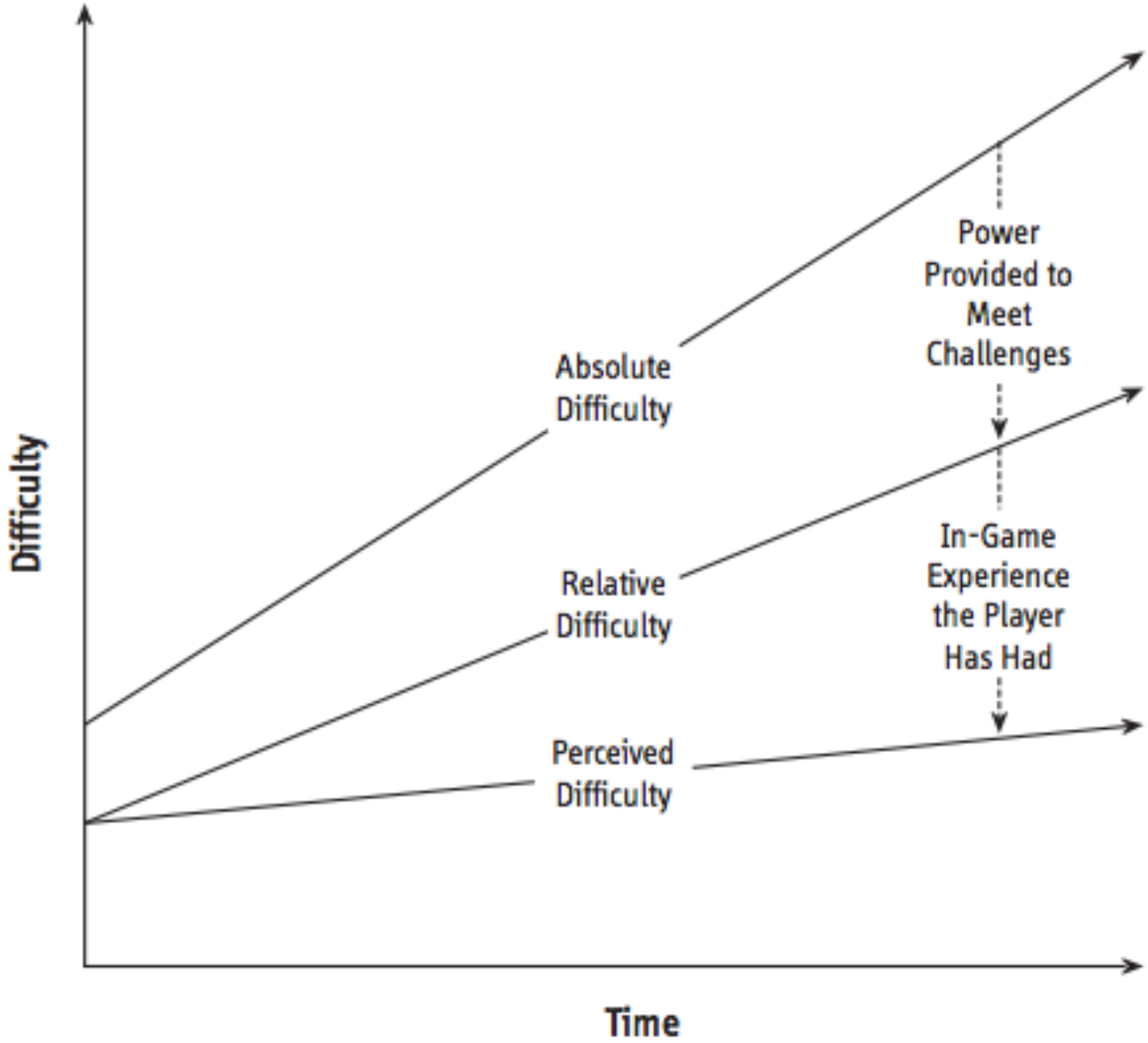
# G54GAM Games

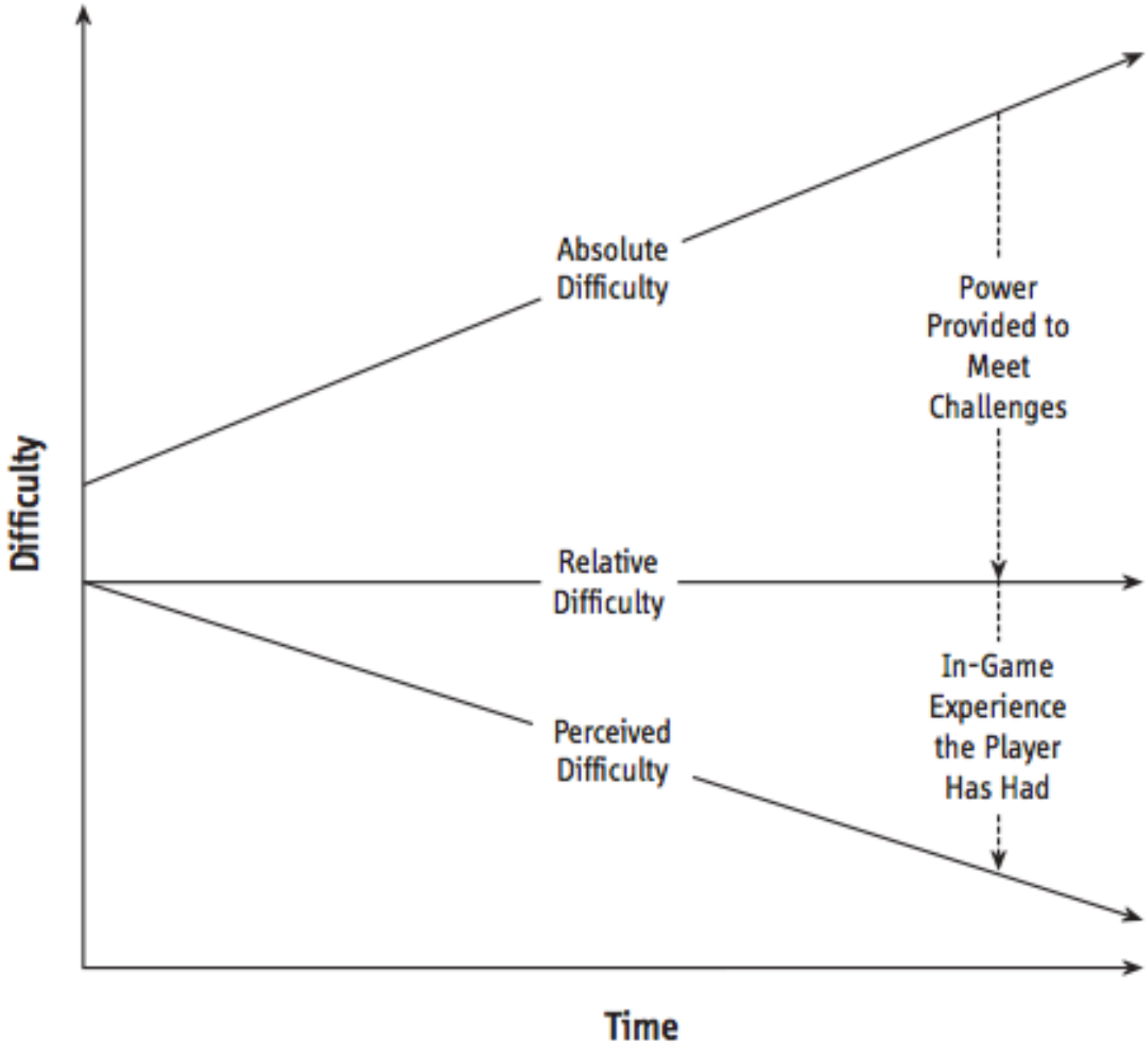
Structuring Games

Progression / Balance

# “Difficulty”

- Actually *how* challenging is it?
  - A trivial enemy: stands still, could not harm the player, could be killed with one hit
  - A non-trivial enemy: moves around, hits the player, requires multiple hits
  - **Absolute** difficulty
    - The intrinsic skill required and the stress of the challenge compared to the trivial case
- What is the *power provided?*
  - How much damage can the player do with a single hit
  - **Relative** difficulty
    - The difficulty relative to the player’s power to meet the challenge
- How does the player’s intrinsic skill change over time?
  - How much time has the player spent meeting similar challenges
  - **Perceived** difficulty = **absolute** difficulty – (power provided + in-game experience)


