the gamedesigninitiative at cornell university

Lecture 14

Level Design

What is Level Design?

- Layout of **game geography**
  - Location and relationship of challenges
  - Movement of dynamic features (e.g. NPCs)
- Understanding of **player capabilities**
  - Abilities, mechanics available to the player
  - Assumptions of current player skill level
- Layout of **player progression**
  - How the player should move through the game
  - How the player visualizes this progression

Aspects of Game Design

- Games as **Exploration**
  - Focuses on game *geography* and *capabilities*
  - Typically involves heavy storyboarding
- Games as **Education**
  - Train player skill and understanding
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- Games as **Storytelling**
  - Focuses on *player progression*
  - Most challenging element of game design

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For a later lecture

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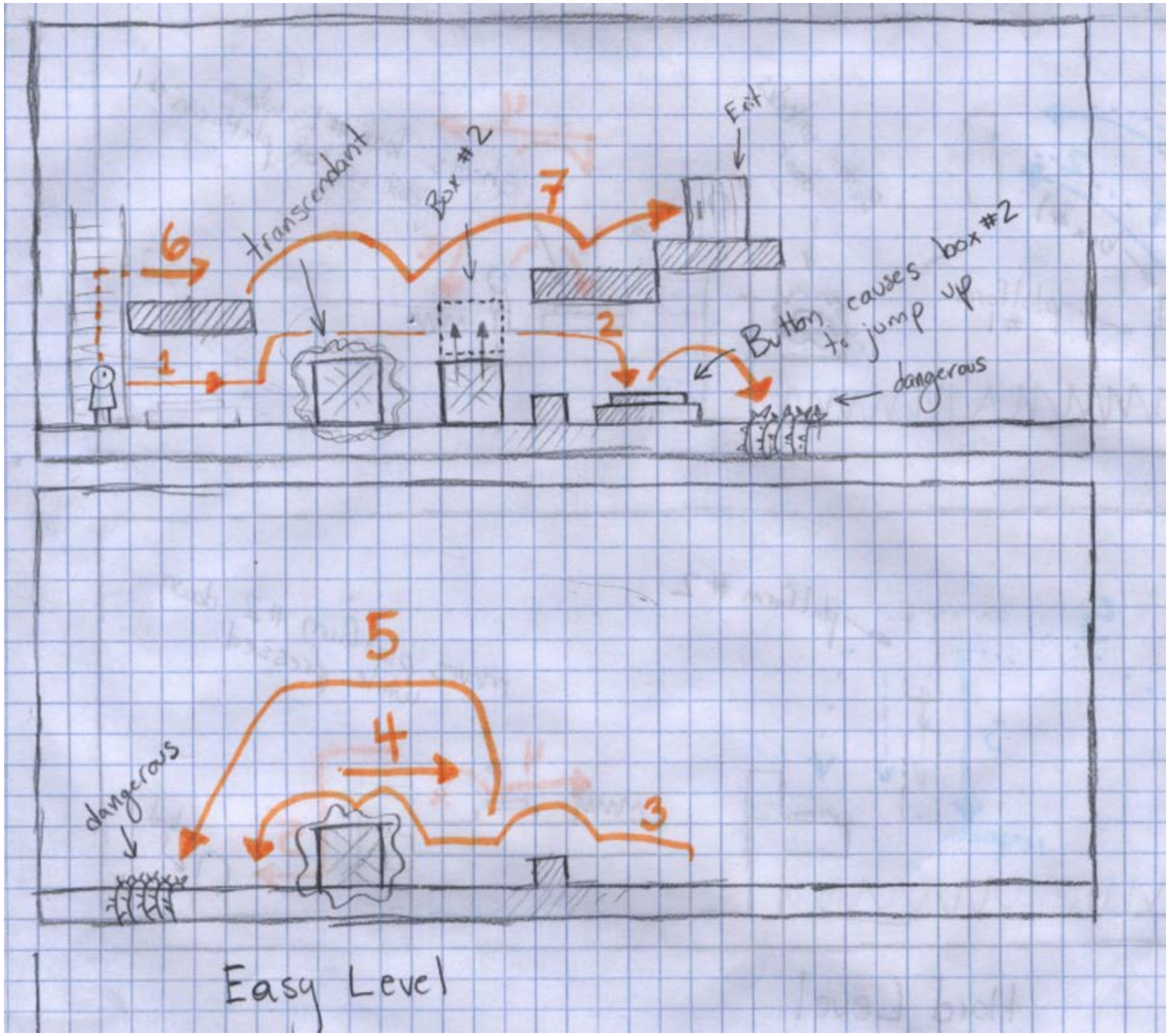
Players Want to Explore the World

- Exploring the **physical space**
  - What happens when I go here?
  - **Example**: Any western RPG
  - But does not require complex game world
- Exploring the **ludic space**
  - What happens when do this action?
  - Requires deep, complex interactions
  - **Example**: Buckets in Skyrim

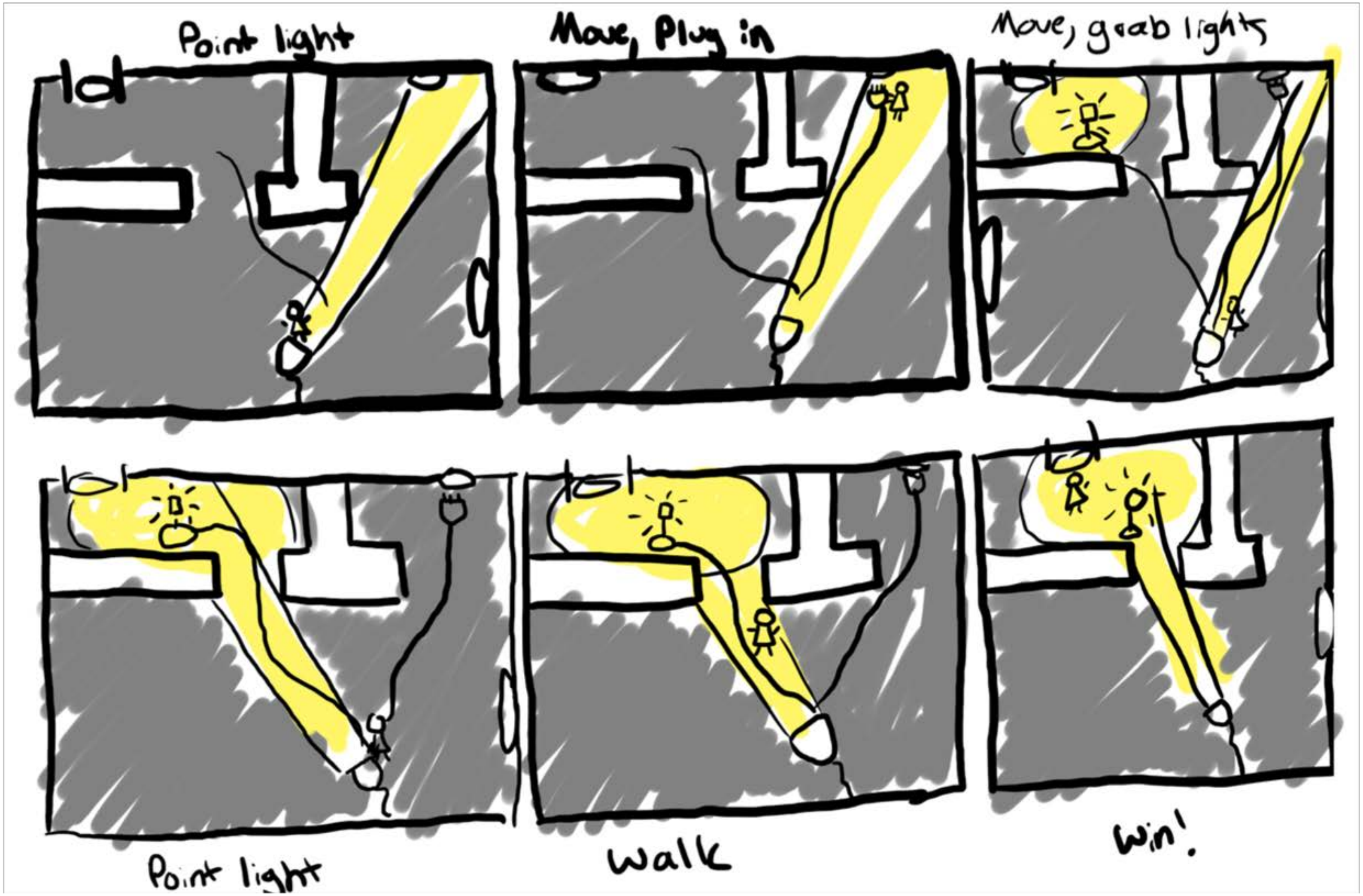
Storyboarding

- Diagrams player action throughout level
  - Different from film storyboarding
  - Currently a bunch of *informal practices*
- **Embodied Action**
  - Action that is tied to a character/avatar
  - Typically maps player movement in level
- **Disembodied Action**
  - Action corresponding to UI elements
  - **Example**: Buttons, menus

