

BEST PRACTICE FOR CO-OP PUZZLE DESIGN

C29 Level Designer

Ronald Wang

AGENDA



High Concept



Researches



Plan of
Artifact



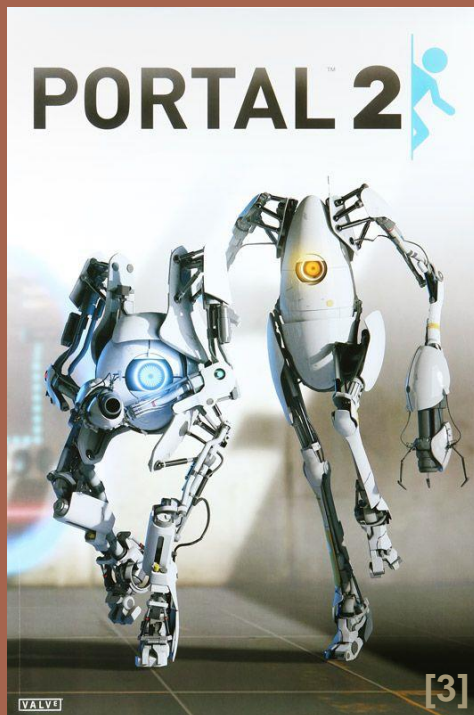
Playtest and
Data Analysis



Conclusion



CO-OP PUZZLE GAMES



JOINT CO-OP

Joint co-op game is a specific game genre where players **help** each other progress without competing against each other.

The gameplay can be either **relaxing or exciting** and the tense varies **from low to high** based on the mechanics.

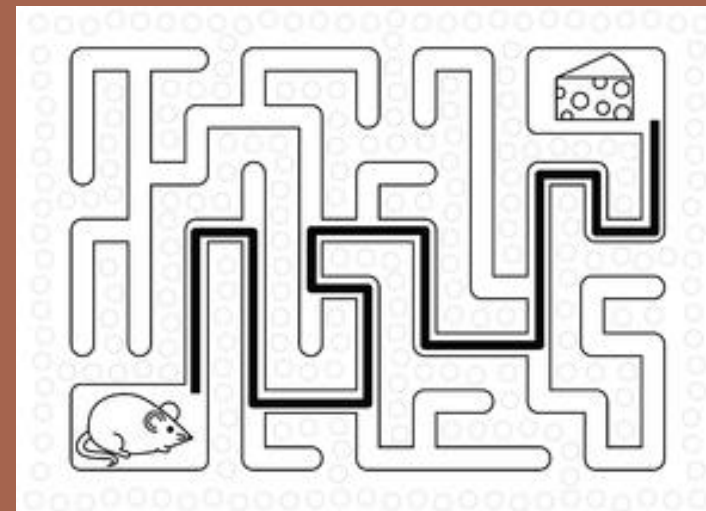


[8]

PUZZLE

Puzzle games are usually **rule-based** logical and conceptual tests that provide a **slow-pacing** and **challenging** gameplay.

The solutions could be obvious, and they could also be **frustrating** if the player does not apply the rules well.



[9]

(JOINT) CO-OP PUZZLE GAME

Co-op puzzle game is a specific game genre where players **help each other** to accomplish challenges and logical tests **based on specific rules** that are usually impossible for a single player.

The solutions could be obvious, and they could also be **frustrating** if players does not apply the rules well.

To create a good co-op puzzle:

- Will players feel helping each other? /How to create gameplay for two?
- Will it be a good puzzle?/ How to prevent frustration?
- What would the general pacing be?

