



GAME DESIGN

An overview

By Mårten Jonsson



INTRODUCTION

What are games?

- Systems
- Rules
- Storytelling
- Interaction
- Entertainment
- Escapism
- Etc...

The approach you take to designing games depends on the view you choose to take, and your intention with the game.

Ludologi vs Narratology - Academic practices

There are two schools of games as an academic subject.

Ludology: Studying games in terms of rules and gameplay, comparing it to other games.

The sum of its gameplay.

Narratology: Studying games in terms of narrative theories, comparing it to works of literature.

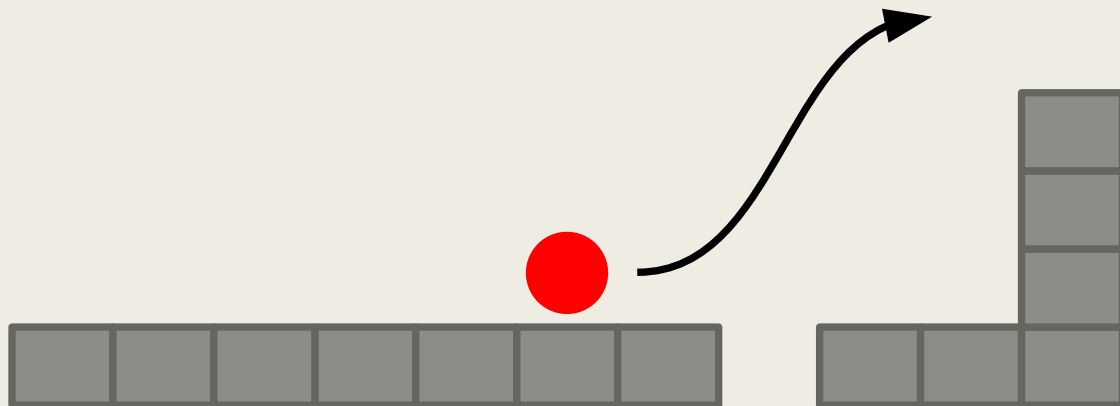
The sum of its narrative.

What is game design?

"Game design is the art of applying design and aesthetics to create a game for entertainment or for educational, exercise, or experimental purposes."

What is game design?

You have a character that can jump. How far and how high can that character jump?
This influences every aspect of the development.



The door problem

Original article by Liz England



Imagine your game has a door. There are questions that needs to be answered.

The door problem

Original article by Liz England

- Are there doors?
- Can the player open them?
- Can only some doors be opened?
- Are certain doors only decorative?
- How does the player know the difference?
- Are certain doors locked/unlocked?
- How is that conveyed to the player?
- Do you need a key? Hack a console? Push a button?
- Are there locked doors that can't be opened?
- Is the door opened automatically? Manually?
- Does the door lock behind the player?
- Does all the doors look the same?
- Do different looking doors need different keys?
- Etc...

The door problem

Original article by Liz England

- The coder needs to know what the doors can do.
- The artist needs to know if there are different types of doors.
 - The level designer needs to know if some are locked.
 - The writer needs to know their purpose.

Etc...

Much like the jump, every has questions about the door that needs to be answered before work is started on them.

Game design document

A game design document (or GDD) is often created for a project. The purpose is to contain all the information available for the game as reference.

Iron Sand: Heart of Darkness

Infiltrate the jungle where the Masters of World Conflict hide

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Bonus Level 3 Game Design Document Template

Weapon combat

Weapon progression

- Technology tree
- Weapon inspiration/concept images
- Weapon damage and effects
 - Targeting system details
 - Lock-on system details
- Ammo required
- Range
- Special attributes (breakable, degrades)
- Controls
 - How does player use weapons
 - How does player swap weapons?

Power-ups/state modifiers

List of power-ups/state modifiers

- Description including image
- Effect
- Duration
- Effect on controls (if valid)

Health

Health (general)

- HUD display
- How to replenish health
- Power-ups and health items
- Warning for player when health is low

Alternate states (stunned, poisoned, turned into a baby)

- Controls
- Show examples and metrics

Lives (if applicable)

- How are lives earned?
- How are lives lost?
- What happens when you run out of lives?