Difficulty
Absolute Difficulty
Relative Difficulty
Perceived Difficulty
Power Provided to Meet Challenges
In-Game Experience the Player Has Had
Time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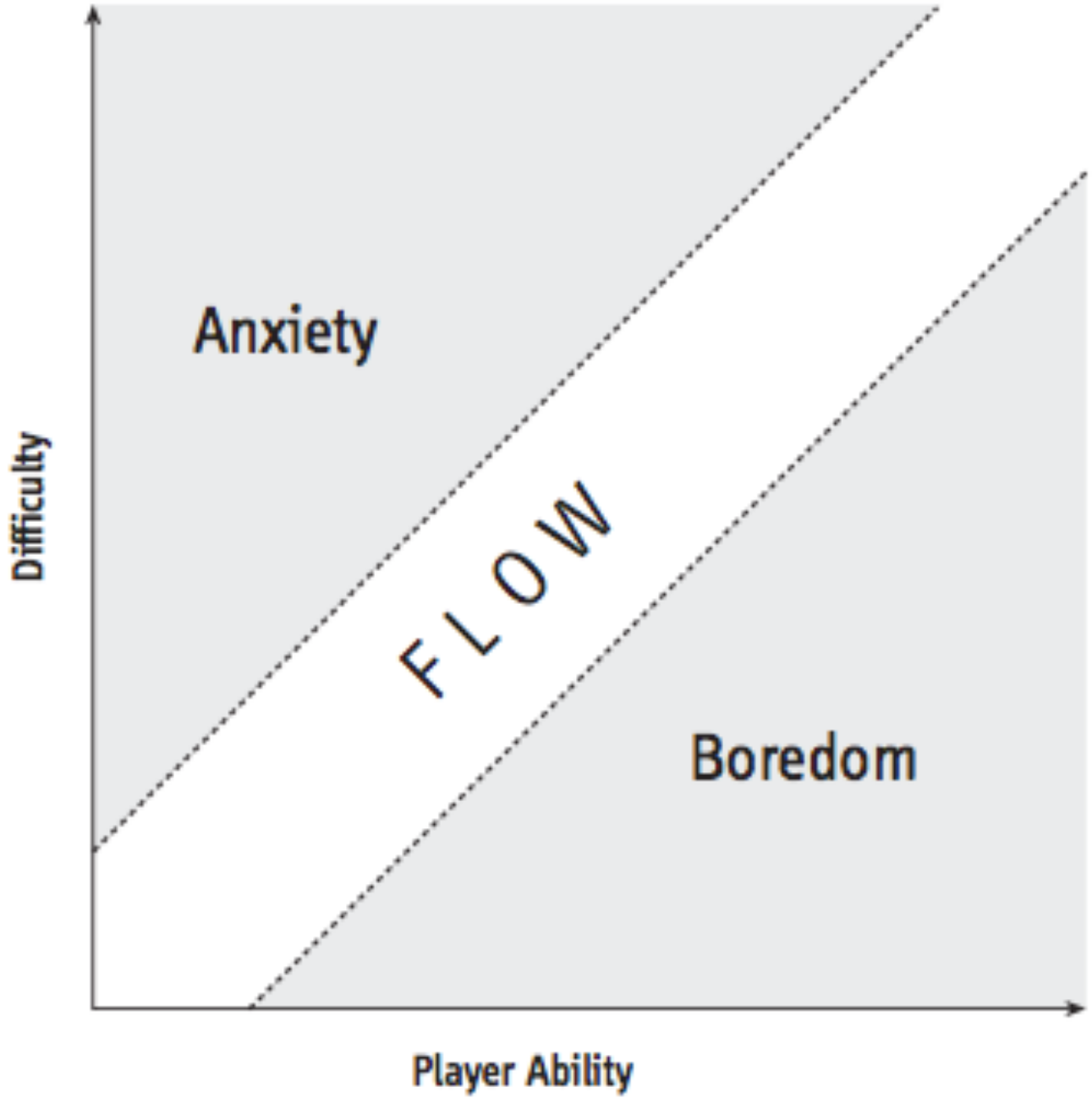
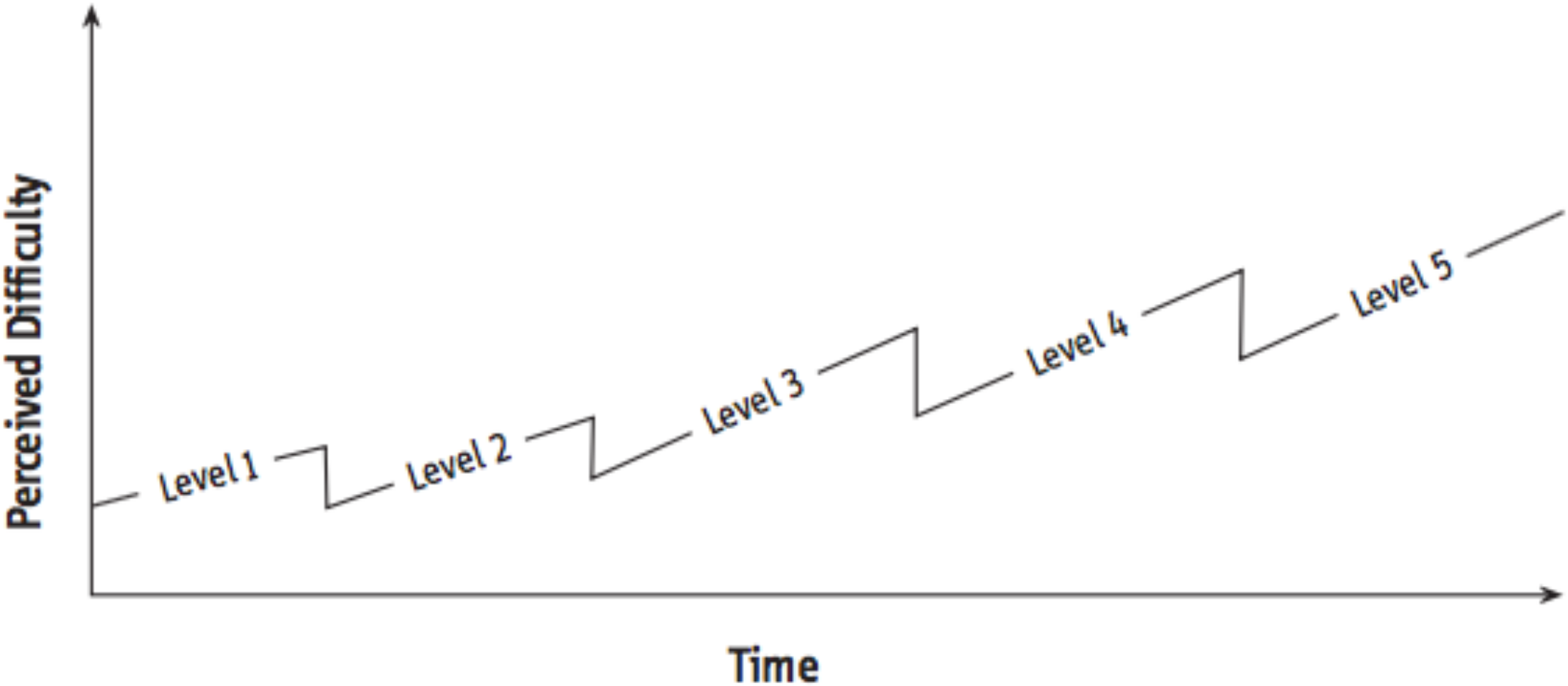
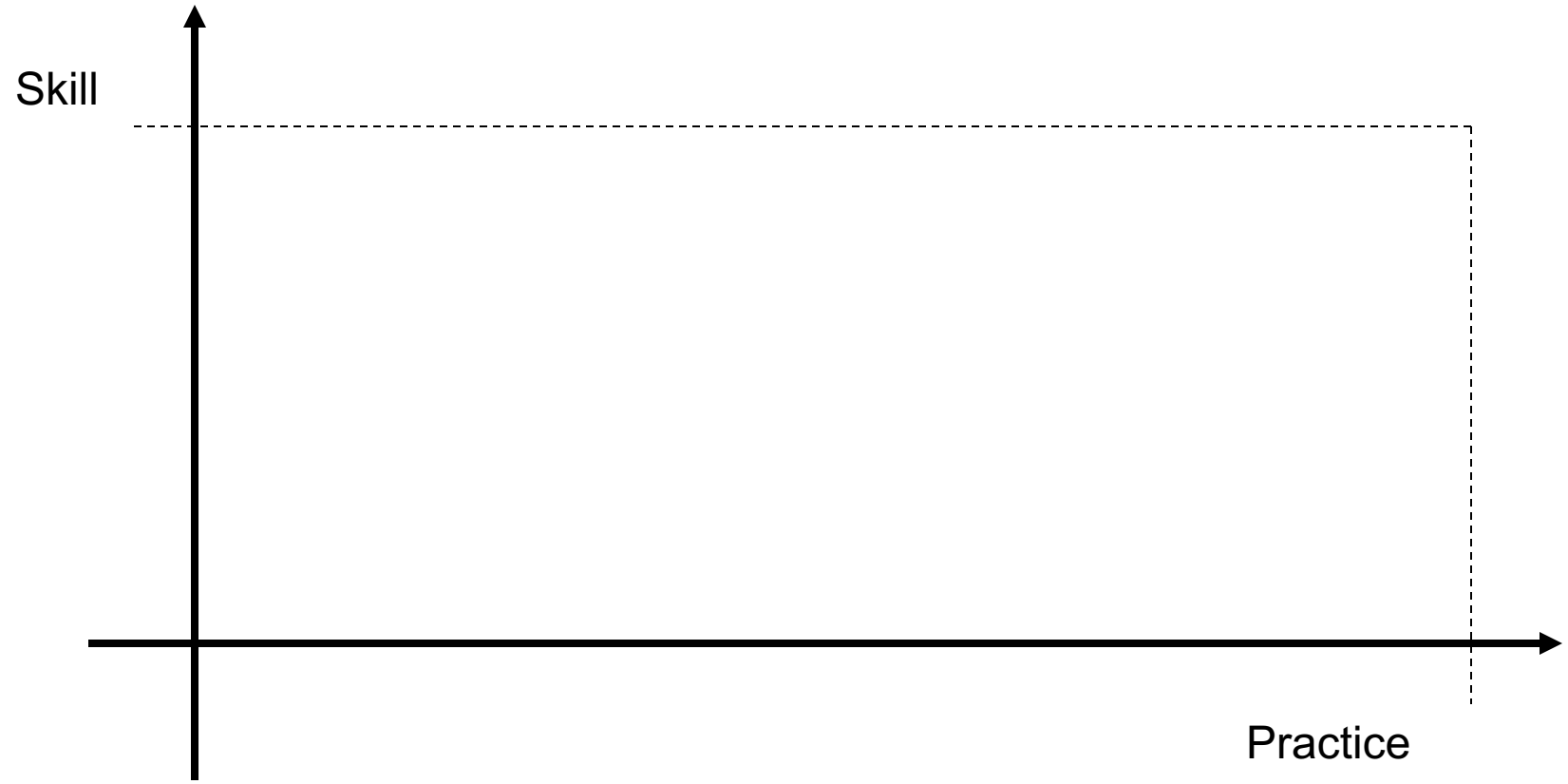