AGENDA



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RESEARCH – CO-OP GAMEPLAY



“Game Design Patterns For Collaborative Player Interactions”

* Introduced 9 common patterns with detailed descriptions and consequences

General

- Concurrency
- Parallelization

Gates

- Separation gate
- Gathering gate

Support

- Strengthening
- Resupply
- Protector
- Savior
- Sacrifice

RESEARCH – CO-OP GAMEPLAY



“Using Design Strategies to Create Engaging Co-op Puzzle-solving Gameplay”

* Designed co-op puzzles by using 5 design patterns

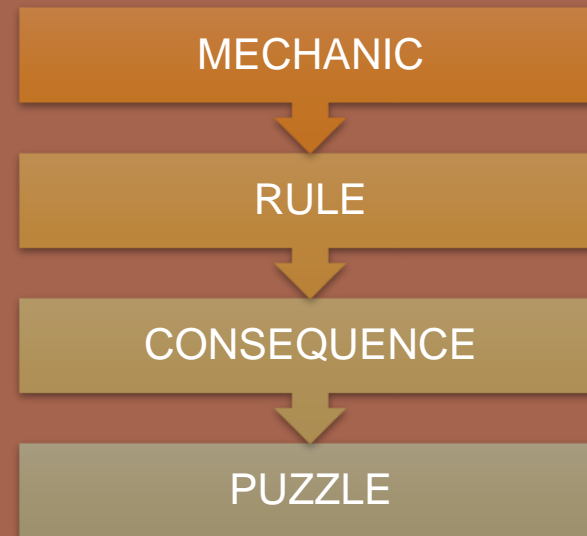
- Concurrency** Operating one or more objects simultaneously that could not be operated by a single player alone.
- Separation** Forcing the players to split up and pushing them go ahead without physical teammates nearby.
- Strengthening** Adding or increasing a positive effect on other players.
- Protector** Preventing a negative effect on other players.
- Perspectives** Giving the players different information.

RESEARCH – PUZZLE DESIGN



“How Johnathan Blow designs a puzzle?”

* Puzzle is never a puzzle, it's a communication of an idea from the designer to the player. Solving the puzzle is the player's way of saying "I understand".



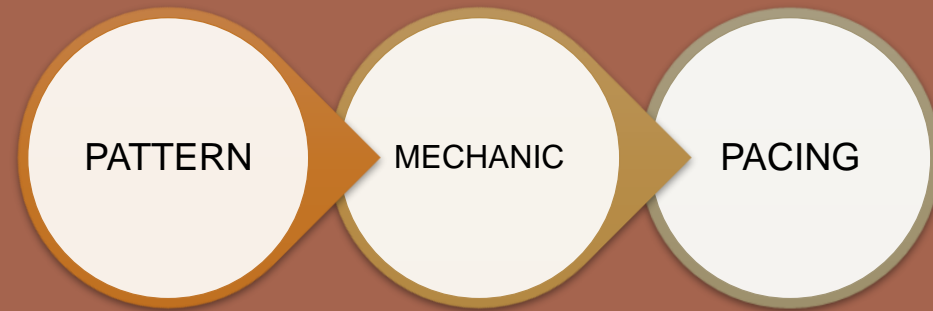
RESEARCH – PUZZLE DESIGN



“How Are Puzzle Games Designed”

- ❖ has clear **RULES**
- ❖ has a clear **OBJECTIVE**
- ❖ finds the **BALANCE** between easy and hard

RESEARCH – PACING



* The application of design patterns will affect the general pacing.

RESEARCH – PACING



“Several common problems with co-op game design”

❖ Knowledge Mismatch

If one player knows a lot more than the other, this becomes less fun than playing alone.

❖ Skill Mismatch

When someone is better than you in skill, that is even less fun.

❖ Public Humiliation

Some people genuinely don't want to play with others because they find the idea of making mistakes in front of others embarrassing.