Embodied Action: Single Scene

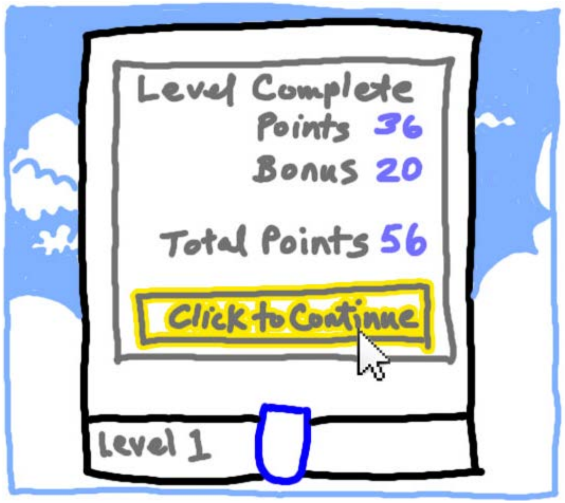


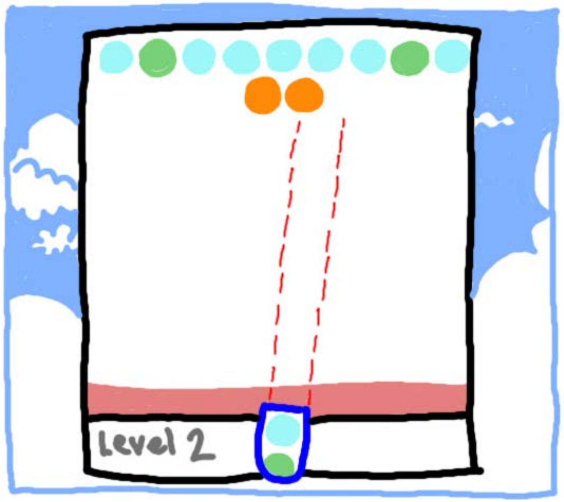
Embodied Action: Multiple Scenes



Disembodied Action: Cause and Effect

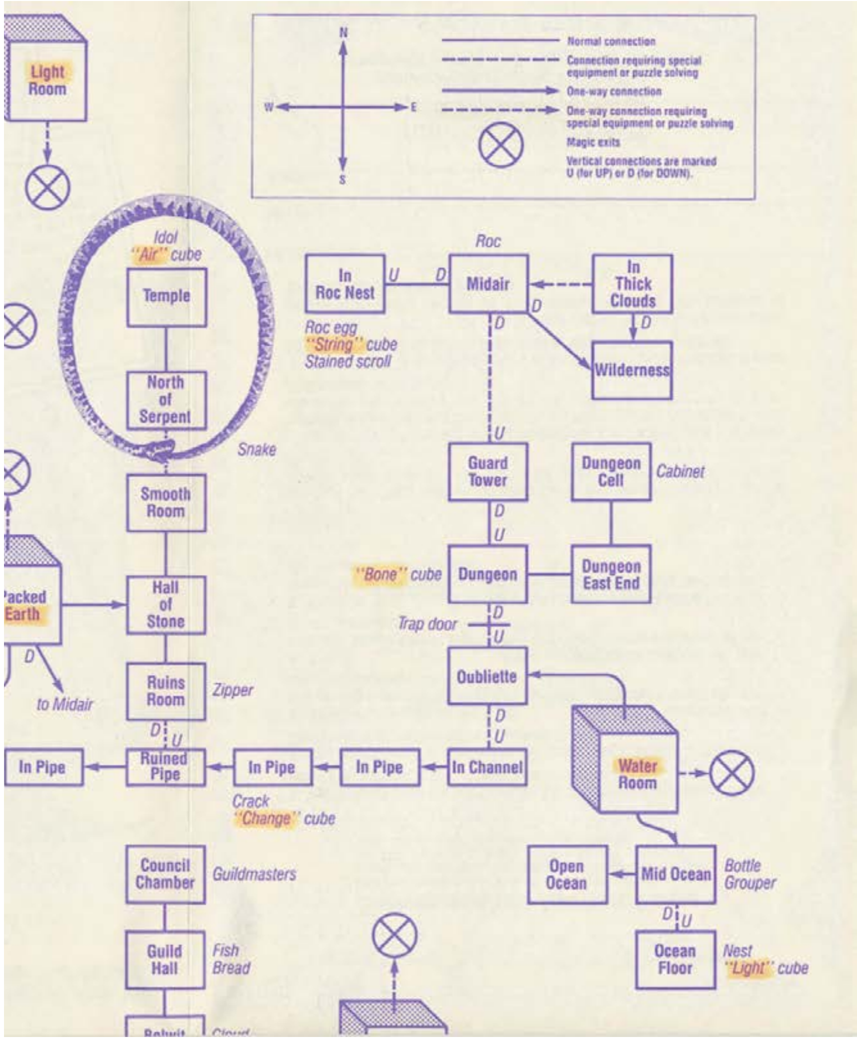
- **Draw the initial scene**
  - Could be the entire level
  - Zoomed in portion of screen
  - Must capture area that will be affected by the action
- **Indicate the action**
  - Draw mouse pointer
  - Indicate gamepad button
  - Annotate with a "tool tip"
- **Draw the action effect**
  - Change in initial scene





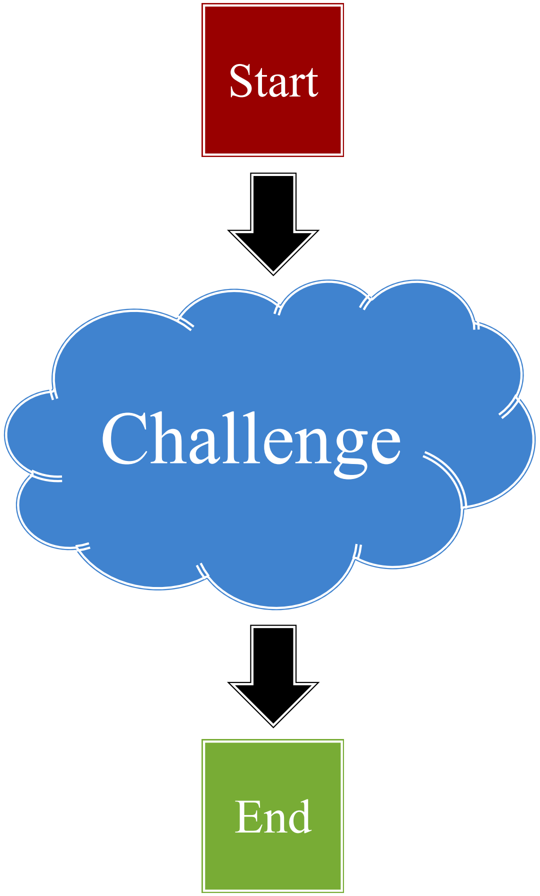
Game Geography

- Relations of game challenges
  - Multiple challenges in a level
  - Flow of level progression
- Easiest to design **discretely**
  - Well defined player paths
  - Some deviation allowed
  - Storyboard indicates paths
- Ensure **meaningful choice**
  - More than one path works
  - Balance the risk vs. reward



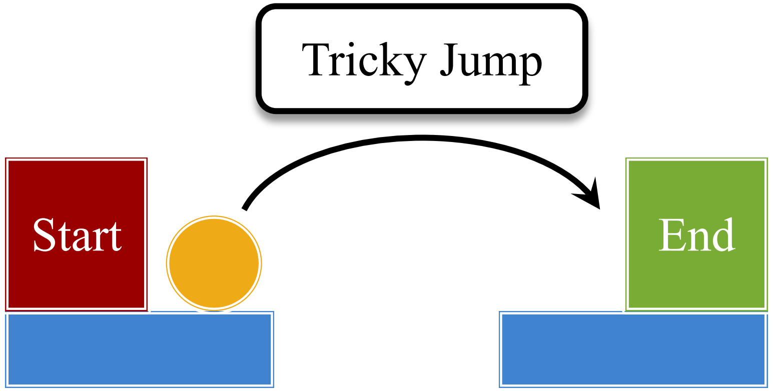
Design Patterns

- Design uses building blocks
  - Mechanic/challenge pairs
  - Start and end location
  - String together to make level
- Key building block features
  - Requires verb/interaction
  - Must be possible to *fail*
  - Difficulty is *tunable*
- **Patterns** are common blocks
  - Appear many times in game
  - Even across multiple games