Death

- Instant death conditions—(combat, fire, drowning, and so on)
- Game over conditions:
 - Penalty for dying
 - Game over screen (show image of game over screen)

Game Design Document Outline

A game design document is the blueprint from which a game is to be built. As such, every single detail necessary to build the game should be addressed. The larger the team and the longer the design and development cycle, the more critical is the need. For your purpose, the intent is to capture as much as possible of your design. I want you to think big...bigger than what you are able to develop. I also want you to be clear about what the software delivers and what the design entails. My recommendation is that you define the ultimate game and then clarify what it is that you have developed. If you are finding it too difficult to do that, you may produce too documents.

1. Title Page
 - 1.1. Game Name – Perhaps also add a subtitle or high concept sentence.
2. Game Overview
 - 2.1. Game Concept
 - 2.2. Genre
 - 2.3. Target Audience
 - 2.4. Game Flow Summary – How does the player move through the game. Both through framing interface and the game itself.
 - 2.5. Look and Feel – What is the basic look and feel of the game? What is the visual style?
3. Gameplay and Mechanics
 - 3.1. Gameplay
 - 3.1.1. Game Progression
 - 3.1.2. Mission/Challenge Structure
 - 3.1.3. Puzzle Structure
 - 3.1.4. Objectives – What are the objectives of the game?
 - 3.1.5. Play Flow – How does the game flow for the game player
 - 3.2. Mechanics – What are the rules to the game, both implicit and explicit. This is the model of the universe that the game works under. Think of it as a simulation of a world, how do all the pieces interact? This actually can be a very large section.
 - 3.2.1. Physics – How does the physical universe work?
 - 3.2.2. Movement in the game
 - 3.2.3. Objects – how to pick them up and move them
 - 3.2.4. Actions, including whatever switches and buttons are used, interacting with objects, and what means of communication are used
 - 3.2.5. Combat – If there is combat or even conflict, how is this specifically modeled?
 - 3.2.6. Economy – What is the economy of the game? How does it work?
 - 3.2.7. Screen Flow – A graphical description of how each screen is related to every other and a description of the purpose of each screen.
 - 3.3. Game Options – What are the options and how do they affect game play and mechanics?
 - 3.4. Replay and Saving
 - 3.5. Cheats and Easter Eggs
4. Story, Setting and Character
 - 4.1. Story and Narrative – Includes back story, plot elements, game progression, and cut scenes. Cut scenes descriptions include the actors, the setting, and the storyboard or script.



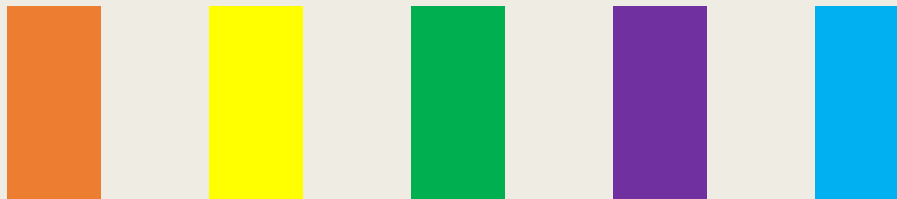
LOOPS



Game Design Pillars

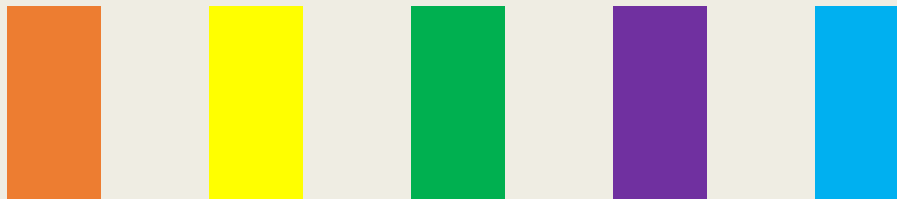
Game design pillars is the concept of creating "core statements" in the beginning of a project in order to get a focused designed and maintain a coherent vision.

Define 3-5 statements that will guide the vision. Everything in the game should fall within one of the design pillars.