❖ No Protagonist

❖ Jerks

GOALS



Using design patterns to create gameplay for 2 players



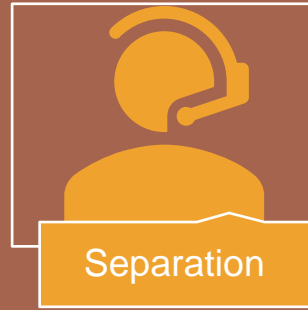
Finding an approximate puzzle pacing for each pattern



Implementing good puzzle design theory



Solving co-op design pattern problems



3 Co-op Design Patterns



4 Stage Best Practice

METHODOLOGY

Description:

Operating one or more objects IN A CERTAIN ORDER that could not be operated by a single player alone

Features:

Taking roles



CO-OP DESIGN PATTERN SERIALIZATION

Description:

Operating one or more objects **SIMULTANEOUSLY** that could not be operated by a single player alone

Features:

Trust, Harmony



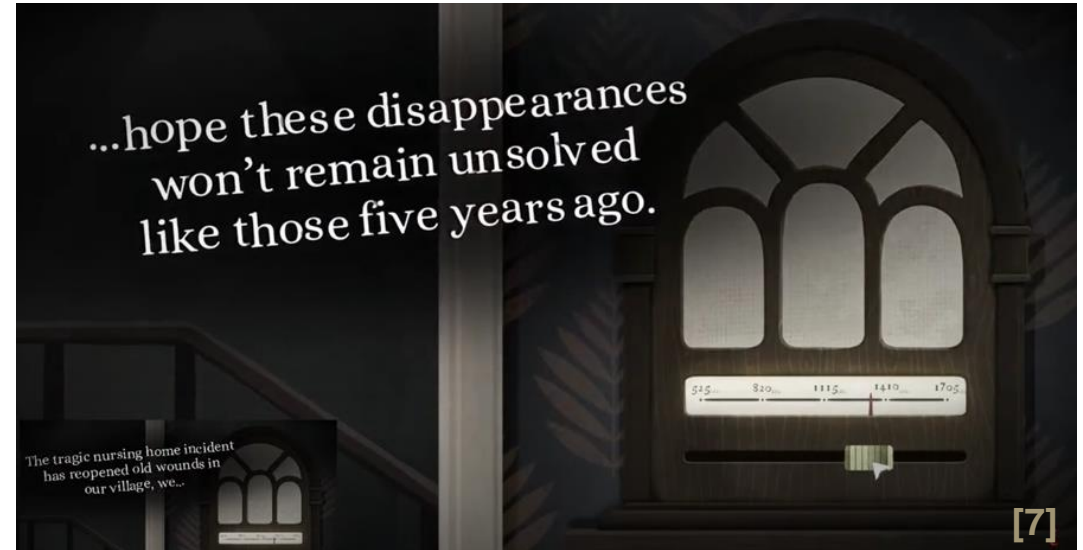
CO-OP DESIGN PATTERN PARALLELIZATION

Description:

Forcing the players to **SPLIT UP** and pushing them to go ahead without physical teammates nearby

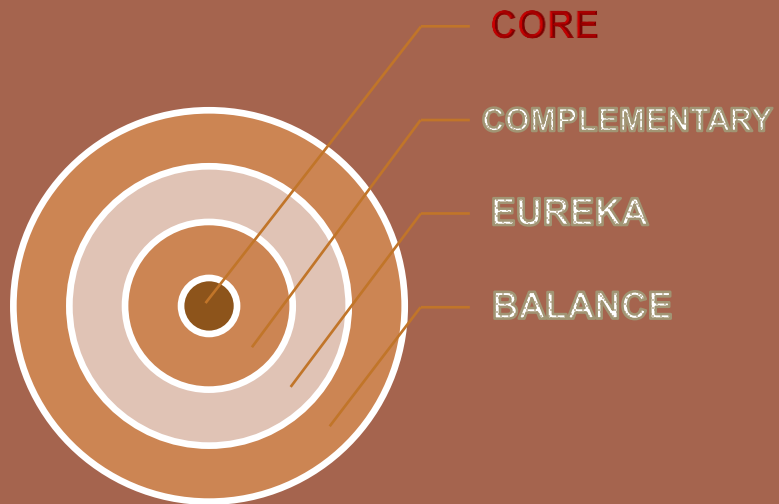
Features:

