

Create your own tier list of all your game's characters/races/starting options. Have playtesters do the same. I give this format to my playtesters:

- 0) **God tier** (no character should be in this tier, if they are, you are forced to play them to be competitive)
- 1) **Top tier** (don't be afraid to put your favorite characters here. Being top tier does not necessarily mean any nerfs are needed)
- 2) **Middle tier** (pretty good, not quite as good as top)
- 3) **Bottom tier** (I can still win with them, but it's hard)
- 4) **Garbage tier** (no one should be in this. Not reasonable to play this character at all.)

My first goal of balancing is to get the god tier empty. Of course some character will end up strongest, or tied for strongest, and that is ok. But a "god tier" character is so strong as to make the rest of the game obsolete. We have to fix that immediately because it ruins the whole playtest (and the game). Also, the power level of anything in the god tier is so high, that we can't even hope to balance the rest of the game around it.

My next goal is get rid of the garbage tier characters. They are so bad that no one touches them, and it's usually pretty easy to increase their power enough to get them somewhere between top, middle, and bottom. If they are somewhere in those three tiers (which gives you a lot of latitude actually), at least they are playable.

Make playtesters post their tier lists so they can see each other's. Allow them to argue with each other over these rankings, and let them each try their hardest to prove their points by winning matches against the best players. Watch closely. Let the top tier establish the desired power level. Make adjustments to improve the worst ranked characters/races/classes and test again, adjust again, test again, etc.

Counter-Matches last

In addition to the tier list, you should also be thinking about all the specific matchups. Street Fighter HD Remix, for example, has 17 characters and 153 possible matchups. For the version of Street Fighter before HD Remix, experts tend separate the characters into four tiers (none of them are god tier or garbage tier), and they place Guile in the respectable second tier. Even though that means Guile's power level is acceptable, he is severely disadvantaged in two specific matches: Vega and Dhalsim. Is it ok that an overall good character gets countered by two specific characters? Not really.

If these were weapons in an FPS or units in an RTS or characters in team-based fighting game, then it might be acceptable. You pick up weapons in an FPS after the game starts, so their balance doesn't need to meet the hard requirements of an asymmetric game. And units in an RTS and characters in team-based fighting game are examples of local imbalances, which are fine (it's the races and teams that need to be balanced). But in Guile's case, you lock in your choice of Guile at the start of the game, then you are stuck with him the entire game, so it really is a problem if he has some bad counter matches, even though players rate him fairly highly overall. Once your tiers are reasonable, look at fixing counter-matches.

Intuition

Following all the steps so far will help you avoid disaster in game balance, but as with any craft, following rules only goes so far. What's missing is lifelong intuition.

Game balance is so complex as to be inherently unsolvable. If it were solvable, your players will solve it and stop playing. Intuition, not math, is the best tool to navigate high-complexity problems.

"Contrary to popular belief, decisions about simple issues can be better tackled by conscious thought, whereas decisions about complex matters can be better approached with unconscious thought."

--Dijksterhuis and Nordgren, A Theory of Unconscious Thought

How to Build Up Intuition

The problem with developing this type of knowledge is time. If we are instead trying to become expert players (rather than expert game balancers), we have access to a very fast **feedback loop**. Play the game against people better than us, see what worked and didn't, adjust, play again. A game of Street Fighter takes only a couple minutes, and even an RTS game takes less than 1 hour. But creating a game and seeing how its balance turns out takes years. It's a very slow feedback loop, and extremely few people get to even participate in it directly. That's why I study the feedback loops of other games:

- 1) *Street Fighter*. I know about more than **20 versions** of this game.
- 2) *Virtua Fighter*. It says version 5 on the box of the latest one, but really, there have been at least **15 versions** of this game if you look closely.
- 3) *Guilty Gear*. I know of **8 versions** of this game.
- 4) *Magic: The Gathering*. This game has changed (with new sets of cards) about **3 times per year** for over 10 years.
- 5) *World of Warcraft*. I played that game for two years before it was released and I couldn't even guess the number of mini-releases over that time. Maybe **50 or 100**.

That is A LOT of data about how changes to a game's balance pan out. You can of course replace this list with any competitive games you like. You can study what the exact changes are from one version of a game to the next, then learn how those changes actually affected the **game's balance** and how **players perceived** the changes.

"Study" can come naturally when you play a game enough to reach tournament levels (*Street Fighter* for me). Or you can study game data (frame stats, equations, flow charts) with some playing (*Virtua Fighter* for me). Watching pro matches and staying in touch with the game's community also helps you study what effects balance changes ended up having.

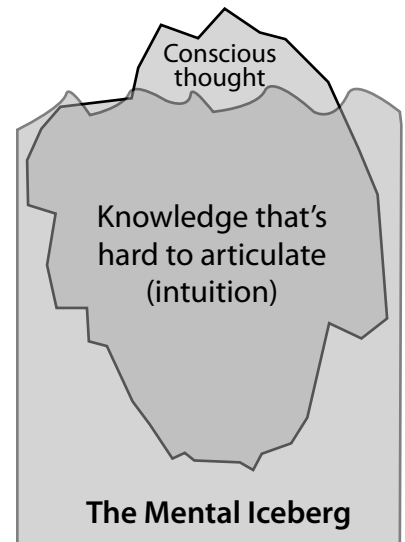
Trusting intuition

Be aware of these unfortunate truths as you use the years of intuition you've built up:

- 1) The intuitive expert will be less sure of his answers, while incompetent people will be very sure of their (wrong) answers.
- 2) Having to explain yourself diminishes your ability to draw on your intuition in the first place.

How to hire or find people who have it

Don't look for number of years in the game industry or number of titles shipped when looking for a game balancer. Those stats are irrelevant (possibly even negatively correlated!) with the skills you need. Instead, look for those who have studied balance feedback loops on their own time, and are part of some competitive community.



Books About Intuition

Blink, Malcolm Gladwell, 2007.
ISBN: 0316010669

Gut Feelings, Gerd Gigerenzer, 2008.
ISBN: 0143113763

Strangers to Ourselves, Timothy Wilson, 2004.
ISBN: 0674013824

The Power of Intuition, Gary Klein, 2004.
ISBN: 0385502893

Research Papers

A Theory of Unconscious Thought,
Dijksterhuis and Nordgren, 2006.
URL: <http://tinyurl.com/9y6ygf>

On Making the Right Choice: The
Deliberation-Without-Attention Effect,
Dijksterhuis, 2006.
URL: <http://tinyurl.com/7sbnhq>

Unskilled and Unaware, Kruger and
Dunning, 1999.
URL: <http://tinyurl.com/962k8>

Sirlin's Articles on Game Balance

Definitions

<http://www.sirlin.net/articles/balancing-multiplayer-games-part-1-definitions.html>

Viable Options

<http://www.sirlin.net/articles/balancing-multiplayer-games-part-2-viable-options.html>

Fairness of Starting Options

<http://www.sirlin.net/articles/balancing-multiplayer-games-part-3-fairness.html>

Intuition

<http://www.sirlin.net/articles/balancing-multiplayer-games-part-4-intuition.html>