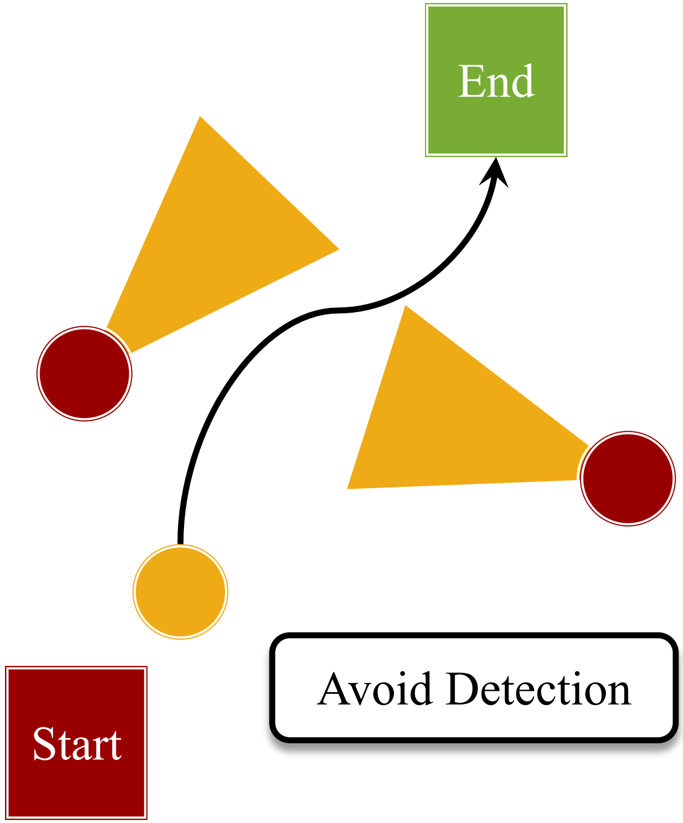


Design Pattern Examples

Platformer

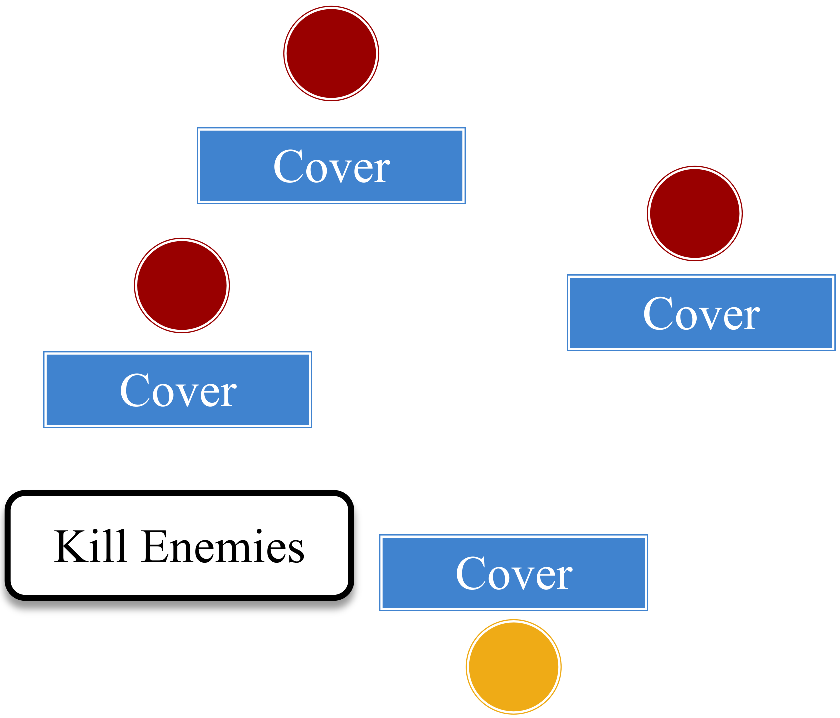


Stealth Game

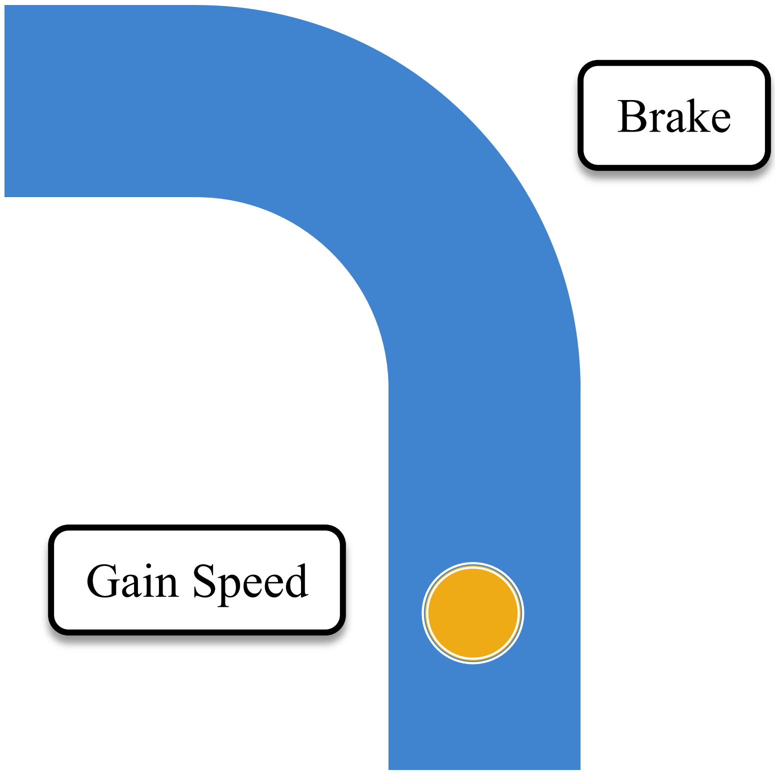


Design Pattern Examples

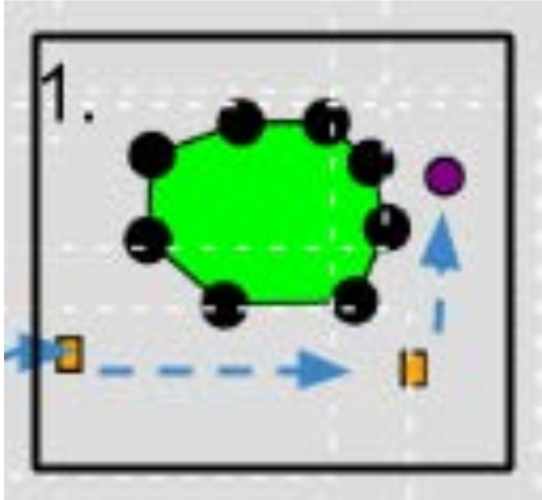
Shooter/Action Game

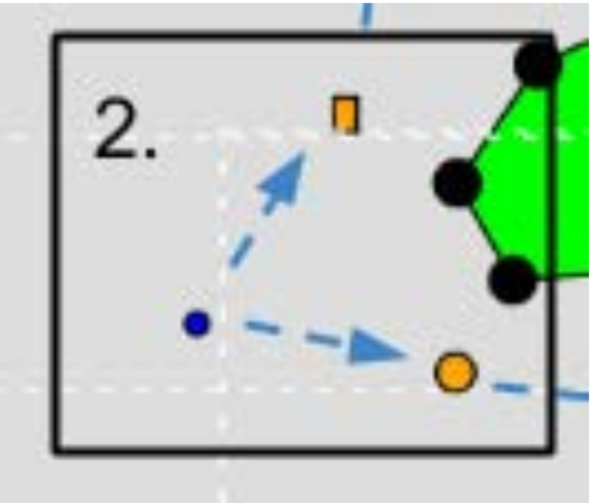


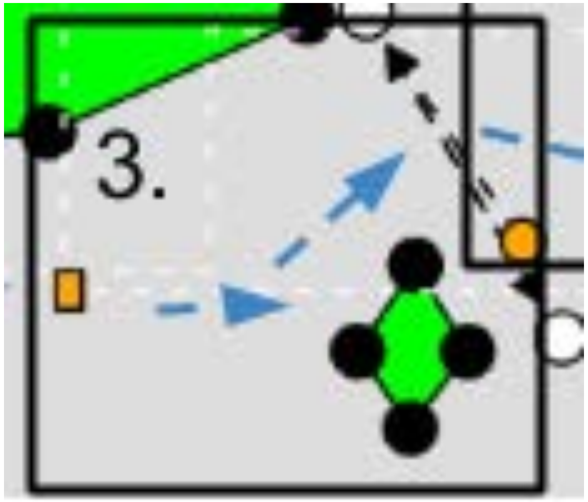
Racing Game

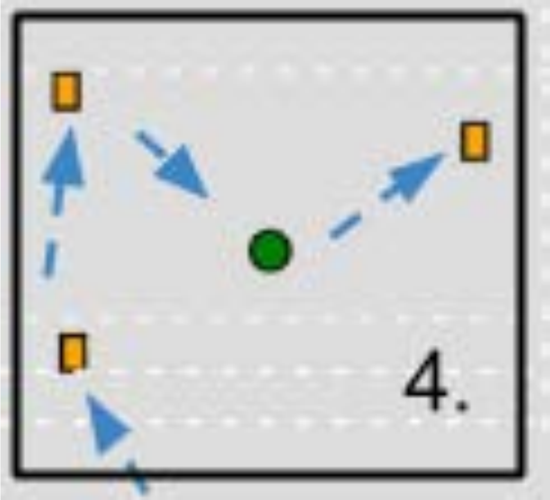


Dash: Basic Design Patterns

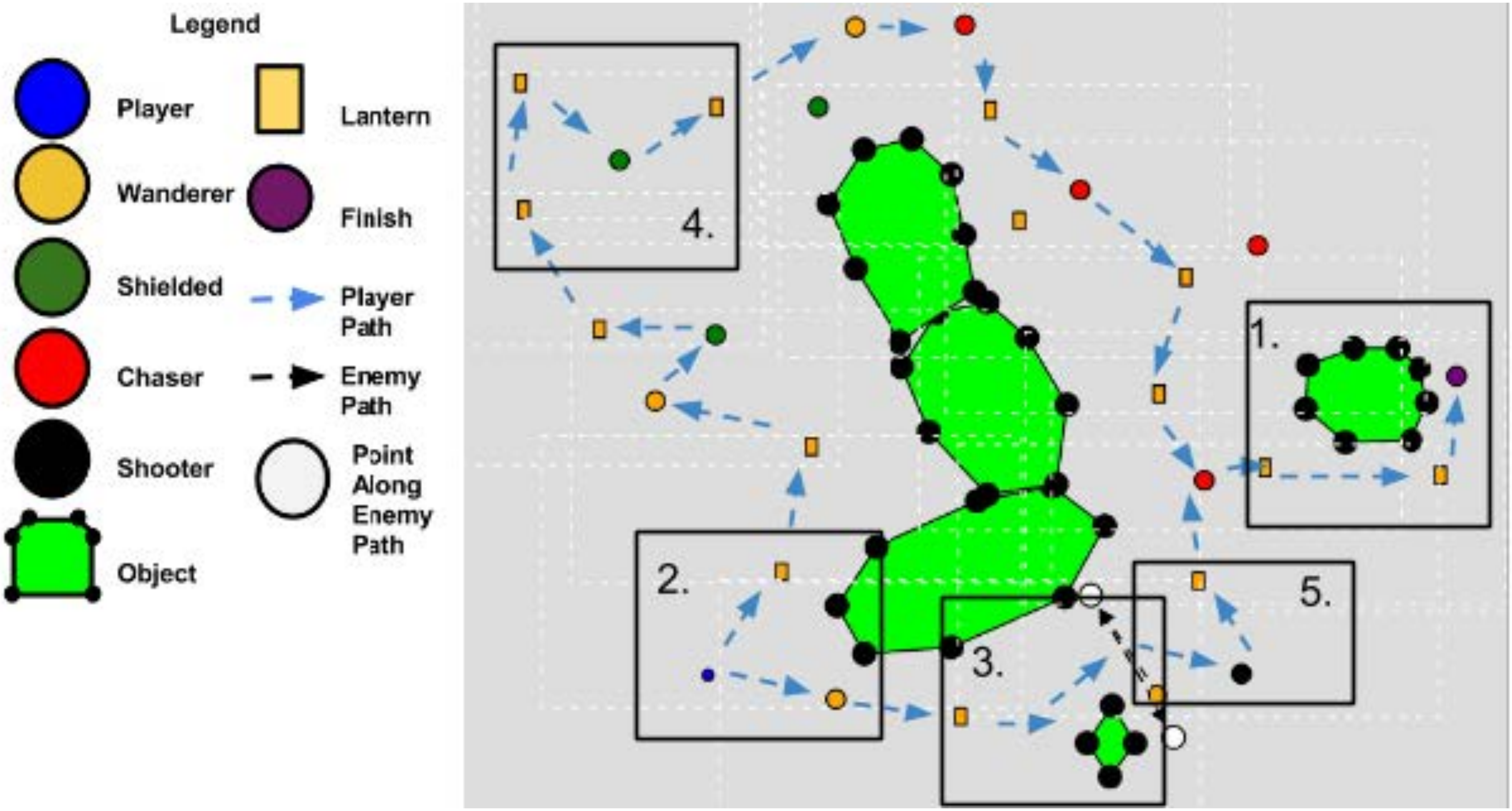








Dash: Putting it All Together

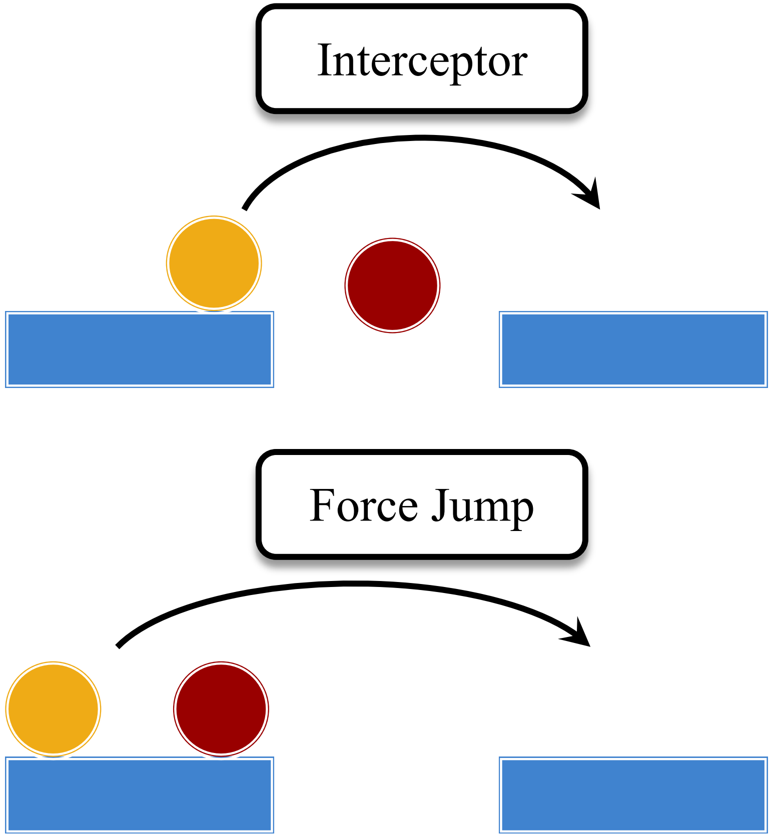


Composite Patterns

- Piecewise design creates a very linear feel
  - Pattern A followed by Pattern B followed by...
  - Player is explicitly aware of building blocks
- **Composite patterns** allow for variations
  - Two patterns combined in the same space
  - Makes original pattern much more difficult
  - Player now has to react to them both
- **Reading:** Extended/Evolutionary Challenge