Communication



CO-OP DESIGN PATTERN SEPARATION

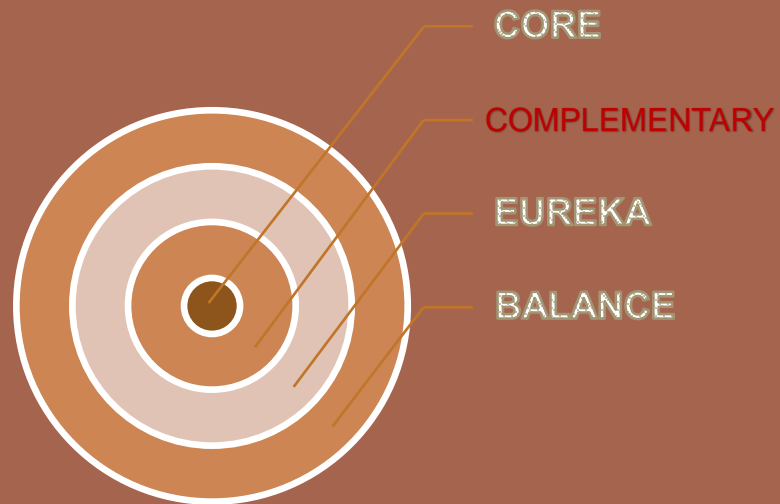
4 STAGE THEORY



STEP1: Create serialization gameplay.

- Divide the puzzles into chunks and make them impossible for one player.
- Set clear goals and objectives.

4 STAGE THEORY



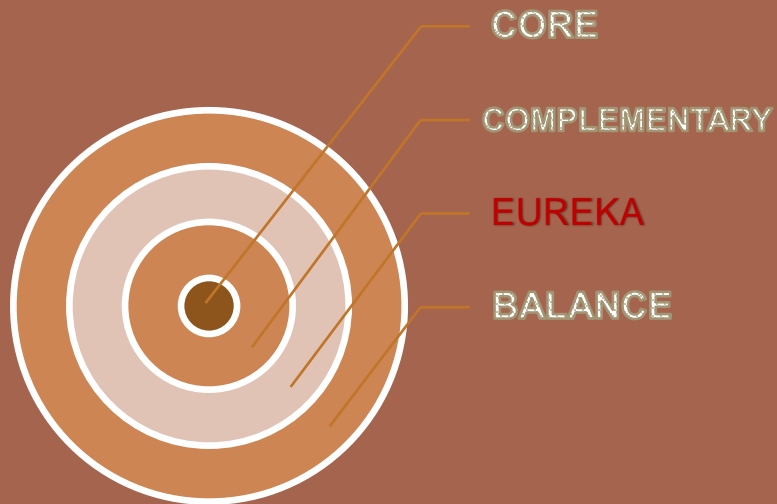
STEP1: Create serialization gameplay.

- Divide the puzzles into chunks and make them impossible for one player.
- Set clear goals and objectives.

STEP2: Use spaces and tasks to create multiple gameplay.

- Separate tasks to create parallelization gameplay, it requires the players to communicate well.
- Separate spaces to create separation gameplay, it requires the players to share information well.

4 STAGE THEORY



STEP1: Create serialization gameplay.

- Divide the puzzles into chunks and make them impossible for one player.
- Set clear goals and objectives.

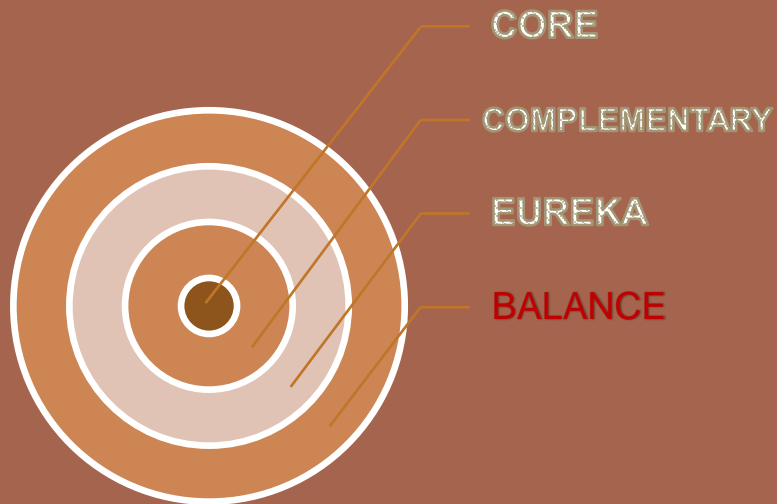
STEP2: Use spaces and tasks to create multiple gameplay.