Game Design Pillars - Examples

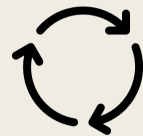
- Metroid Dread – Exploration, Stealth, Resource Gathering
- The Last of Us – Crafting, Story, AI Partners, Stealth
- Undertale – Narrative, Combat, Characters, Choice



Core Loop

The Core Loop in addition to the design pillars is the most important aspect of a game. It is the primary game system or mechanic that defines a game. It is the part of the game players will most often repeat or engage in, and comprises the most basic kind of actions the player can take.

If the core loop isn't fun or engaging it doesn't matter how well executed the rest of the game is.

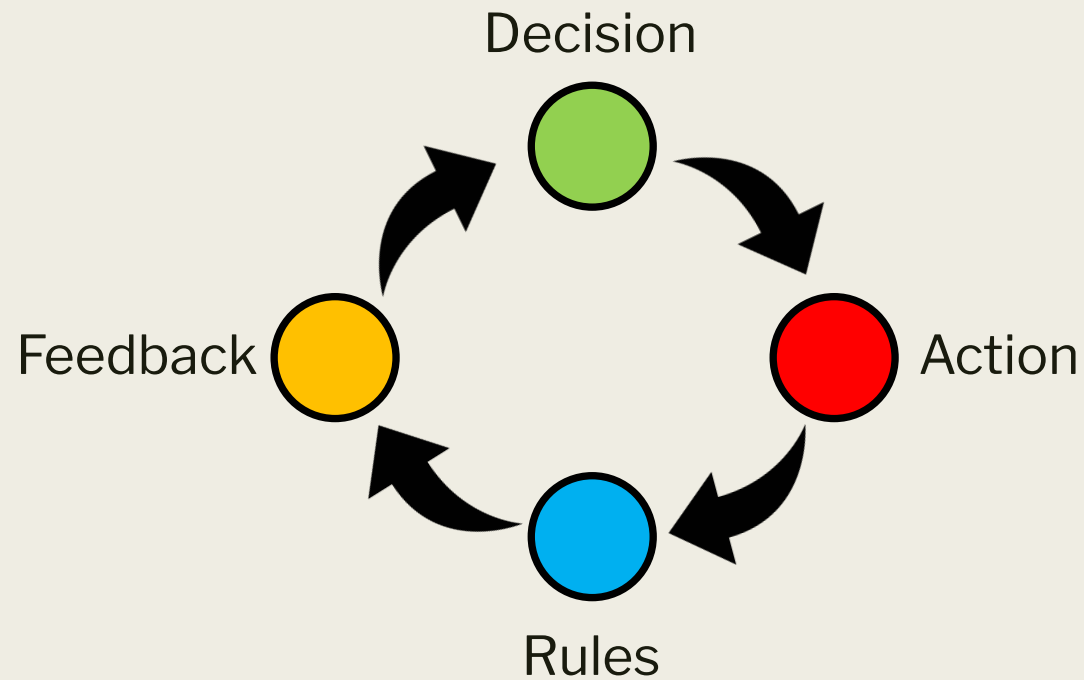


Core Loop - Examples

- Super Mario – Run and jump. Everything in the game is based on these actions, from maneuvering the levels to defeating enemies.
- Doom – Defeat enemies. The game is based on combat encounters with subsequent secondary actions that enhances this core.
- Candy Crush Saga – Match icons. The simple mechanic is enhanced with game juice and additional features to give the player a positive feedback.