Composite Patterns

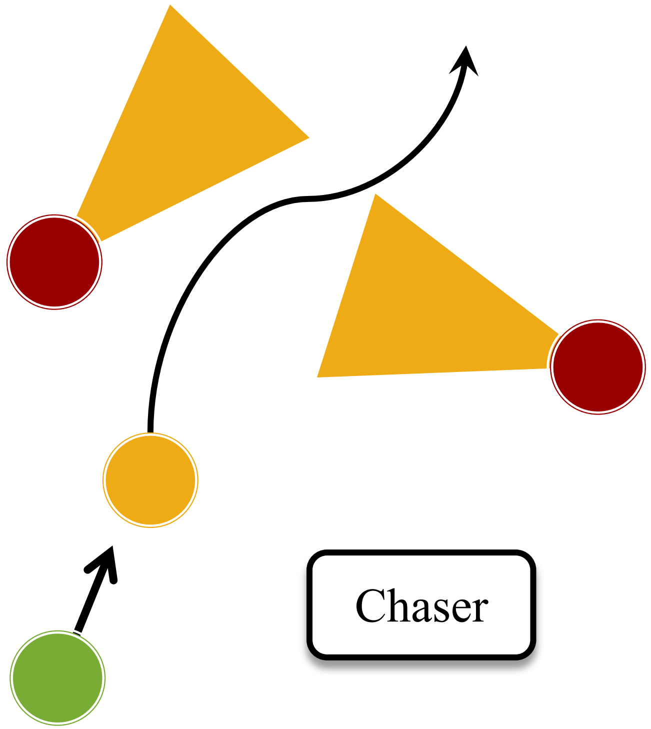
Platformer



Interceptor

Force Jump

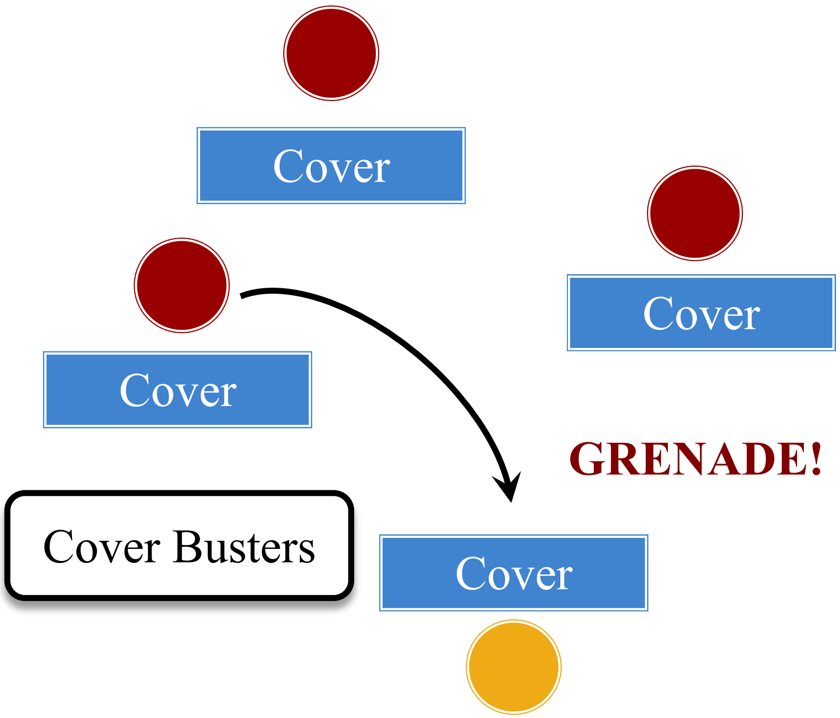
Stealth Game



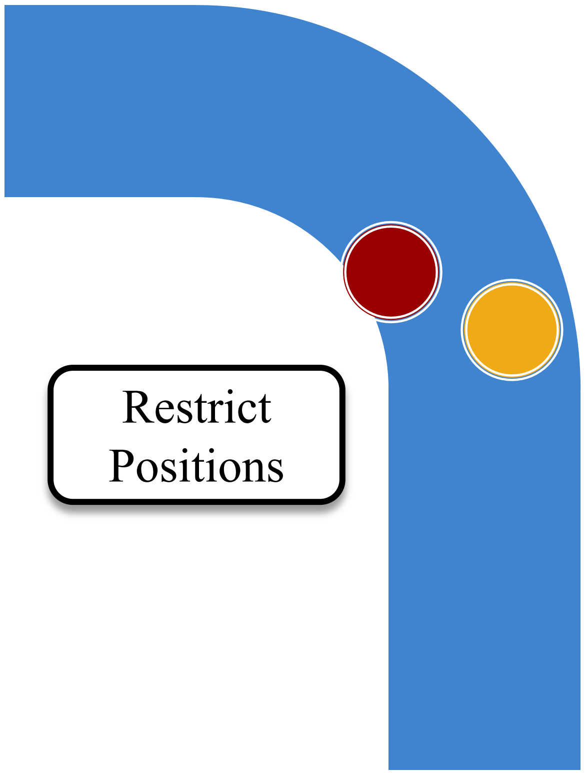
Chaser

Composite Patterns

Shooter/Action Game



Racing Game



Is Linearity a Problem?

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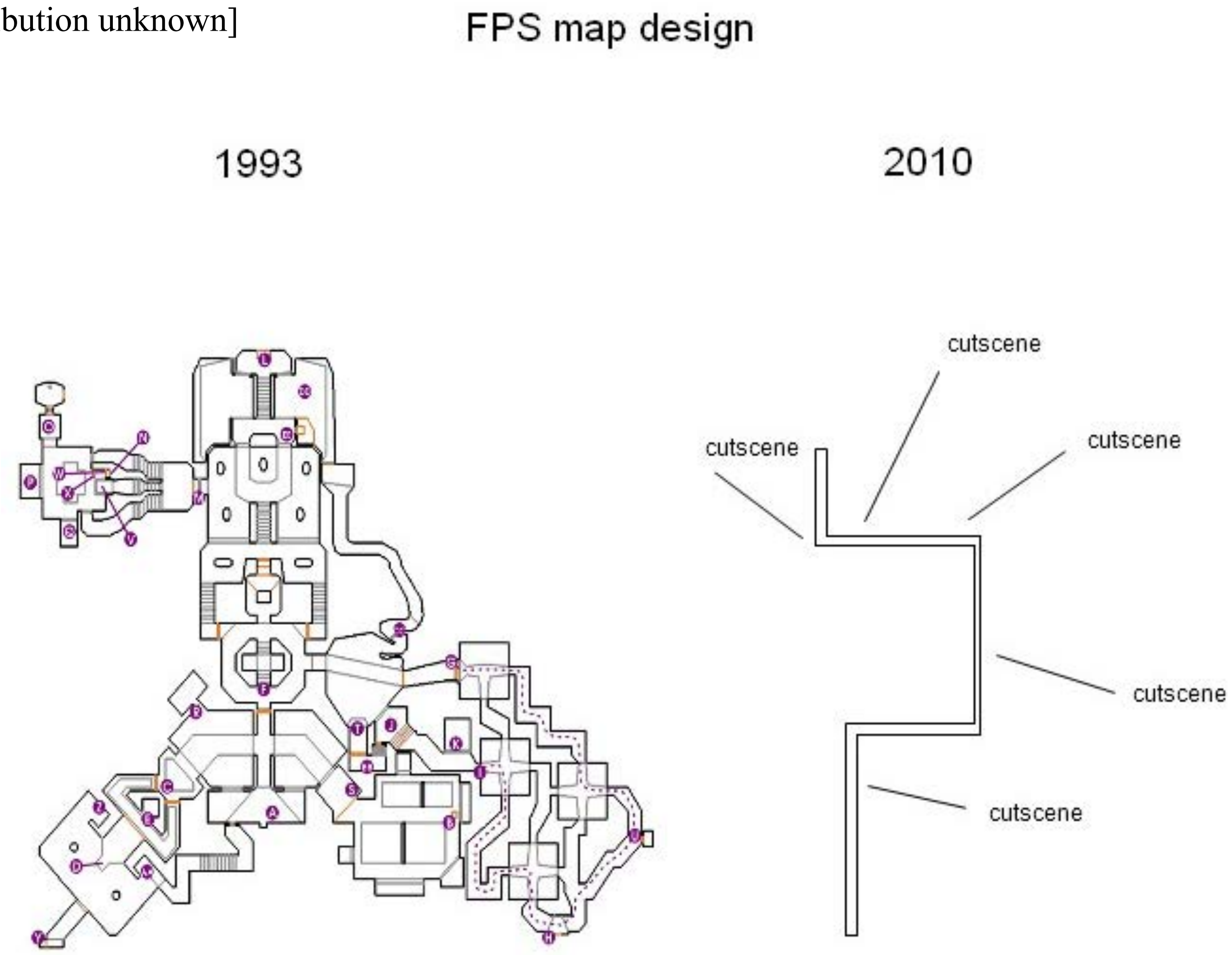
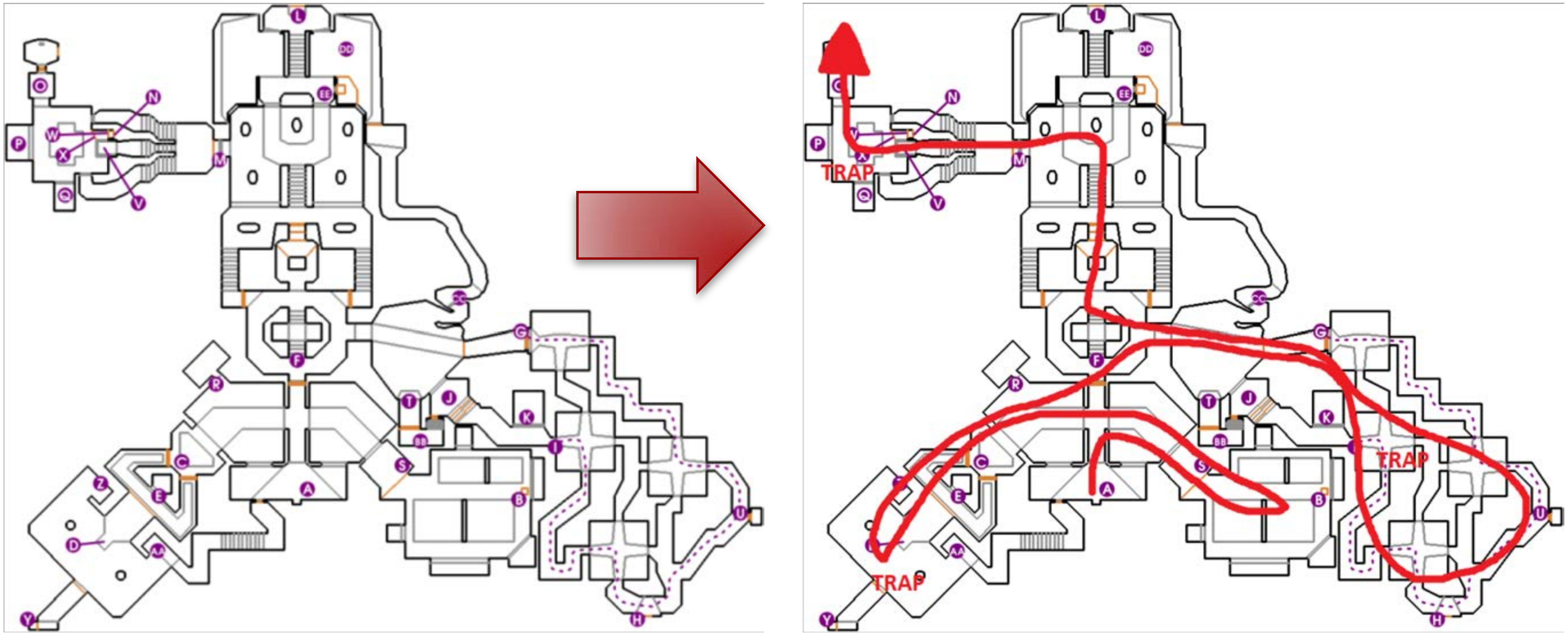