- Separate tasks to create parallelization gameplay, it requires the players to communicate well.
- Separate spaces to create separation gameplay, it requires the players to share information well.

STEP3: Design "wow" moments

- Create puzzle catches in serialization gameplay
- Add puzzle challenges in parallelization gameplay
- Design reunion moments after players being separated for a period.

4 STAGE THEORY



STEP1: Create serialization gameplay.

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- Set clear goals and objectives.

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STEP3: Design "wow" moments

- Create puzzle catches in serialization gameplay
- Add puzzle challenges in parallelization gameplay
- Design reunion moments after players being separated for a period.

STEP4: Balance the gaming experience

- Split tasks for both players, do not let the players wait.
- Split information for both players.
- Have engaging cooperative tasks for the players.

AGENDA



High Concept



Researches



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Playtest and
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ARTIFACT DESCRIPTION

A Portal 2 co-op level series:

- Level 1: Showcase of serialization design pattern
- Level 2: Showcase of parallelization design pattern
- Level 3: Showcase of separation design pattern
- Level 4: Showcase of 4 staged best practice theory

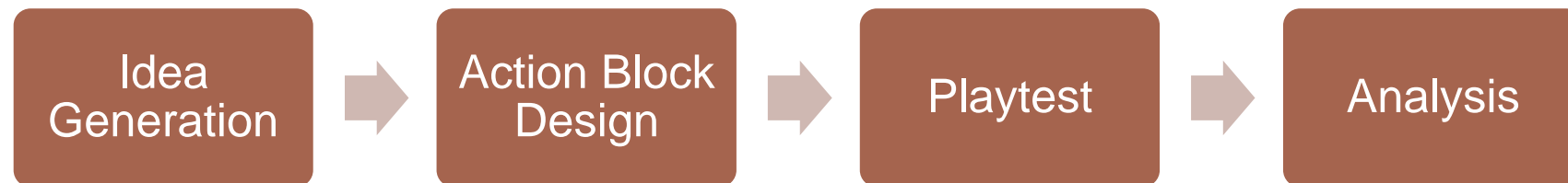
PREPRODUCTION PLAN

Goals for Preproduction:

- Brainstorming gameplay for 2 players
- Finding an approximate pacing for each pattern

Solutions:

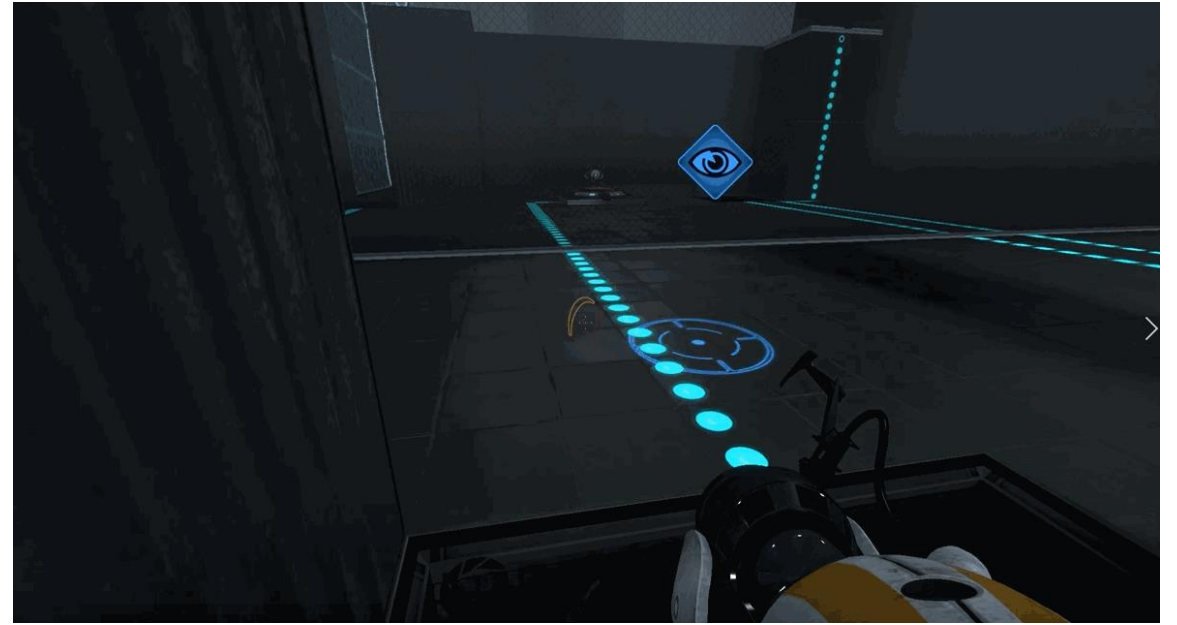
- Create gameplay moment (action block) for each design pattern