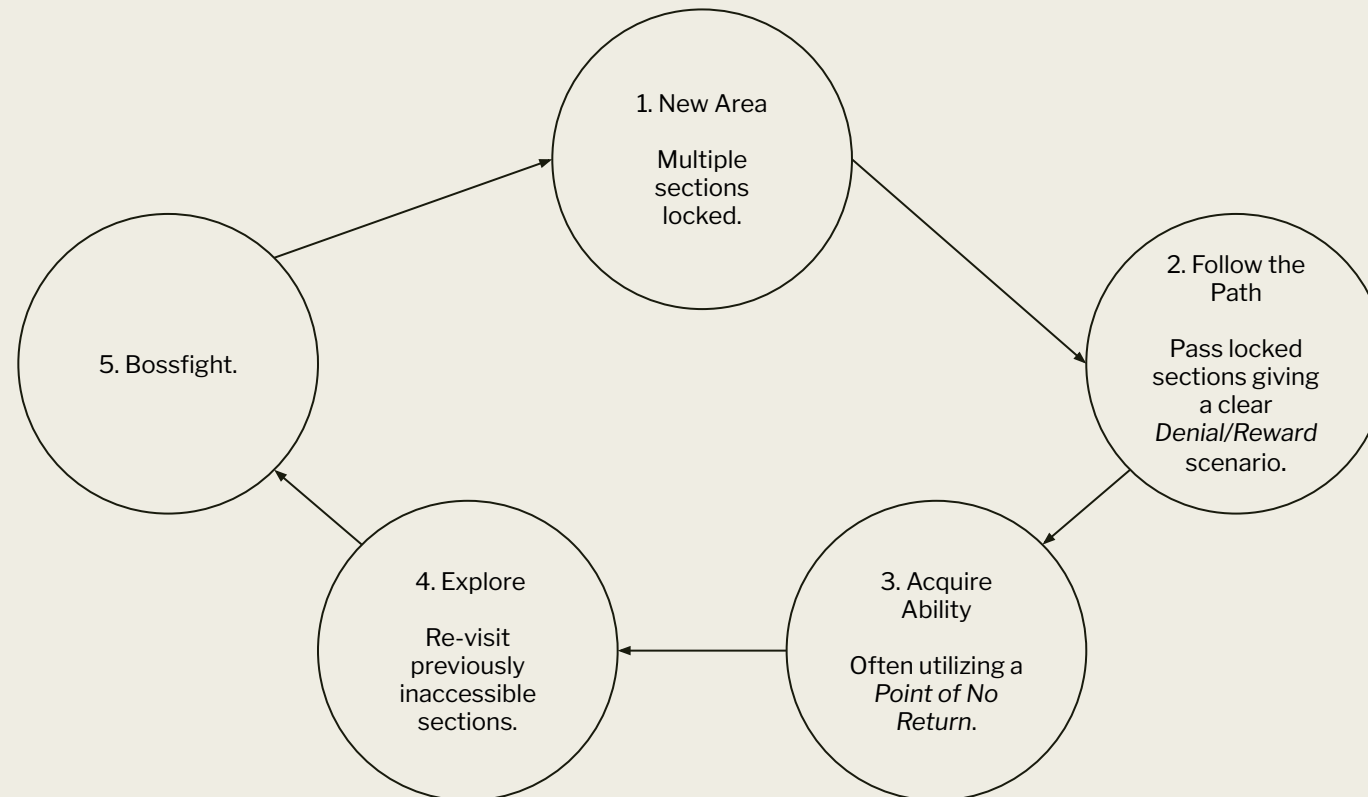
Core Loop

The core loop should be engaging and leaving the player wanting to repeat the action.



Main Gameplay Loop

Another way to break down a game is to create a gameplay loop, a way to summarize the core gameplay. An example from Metroid Dread:



Secondary Loop

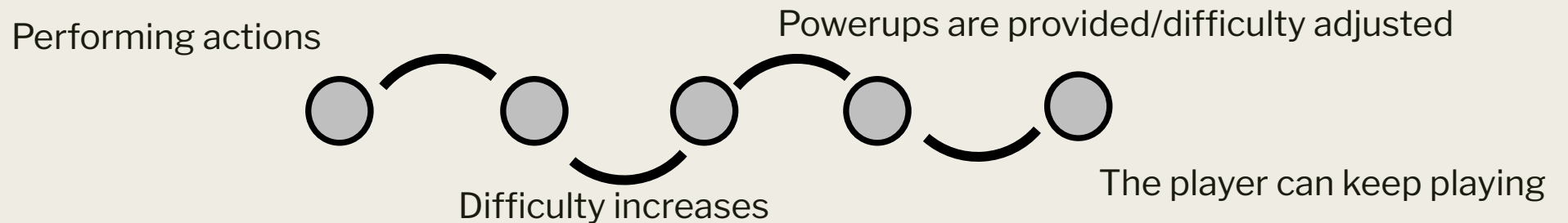
The game can be supported by any number of mechanics that work to enhance the core loop, or work in tandem with it to provide variety.

Example - Powerup enabling the player to jump further.



Core Loop - Flow

A game should strive for the player to achieve game flow. A state in which the player can continuously play without interruption. Systems can be implemented for the game to automatically adjust the gameplay to preserve flow.