But Actually…



[refugeinaudacity.wordpress.com]

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Learning How to Play

- Mechanics are (often) new and unfamiliar
  - Players have to learn how to interact with them
  - **Aside**: why innovation is not always popular
- Players could learn by reading the *manual*
  - This is boring! Let me play already
- **Tutorial levels** allow the player to…
  - Get started playing immediately
  - Learn the mechanics while playing

Classic Approach: Restrict the Player

- Start with your **gameplay specification**
  - Remove all but the barest mechanics
  - Remove verbs by disabling controls
  - Remove interactions by omitting "board elements"
- Levels add new mechanics back one at a time
  - **Example**: Platformer with a "no-jump" level
- Do not need to add a new mechanic each level
  - "Deep" mechanics allow many levels per mechanic
  - This can influence game geography (e.g. worlds)

Example: Starcraft Campaign

Explicit Restrictions

- Mechanics are unavailable for current level
  - Controls for actions are explicitly disabled
  - Interactions disabled, even if elements present
- **Motivation**: Prevents player confusion
  - Do not waste time on useless mechanics
  - Key in the casual and young audience
- **Examples**: Many AAA comercial games
  - *Starcraft* single-player campaign
  - *Portal* (integrated into story)

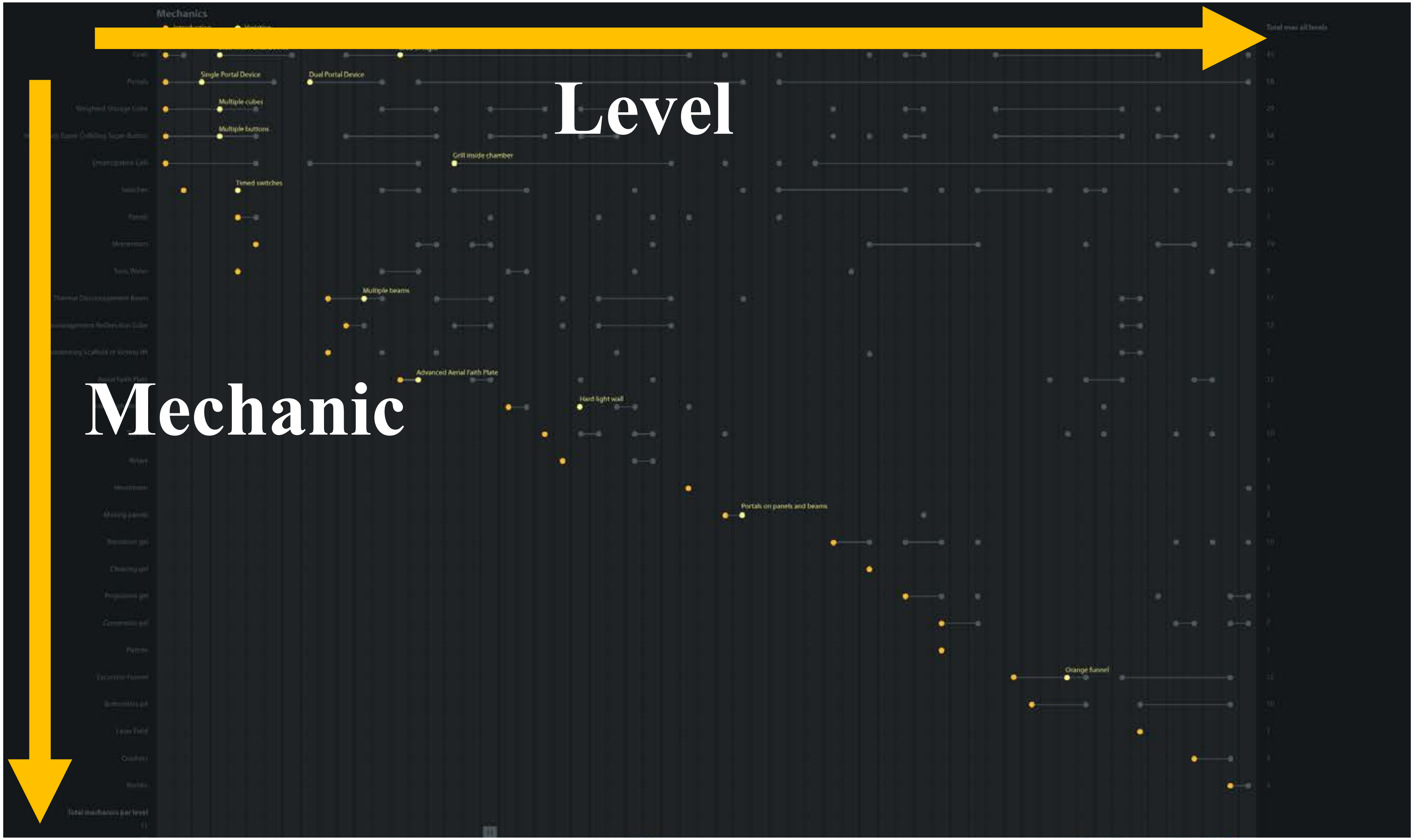
Implicit Restrictions

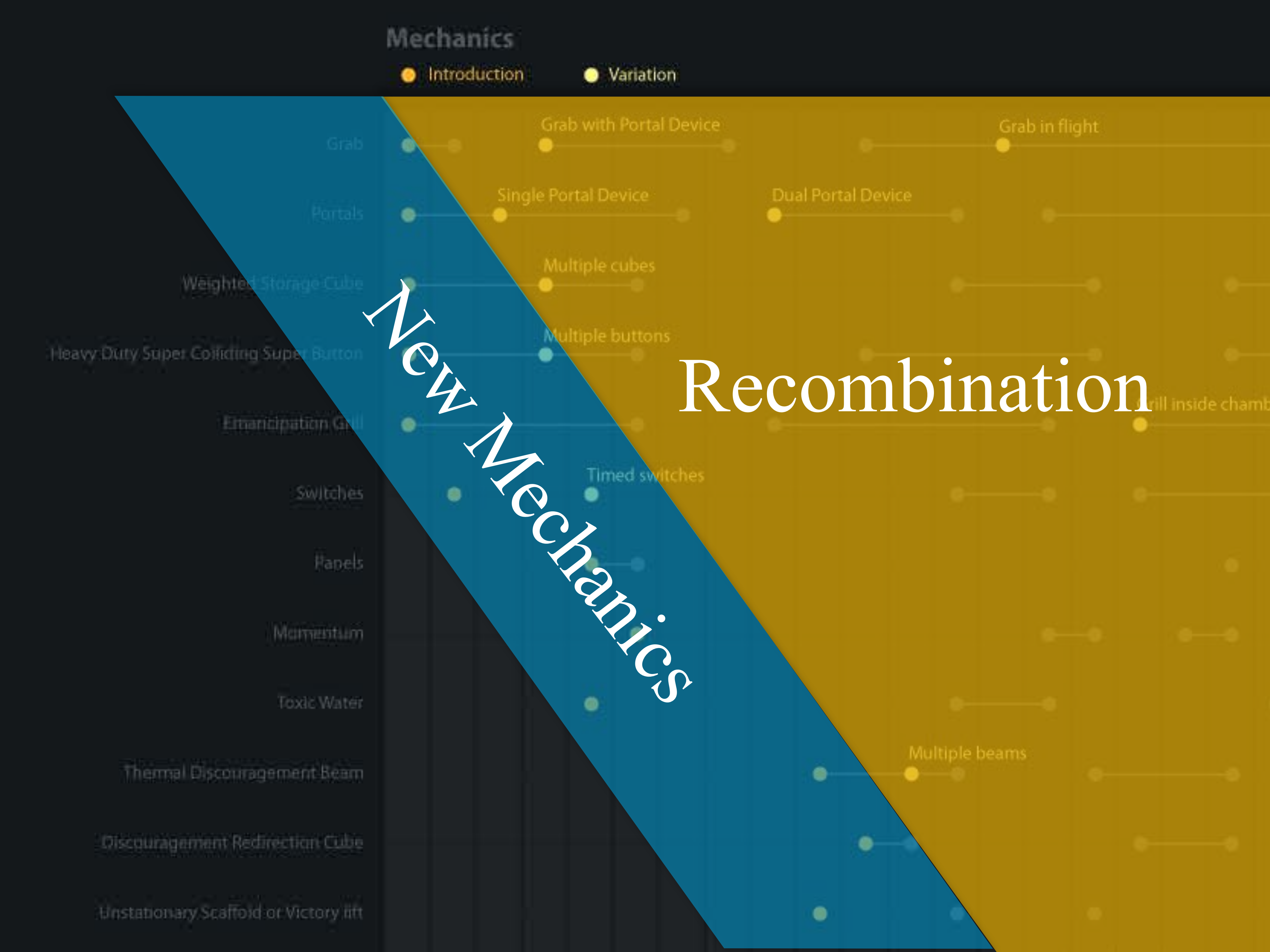
- Mechanics are always available, but not needed
  - Challenges designed for an explicit mechanic
  - Other mechanics may succeed, but they are harder
  - Level has hints to guide player to right mechanic
- **Motivation**: Allow replay in tutorial levels
  - Players go back and try optional approaches
  - Achievements are structured to encourage this
- **Example**: Many amateur Flash games
  - *My First Quantum Translocator*

The Tyranny of Choice

- Too much choice can make us unhappy
  - We are often paralyzed by what to do
  - Studied by Myers & Lane; popularized by Barry Schwartz
- But games are about **meaningful choice**
  - Problem is when choices are too similar
  - Good choices must be *significantly* different
  - **Example**: Dagger adds +1 bonus to a stat of 102
- Players use rough heuristics for making choices
  - Pattern match current situation to determine action

Portal 2 Mechanics





New Mechanics

Recombination

Reinforcement

How long to "dwell" on mechanic before a new one?