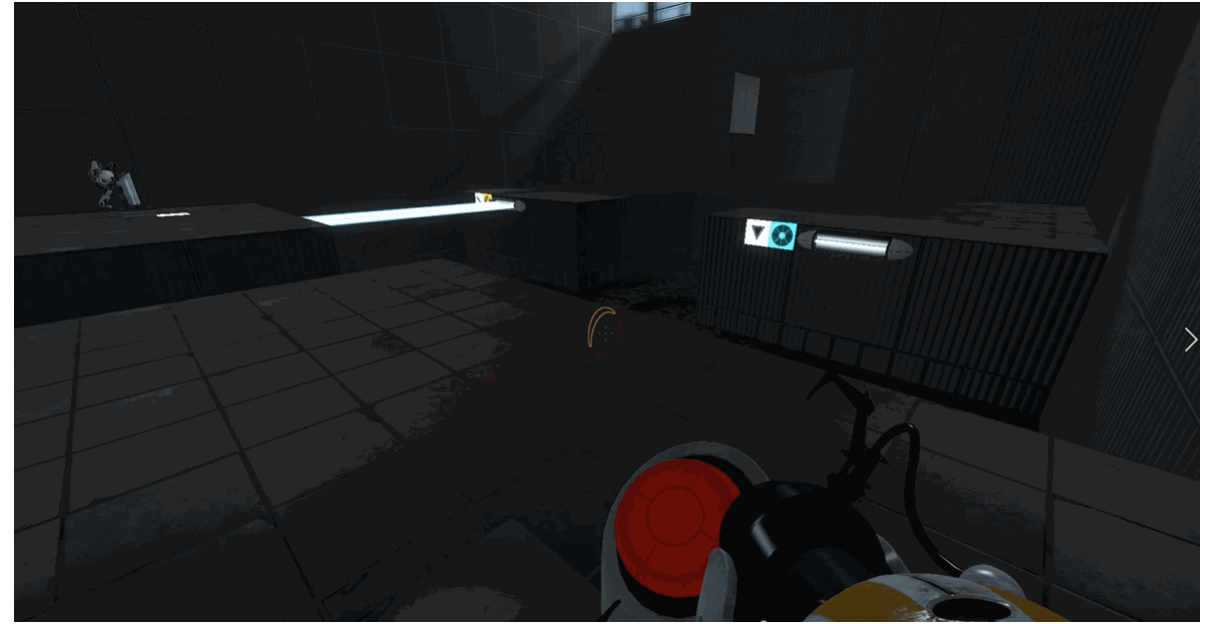
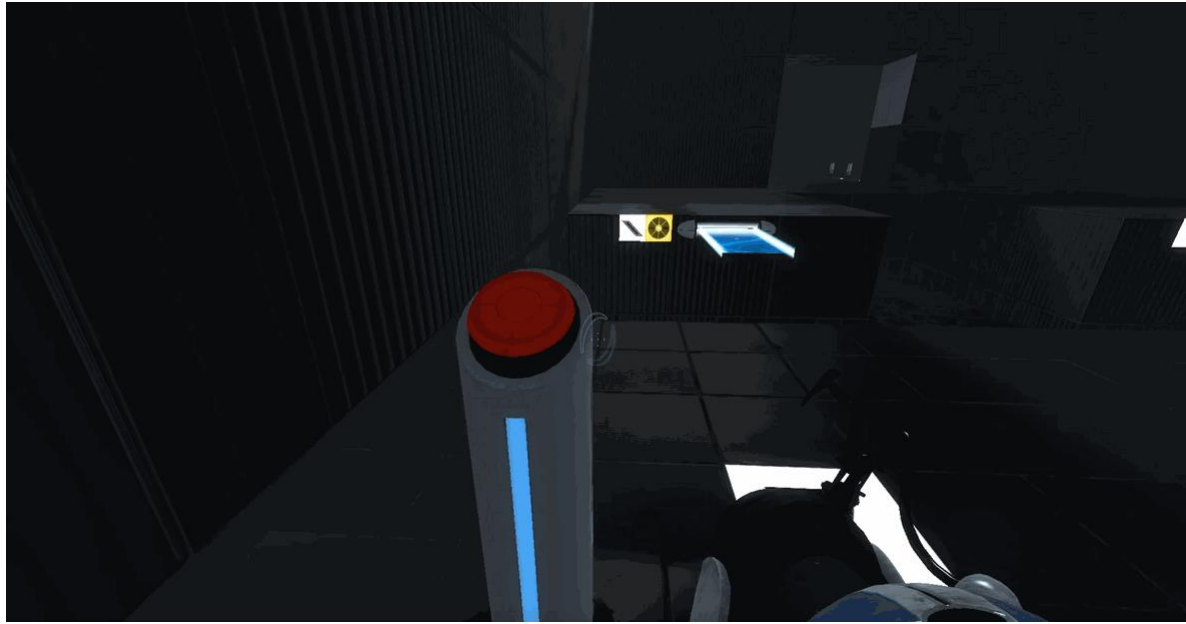
INDEX	PATTERN	MECHNICS / FOCUS
1	Serialization	Dual-player puzzle sequences, share space, share information
2	Serialization	Dual-player puzzle sequences, multiple space, information split
3	Serialization	Dual-player puzzle sequences, multiple space, share information
4	Parallelization	Timing mechanics, one time communication
5	Parallelization	Timing mechanics, a lot of communication
6	Parallelization	Timing mechanics, continuous communication
7	Separation	Single-player puzzles, some communication required
8	Separation	Dual-player puzzles, a lot of communication required
9	Separation	Dual-player puzzles with different roles, a lot of communication required