Positive/Negative Feedback Loops

- A positive feedback loop is when a system accelerates itself.
 - Defeating an enemy gives you XP which makes future enemy encounters easier. Winning makes winning easier = A loop that accelerates itself.
- A negative feedback loop tries to self-adjust, to keep balance.
 - You're in first place in a race. The opponents gain extra acceleration in order to be able to catch up with you = A loop that corrects itself.

Metagame Elements

A game can contain any number of metagame elements; loops and features which are optional, but can enhance the value of a game. Examples:

- Collectibles
- Sequence breaking
- Story elements
- Replayable features



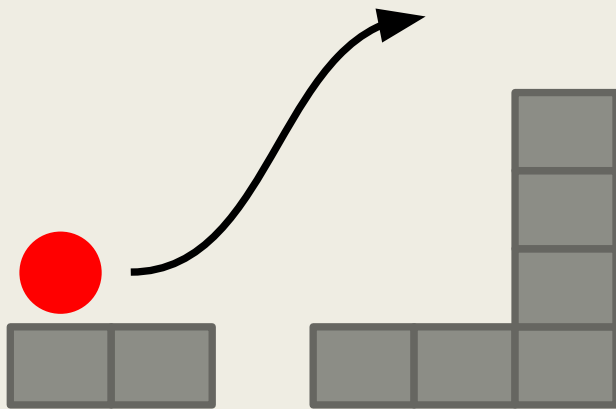
BALANCING &
METRICS



Metrics

Metrics are the variables that drives the game.

An example of metrics for a platform character:



- Walking speed
- Running speed
- Jump height
- Jump height when walking
- Jump height when running
- Jump length
- Jump length when walking
- Jump length when running
- Health
- Attack power
- Character height
- Character width
- Hitbox size
- Etc...

Balancing

How to properly balance the aspects of a game is fundamental to the overall experience, and depending on genre, a core aspect of it. In a fighting game, the different metrics such as damage, defense, and health have to be balanced.



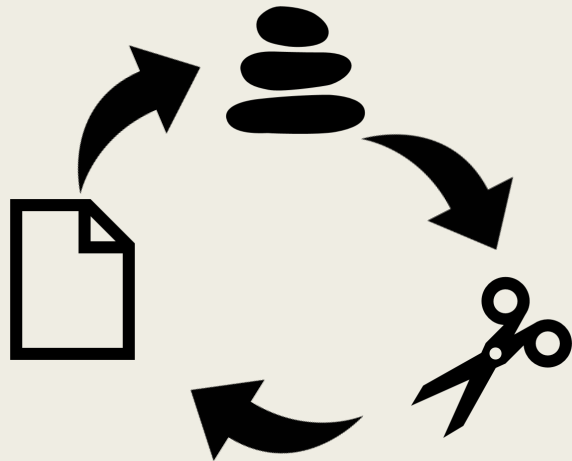
Balancing

- Fighting games are based on characters various stats (Metrics) being balanced.
- Strategy games employ a myriad of variables to balance the gameplay.
- Racing and sport games are based on variables to create a good flow.
- Shoot em up games needs to be balanced to create a proper difficulty curve.
- Etc...

A big part of game design is testing and balancing variables against each other.

Balancing

Rock, paper, scissor is a standard model for balancing aspects of game. It can be applied to a variety of variables.



Attack – Defense – Speed

Aggro – Control – Combo

Economy – Strategy - Resources

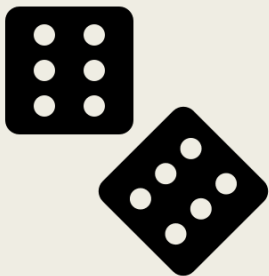
Balancing – Target Audience

Remember who the target audience is, and what they are expecting of the game.
Make sure it's balanced accordingly.



Random

Random elements in games should be designed. There are several methods for generating random numbers, utilizing various models. How random-generation is done can affect the gameplay of a game. Puzzle games and match-3 utilize it heavily.