Anxiety
FLOW
Boredom
Difficulty
Player Ability

# Progression

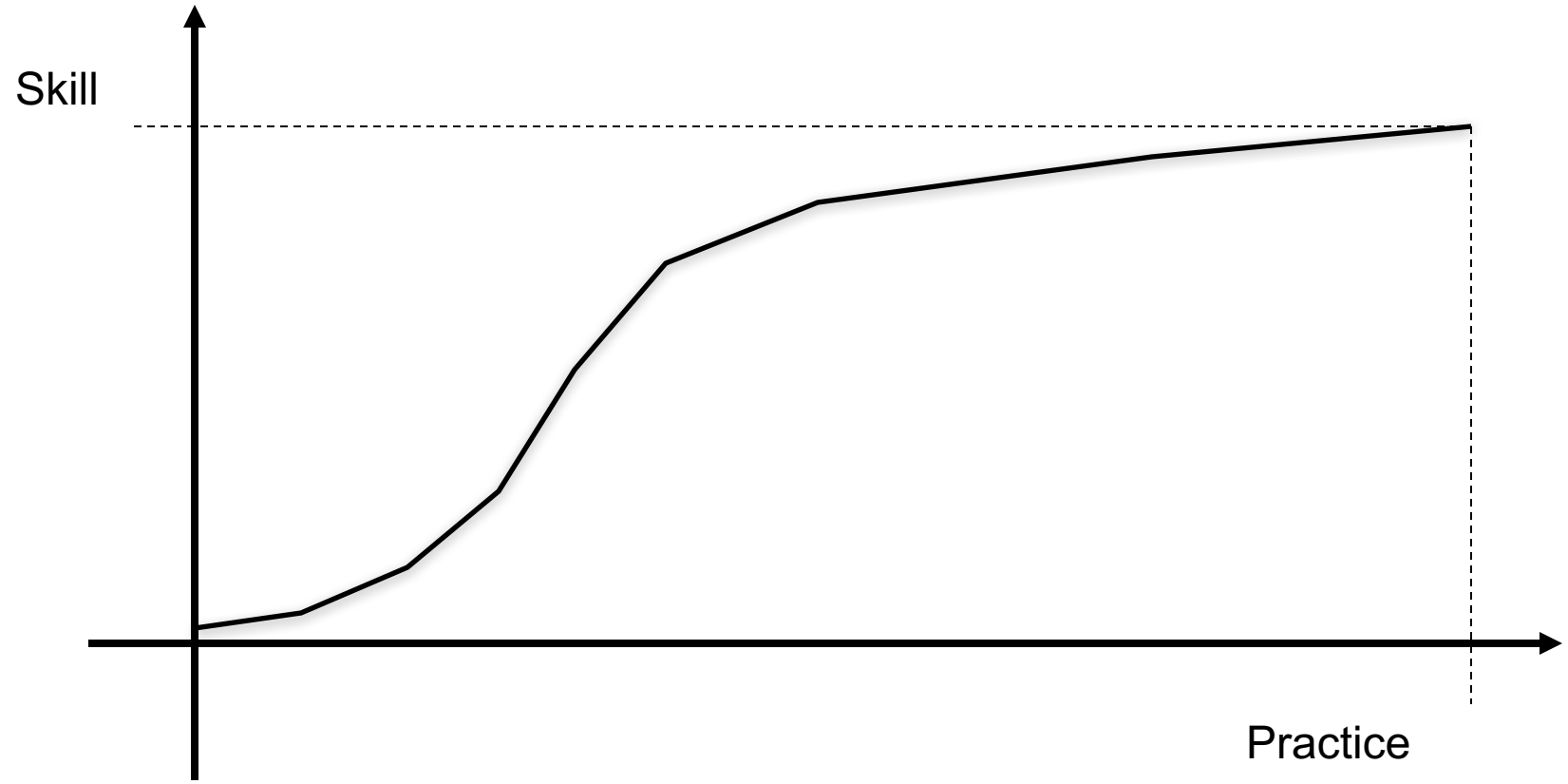
- Design should exhibit *progression* of some kind
  - Changes from level to level that represent growth in some form
    - Narrative advancement
    - Character growth
    - Longer levels
    - Difficulty increase (dynamic difficulty)
  - The perceived *difficulty* of challenges presented to the player either should not change or should rise, so the player feels that later challenges present greater difficulty than those at the beginning
- Frequency of challenges determines *pacing*
  - Alternate between fast and slow periods