Actions:

A = jump **B = dash**

A B vs. A A A B

Recombination

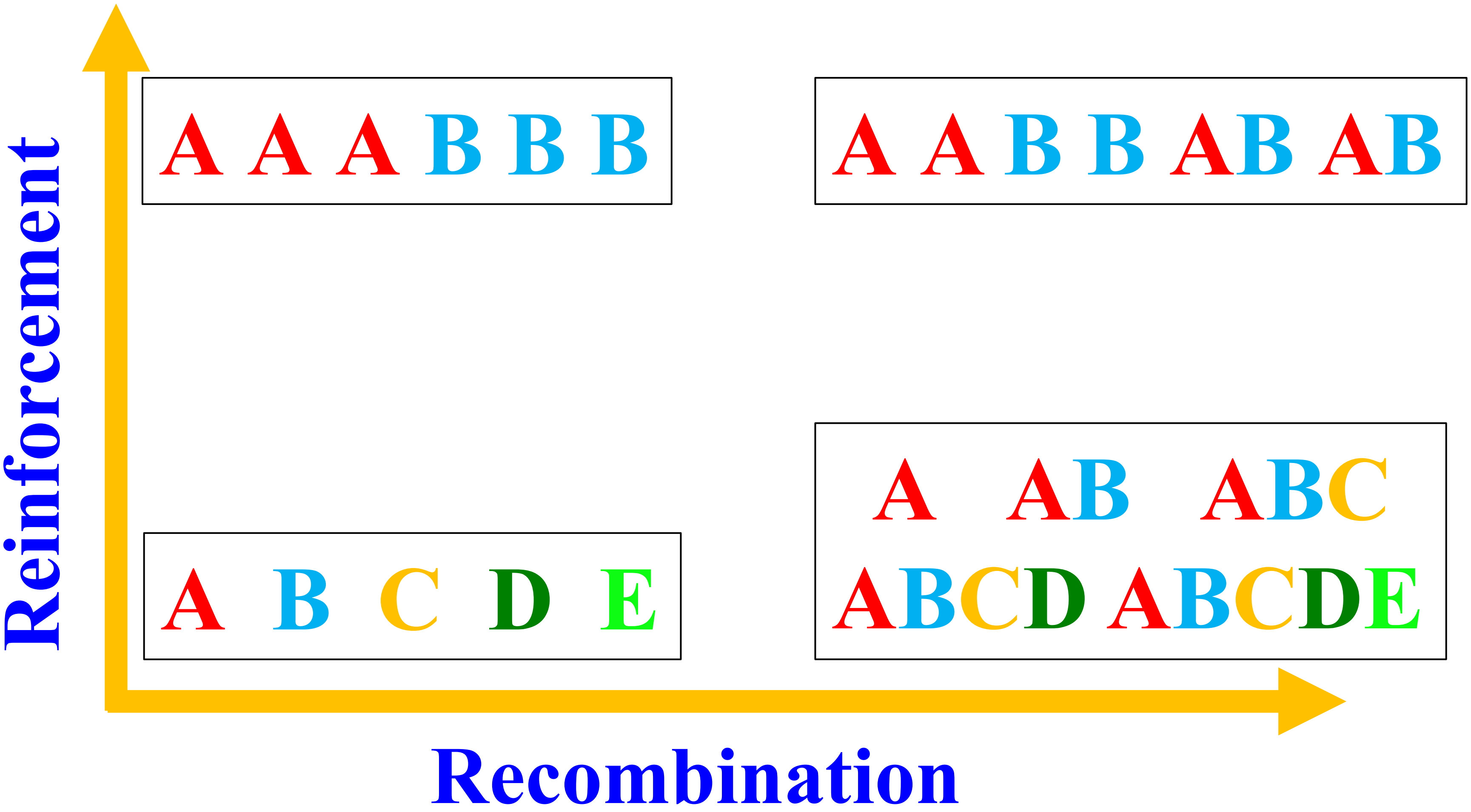
How often to combine with other mechanics

Actions:

A = jump **B = dash** **C = shoot fireball**

A B C vs. A AB ABC

Reinforcement vs. Recombination



Reinforcement

A A A B B B

A A B B AB AB

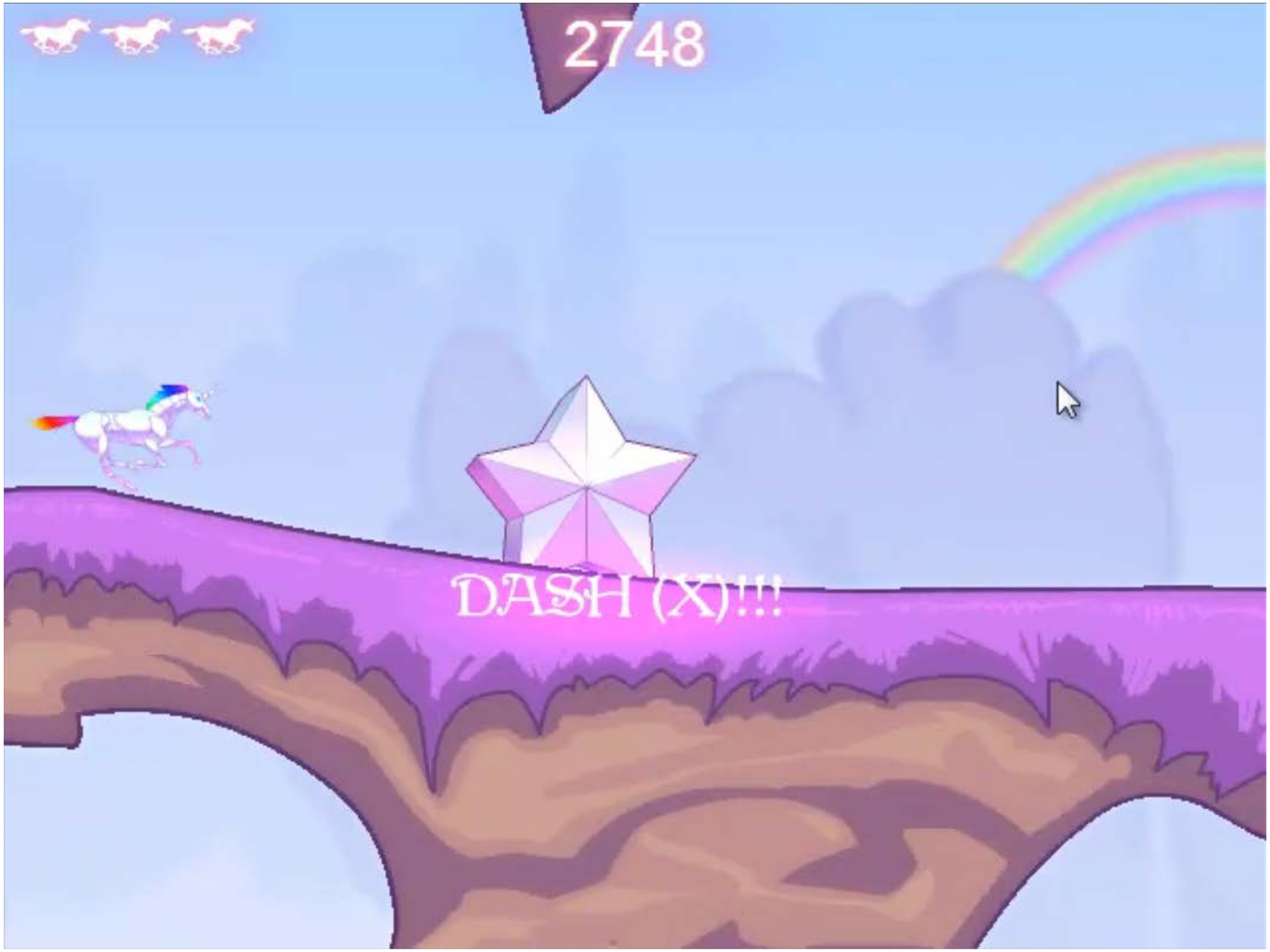
A B C D E

A AB ABC

ABCD ABCDE

Recombination

Robot Unicorn Attack



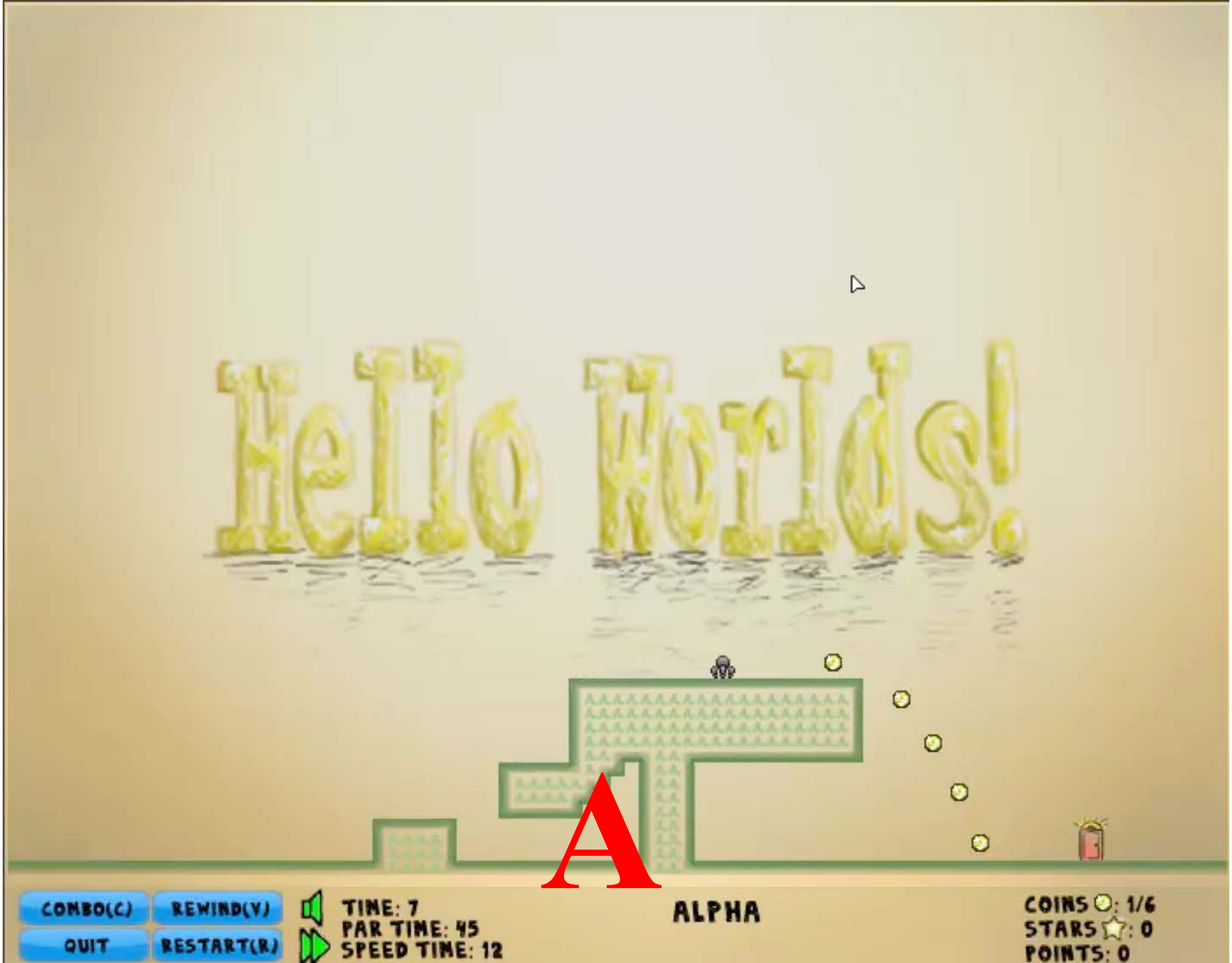
Robot Unicorn Attack Progression

Mechanics:

A = jump **B = dash**

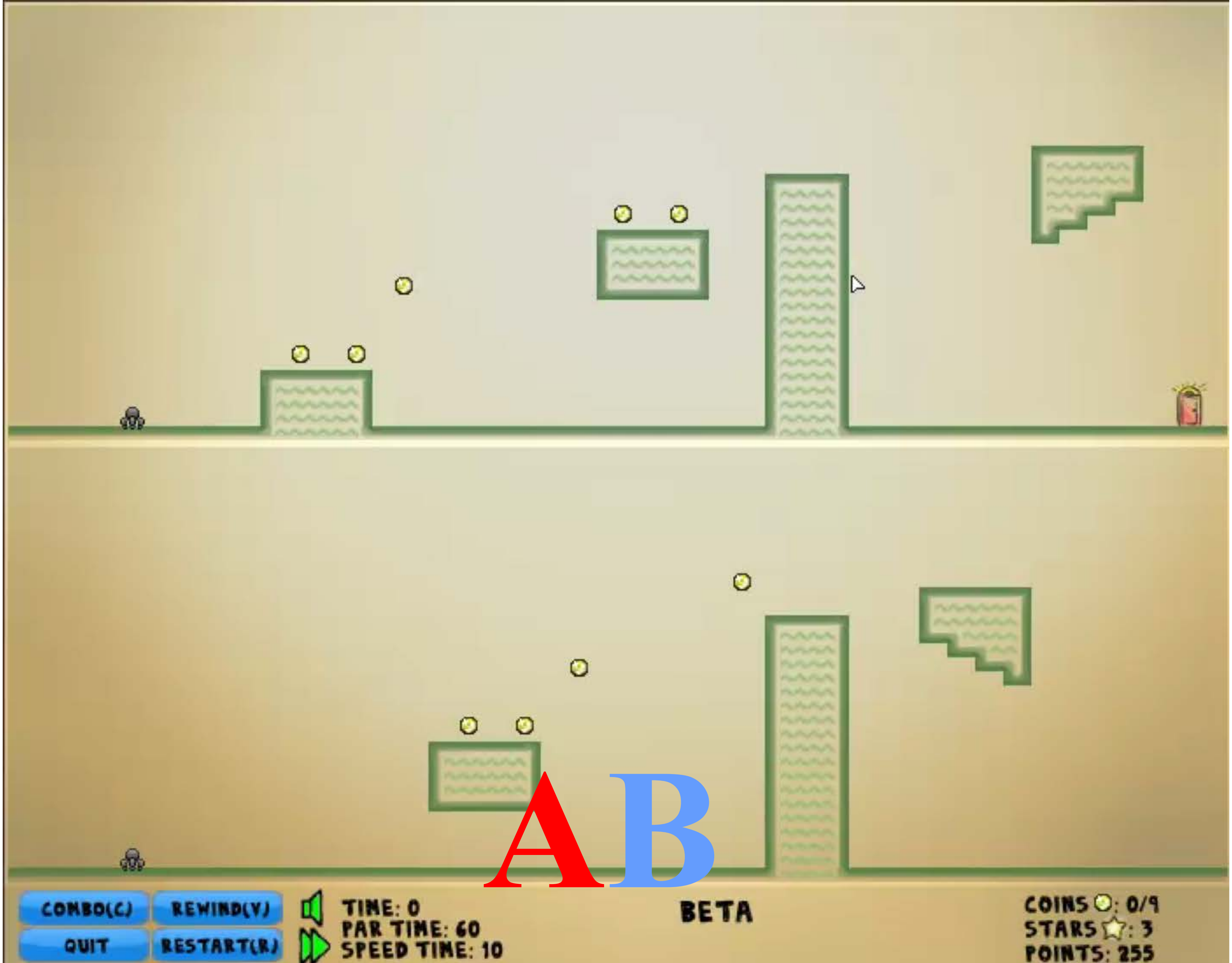
A A A B A A B

High reinforcement, low recombination



TIME: 7
PAR TIME: 45
SPEED TIME: 12

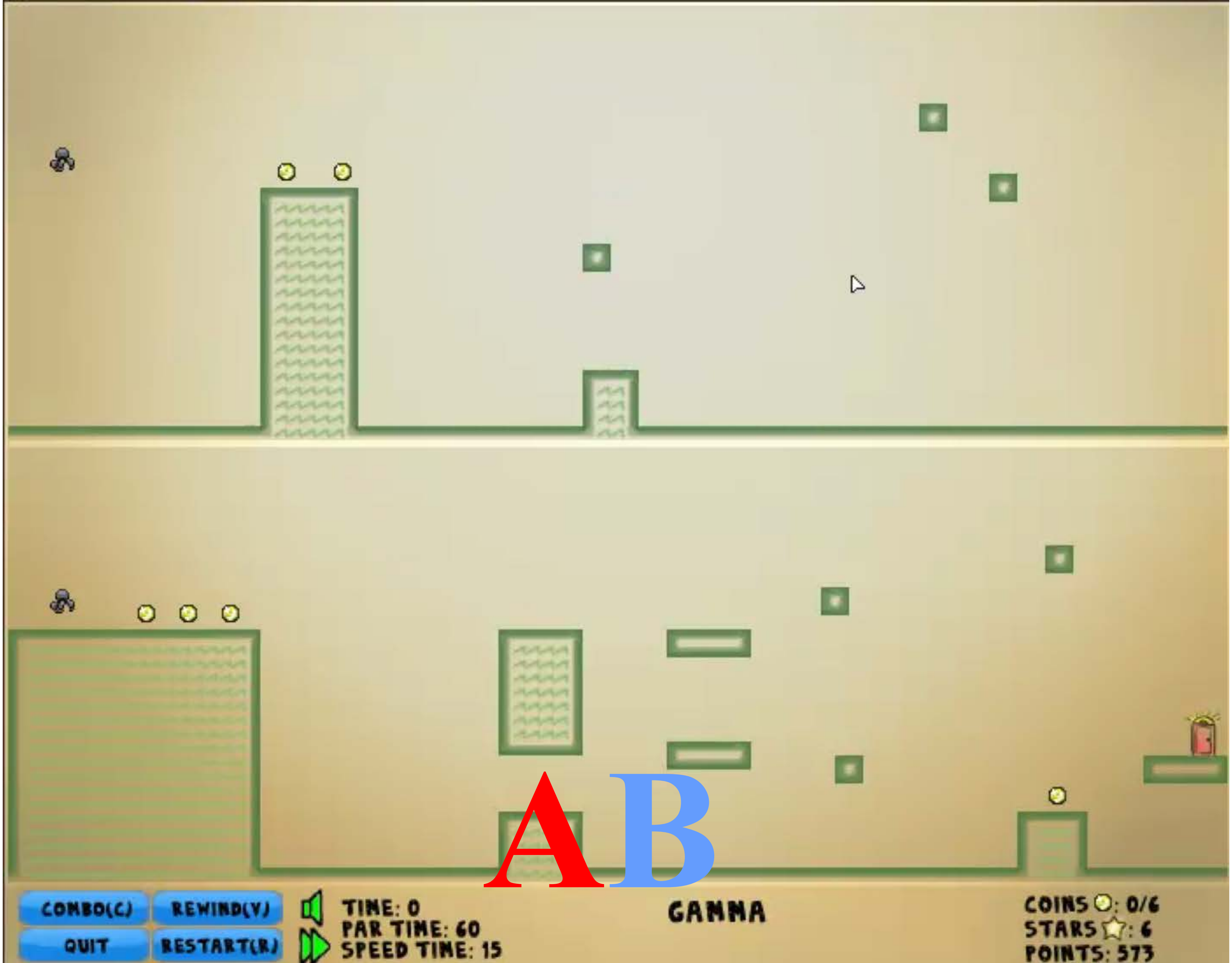
COINS: 1/6
STARS: 0
POINTS: 0



TIME: 0
PAR TIME: 60
SPEED TIME: 10

COINS: 0/9
STARS: 3
POINTS: 255

AB

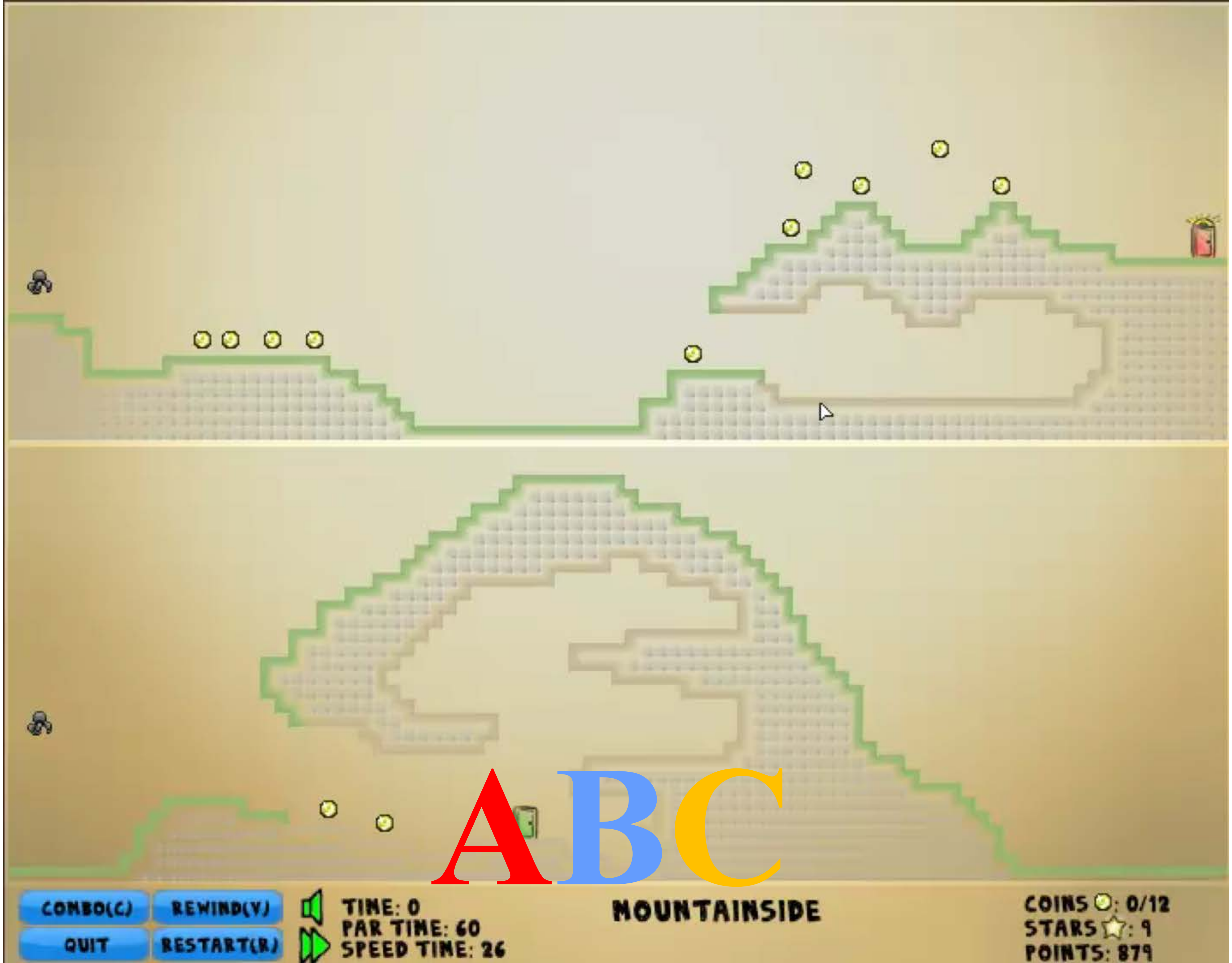


AB

TIME: 0
PAR TIME: 60
SPEED TIME: 15

GAMMA

COINS: 0/6
STARS: 6
POINTS: 573

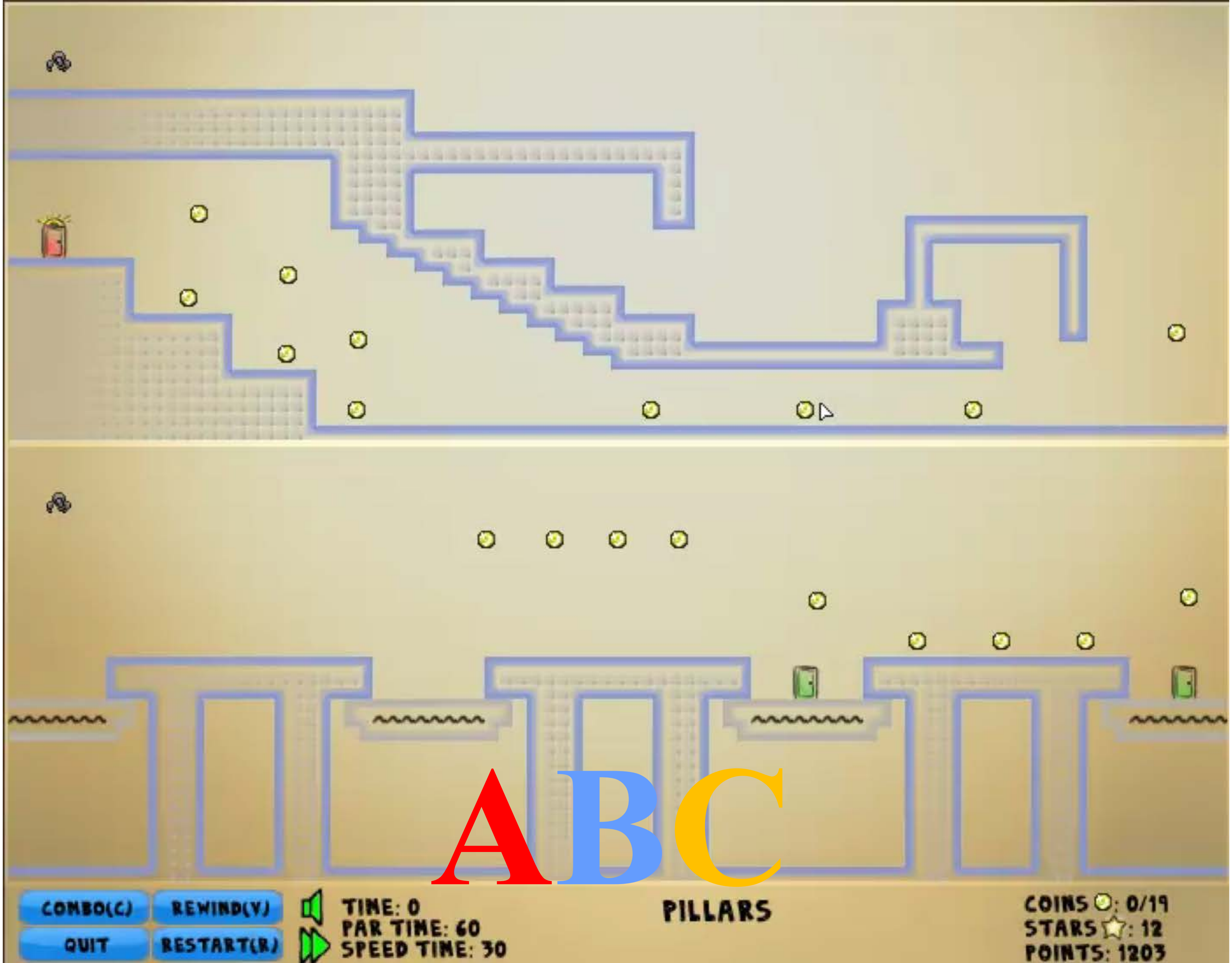


TIME: 0
PAR TIME: 60
SPEED TIME: 26

MOUNTAINSIDE