Some examples of random sampling methods:

Simple Random Sampling

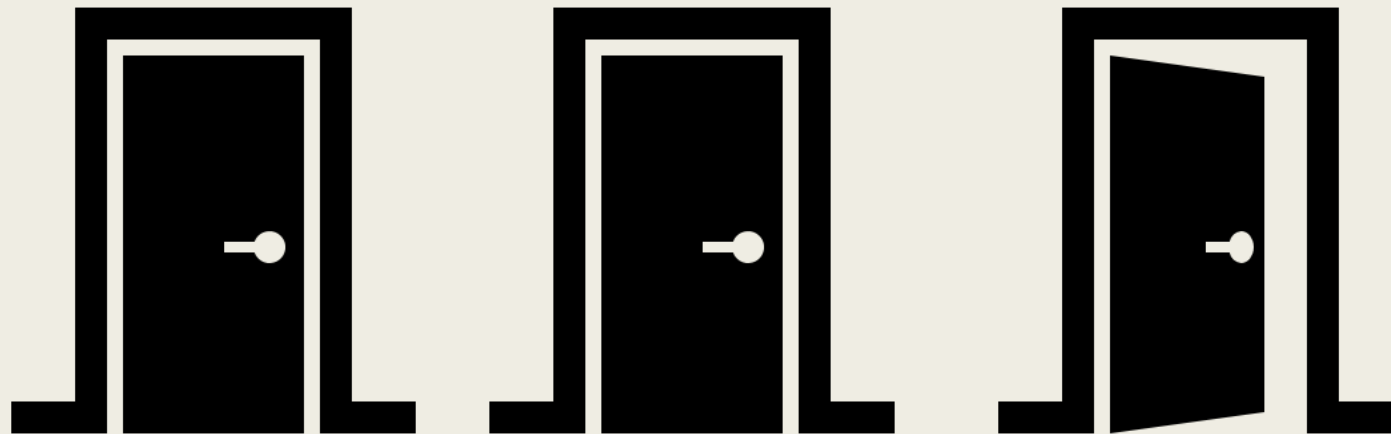
Stratified Random Sampling

Cluster Random Sampling

Systematic Random Sampling

Random

[The Monty Hall problem](#). An example of probability. Behind one door is a prize. You pick one door. One door (not containing the prize) is removed. You then get the chance to switch your pick (which increases your odds to 66%)



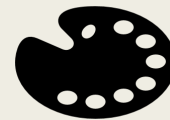
The image features two thick black L-shaped corner brackets. One is positioned in the top-left corner, and the other is in the bottom-right corner. They are oriented towards each other, framing the central text.

ACCESSIBILITY

Accessibility

When designing a game it is important to consider various accessibility issues player may have and either preemptively deal with them, or include options it.

<https://gameaccessibilityguidelines.com/>



Accessibility - Text

Things to consider:

- Is it possible to scale the size of the text? For example with dialogue.
- Is the text compatible with a screen reader? Especially menus and UI.
 - Is the text system designed for easy localization?
- Always make subtitles an option. Additionally, make sure important dialogue information is always conveyed in audio as well.
 - Make sure the font is easily readable.

Accessibility - Audio

Things to consider:

- Include spatial audio whenever possible.
- Include options for adjusting volume between music, FX, and dialogue.
 - Always include the option for subtitles.

Accessibility

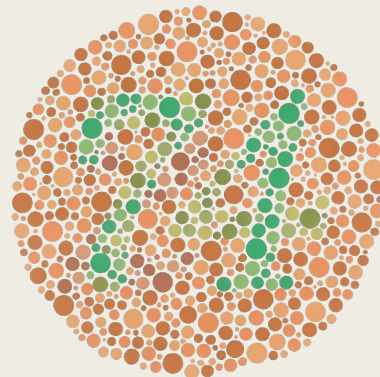
With few and simple modifications many games can be adapted for blind and visually impaired players.

Fighting games can be played by blind players by implementing thought-out spatial sound design and screen reader friendly menus. The same is true for many UI-driven games such as Hearthstone and management simulators.

Accessibility - Color

Things to consider:

- Never convey information by only color.
- Make sure there is contrast between text/menu and background.
 - Allow gamma to be adjustable.
- Consider the palette to ensure readability for various degrees of color-blindness.



Accessibility - Input

Things to consider:

- Always allow remapping of buttons.
 - Keep the interface simple.
- If possible, allow different types of input.
 - Make sure haptics can be turned off.
- If possible, make the game playable with one hand.