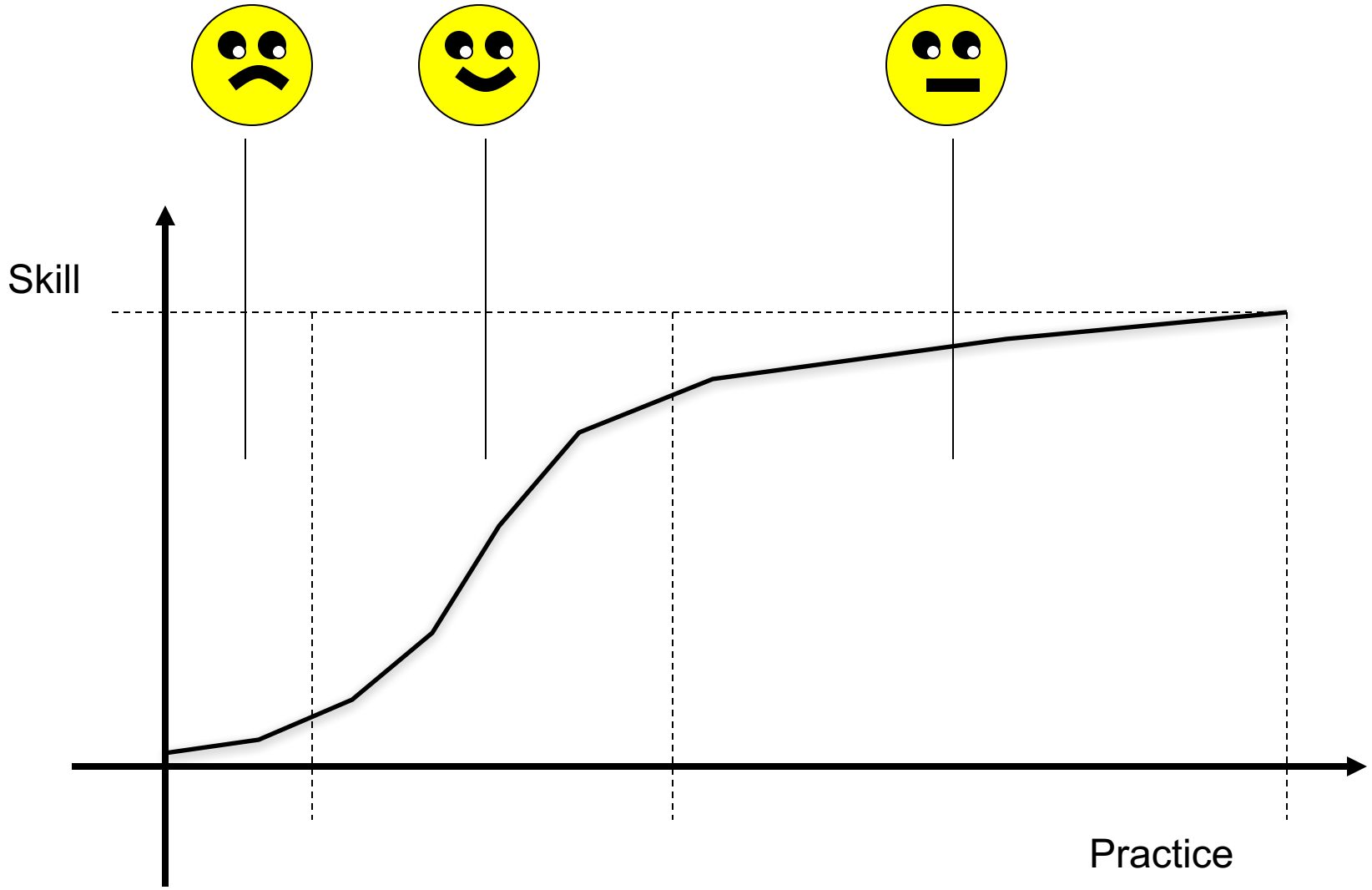

Perceived Difficulty
Level 1
Level 2
Level 3
Level 4
Level 5
Time

# Skill increases with practice



# Skill increases with practice




Skill
Practice

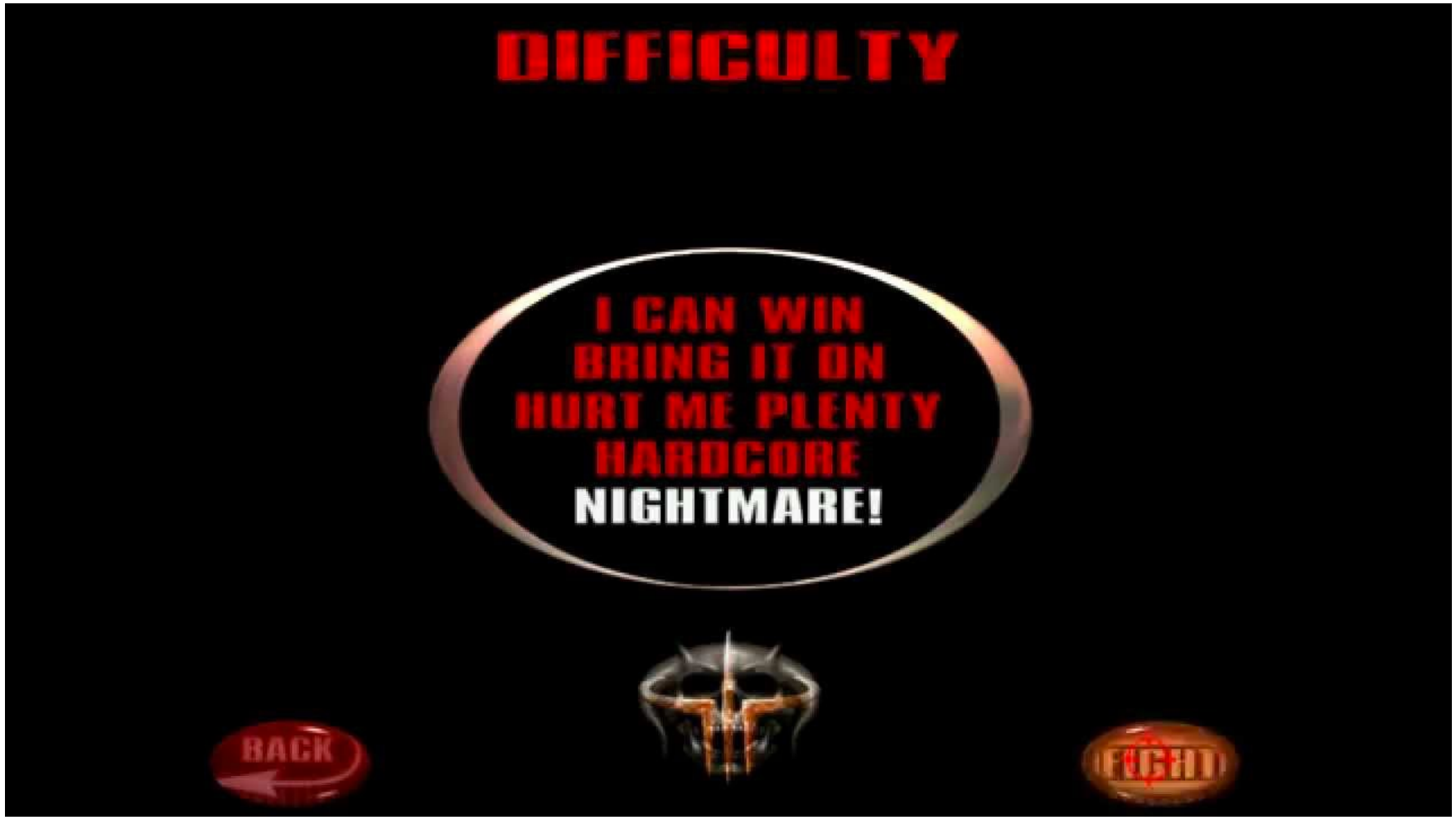
# Progression

- Stage 1
  - Slow progress, high frustration
  - A lot to learn, freedom to make mistakes without punishment
  - Design should support the player in gaining a sense of control
- Stage 2
  - Skill increasing
  - Aware of success
    - Merging of action and awareness
  - Ideal state, extend for as long as possible
- Stage 3
  - Mastery of the challenge
  - Boredom
  - Unlikely to complete the game

# The Last Guardian (2016)

- https://youtu.be/xGJOPKnCi88?t=360

# Quake 3 Arena (1999)



# Tomb Raider II (1997)

# Half Life 2 (2004)

# Half Life 2 (2004)


Stage 1 training
Difficulty
Modify and add features and
challenges to extend stage 2
Progress

# Progression

- Skill “gates”
- Exploration
  - Unlock new areas
  - Re-use an existing area with new challenges
  - New opponents, obstacles and environments
- Conflict
  - New abilities
  - *Reset* of ability
  - New opponents and obstacles
- Economy
  - Increase resource scarcity
  - Crafting and skill trees
  - Harder opponents and obstacles
    - Require greater skill to overcome, increase in power, greater ability / accuracy


LVD
SFD
NRG
BMX
DD
LSD
LSD - Los Santos Courier
BMX - BMX Challenge
DD - Dhiliad Dhallenges
SFD - San Ferro Courier
NRG - NRG-500 Dhallenge
LVC - Las Venturas Courier