COINS: 0/12
STARS: 9
POINTS: 879

ABC



TIME: 0
PAR TIME: 60
SPEED TIME: 30

PILLARS

COINS: 0/19
STARS: 12
POINTS: 1203

ABC

Hello Worlds

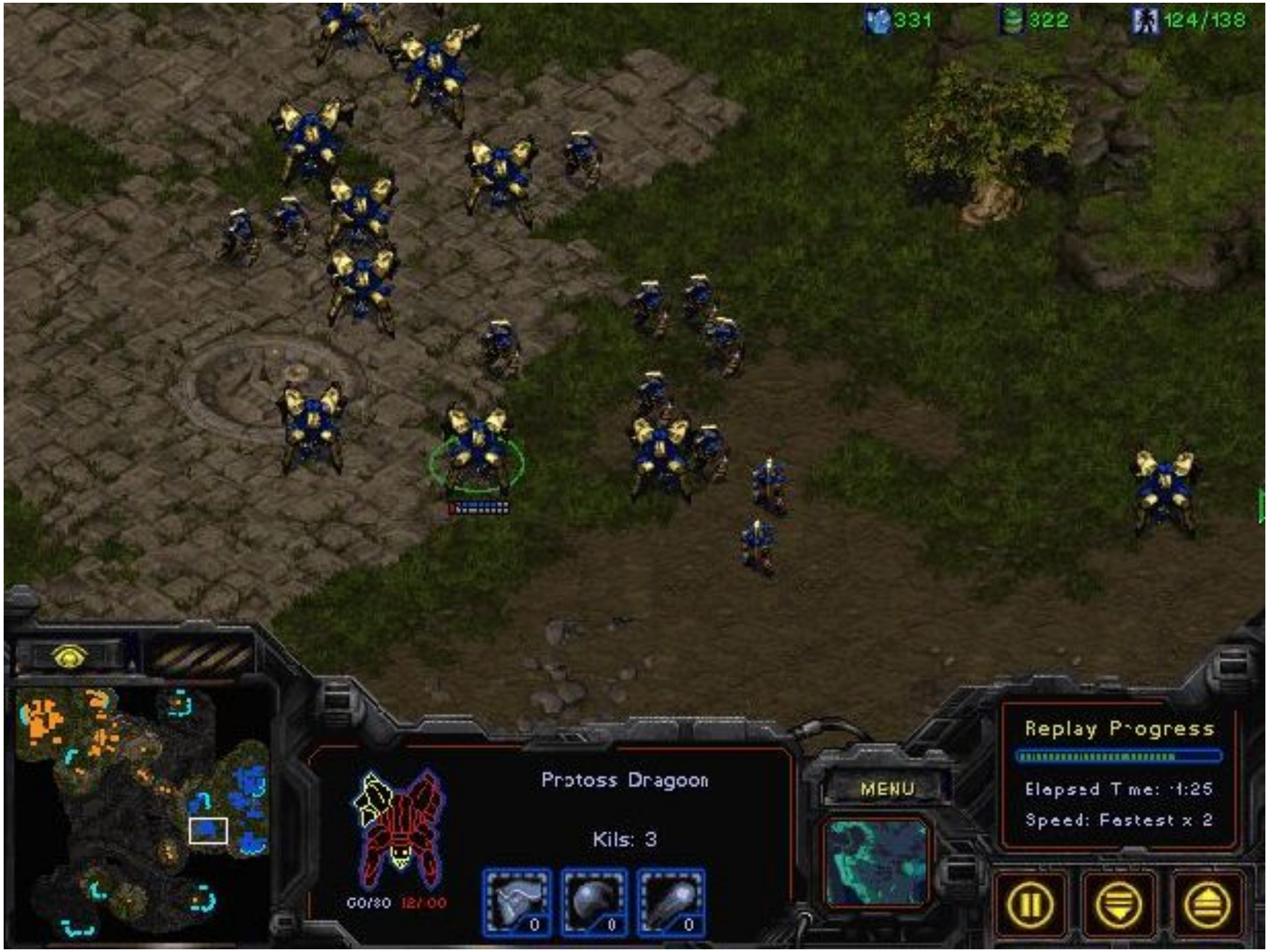
Mechanics:

A = move B = two worlds C = close world

A AB AB ABC ABC

Moderate reinforcement, high recombination

Starcraft



Replay P^ogress

Elapsed T me: ·1:25

Speed: Fastest x 2

Starcraft

A AB ABC ABCD

Low reinforcement, high recombination

A B C D

A A A A

Next Time…

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