HOLISTIC DESIGN

Standards

Always follow established standards, unless there is a specific purpose to breaking them. Examples:

- Controls
- Actions
- Features
- Interface
 - UX

High Concept

A high concept is a description of the game, meant to be short, engaging, and selling. Can also be called an elevator pitch, and is usually just one sentence.

- Minecraft – Craft items and building blocks in a procedurally generated landscape.
 - Grand Theft Auto V – Perform criminal missions in a vast open world.
 - Tetris – Match differently shaped falling blocks at an ever-increasing pace.

Low Concept

When the premise of the game can't be compressed to a single tagline. The main premise is not centered on its concept. Often used in film to describe character driven plots.

- Seinfeld – "It's a show about nothing."

Many RPG's and similar games fall into this category.

Diegesis

The principle of having things like sound, barriers, UI, and similar be a part of the gameworld instead of being a part of the game. Having diegetic elements is a good way to increase immersion.

- Diegetic – When something has its origin within the gameworld. For example, sound effects when performing actions, or dialogue being presented by NPC's.
- Non-diegetic – When something has its origin outside of the gameworld. For example UI sound, invisible barriers, and pop-up text.

Design by Subtraction

- Created by Ueda Fumito.
- The process of removing extraneous parts in order to strengthen the core experience.
- When designing, ask the question: "Does this contribute to the core element of the game?" If the answer is no, remove it.
- Examples: Fez, Ico, Shadow of the Colossus, Flower.



PSYCHOLOGY



Cognition science

"Cognitive science is the interdisciplinary, scientific study of the mind and its processes with input from linguistics, psychology, neuroscience, philosophy, computer science/artificial intelligence, and anthropology. It examines the nature, the tasks, and the functions of cognition (in a broad sense)."

Selective attention

The human brain is exceptionally good at filtering out things, and focusing on individual objects.

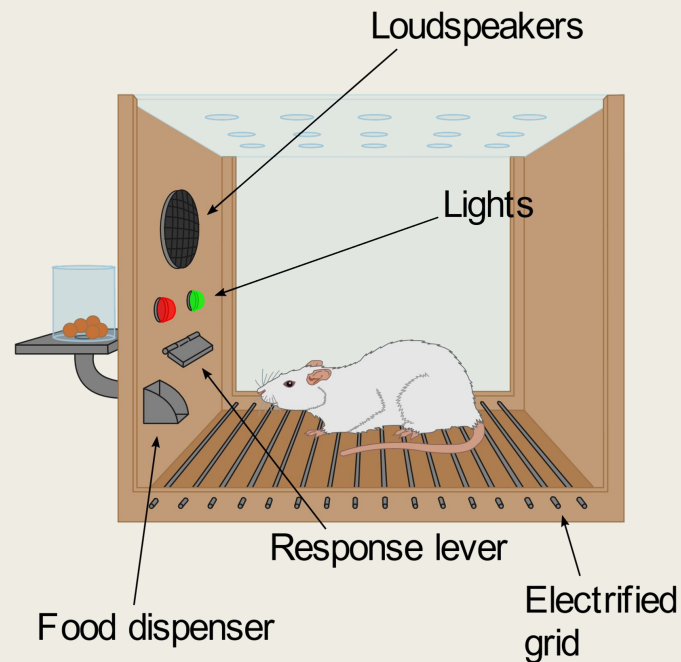
The Invisible Gorilla:

[Selective Attention Test - https://youtu.be/vJG698U2Mvo](https://youtu.be/vJG698U2Mvo)

[The Monkey Business Illusion - https://youtu.be/IGQmdoK_ZfY](https://youtu.be/IGQmdoK_ZfY)

Skinner Box

A skinner box is an operant condition chamber, a psychological experiment regarding the concept of conditioning.



Skinner Box

The principle of conditioning can be applied to game design by creating a reward system for the player.

Most games strive to give the player a reason to continue playing, and it can be done by adding psychological incentive, triggering the brain's reward compartment.





Game Over

Created by Mårten Jonsson

marten@jm-j.com
[linkedin.com/in/jmartenj/](https://www.linkedin.com/in/jmartenj/)