HEALTH 51
AMMO 0

# Poor Progression

- Equivalent Features
  - Look different, but perform a very similar function to an existing feature
  - Different coloured enemy
    - Sensory immersion?
- Arms Race
  - Player gets more powerful, enemies get more powerful
  - Game play and challenge does not change
    - Sensory immersion?
- One Trick Pony
  - A challenge that is completely different to previous challenges, does not fit with the game genre
  - Racing game that suddenly requires puzzle solving

# Simple Progression Dynamic

- Create a number of challenges or levels and group by difficulty
- Easy
  - All players should be able to complete these challenges
  - Design for those who are new to the genre
- Medium
  - Most players should be able to complete these challenges, including the game designer
  - Design for casual players
- Hard
  - Good players should eventually be able to complete these challenges

# But is it balanced?

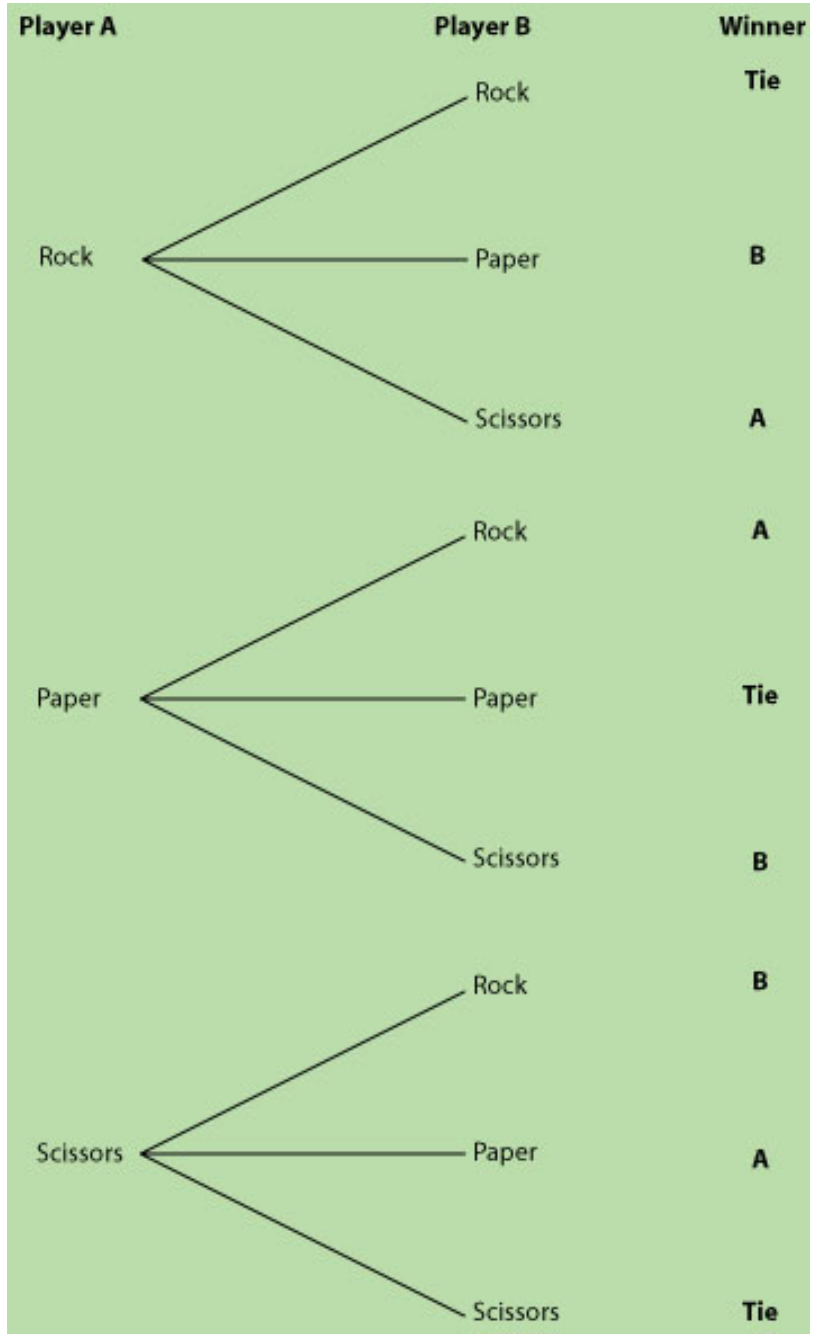
- Contains meaningful choices
- The role of chance is not too great
- Perceived to be *fair*
- Player-versus-Environment
  - *Appropriately* challenging: neither too hard nor too easy
  - Balanced resources: actions are not too “expensive”
  - No dominant strategy: requires multiple play styles
- Player-versus-Player
  - Fairness: equal players have equal chance of winning
  - Pacing: players have “reasonable” chance of catch-up
  - Politics: skill should be more important than alliances

# Balance

- Can make or break a game
  - May look, sound and even play well
  - Can still be a failure
  - We may have all the formal and dramatic elements of game play
    - Need to be in balance with one another and the player
    - Game fails if they are not, no fun
- A **balanced** game is one where success of the player is largely determined by the skill of the player
  - Random events may occur
  - In general a better player should get further than a poor player
  - Could think of balance as inherent advantages and disadvantages

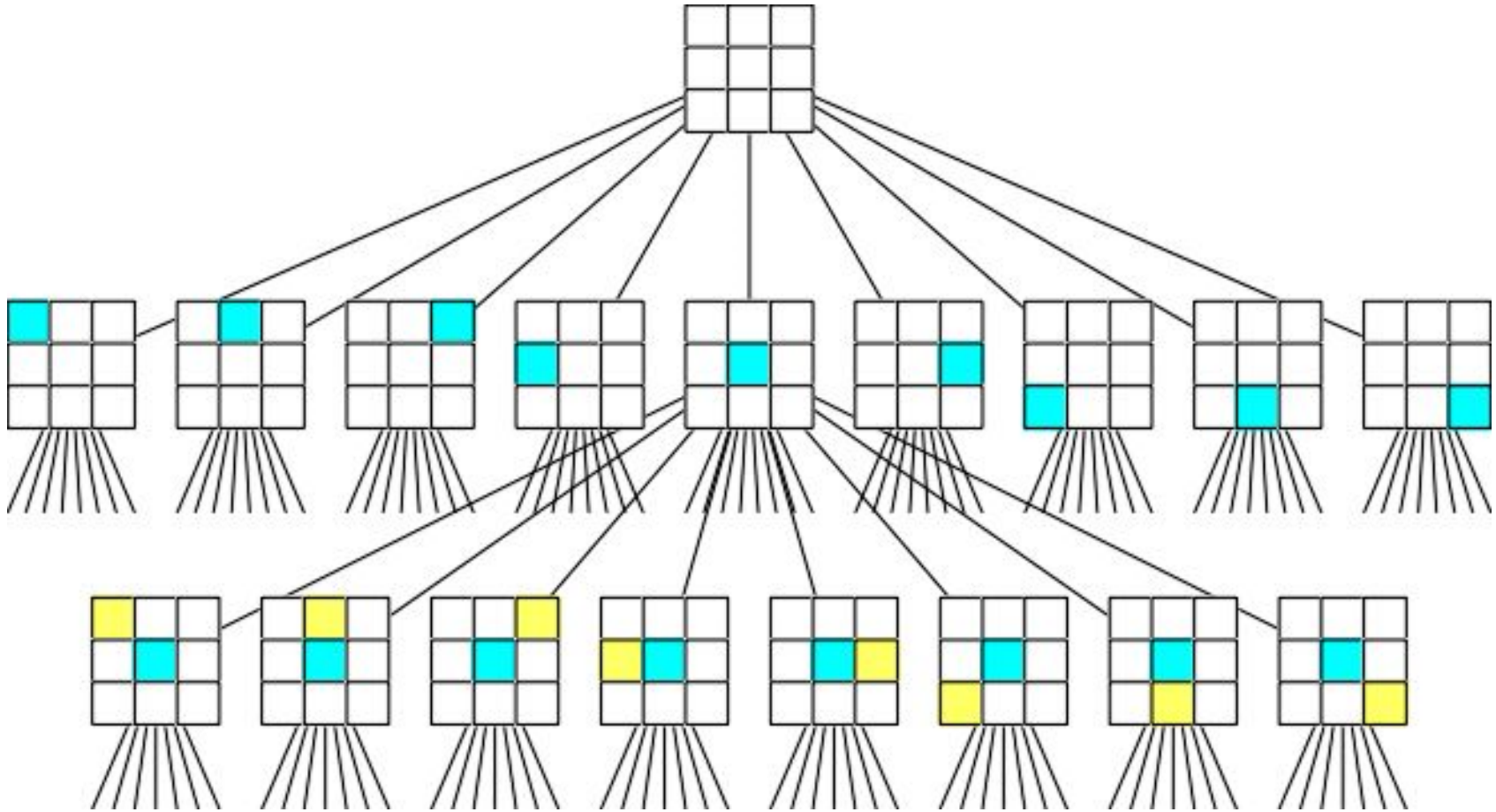
# Is it balanced?

- Combinatorial analysis of the game components
  - Optimisation problem
  - Just because a result is mathematically correct does not mean it is aesthetically interesting
- Trial and error
  - Run out of time, release game
  - Tweak further by releasing additional patches
- Need to understand what we're balancing and how
- **Static** balance
  - Are the rules fair when considered as a static system?
  - Is the initial state of the system (formal) balanced?
- **Dynamic** balance
  - Is an equilibrium maintained?
  - How does balance change with time and player interaction?


Player A
Player B
Winner
Rock
Rock
Tie
Paper
B
Scissors
A
Paper
Rock
A
Paper
Tie
Scissors
B
Scissors
Rock
B
Paper
A
Scissors
Tie

# Rock, paper, scissors – is it balanced?

| | Scissors | Paper | Rock |
|---|---|---|---|
| Scissors | 0 | 1 | -1 |
| Paper | -1 | 0 | 1 |
| Rock | 1 | -1 | 0 |



# Birthday Conundrum

- If it is my birthday, and you buy me a present, you win 10 points, because you remembered my birthday.
- If you don’t buy me a present on my birthday, I will be upset, and you will lose 100 points.
- If it's not my birthday, you win 20 points, because you have surprised me with your thoughtfulness.

# Birthday Conundrum

| | Birthday | Not Birthday |
|---|---|---|
| Buy present | 10 | 20 |
| Do not buy present | -100 | 0 |

# Dominant Strategies

- Always buy presents
  - Always get positive payoff
  - Assuming there is no “memory” in the system
    - Rarely is in a game mechanic
- Never buy presents
  - Zero payoff
  - Massive loss
- **Strongly** dominant strategy
  - Guarantees winning every time
- **Weakly** dominant strategy
  - Guarantees not losing, but drawing – Tic-tac-toe
- All other strategies **recessive**
  - Why would a player choose to do something else?
  - Once discovered, they never have cause to use any other strategy

# Reading

- Rollings and Adams, chapter 8.
- Salen and Zimmerman, chapter 18.