ACTION BLOCK DESIGN

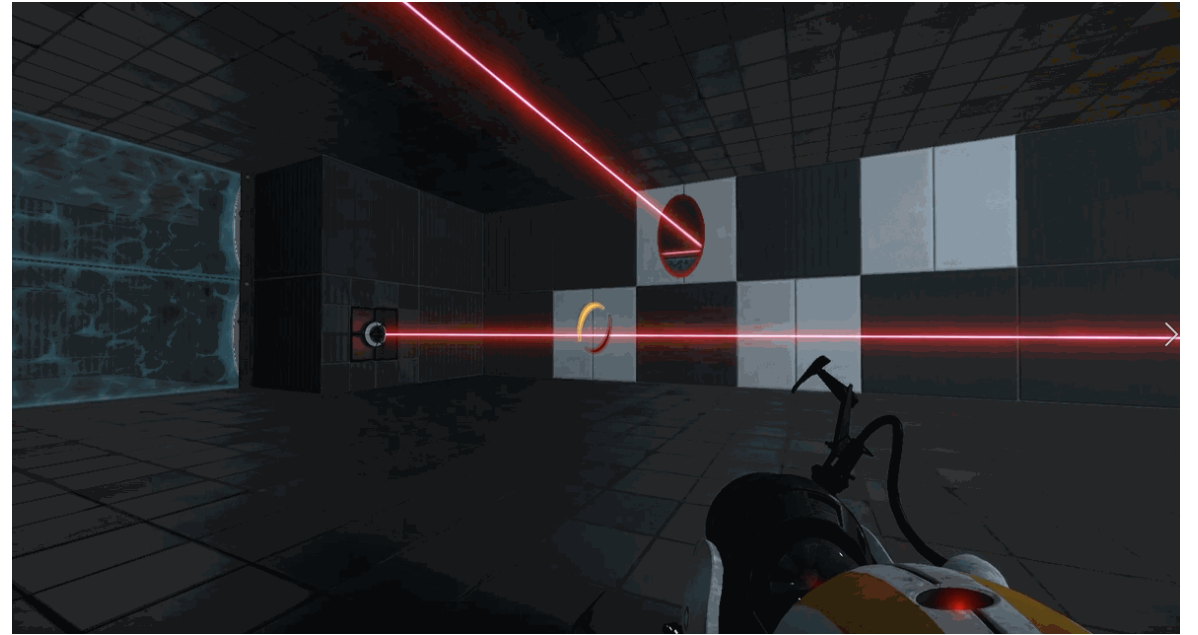
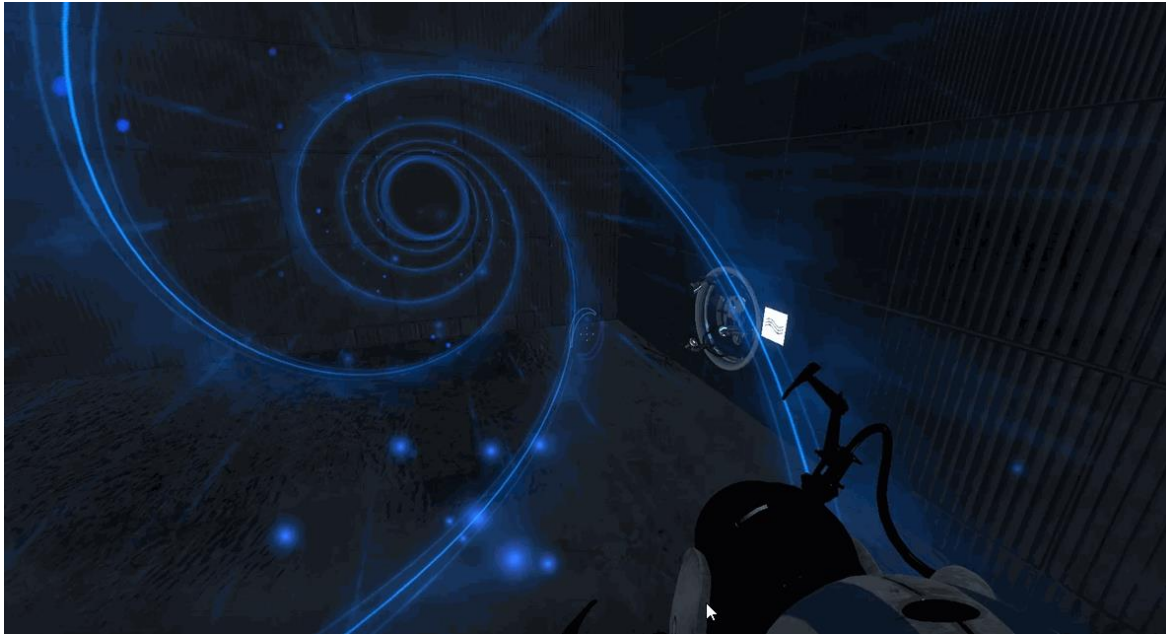




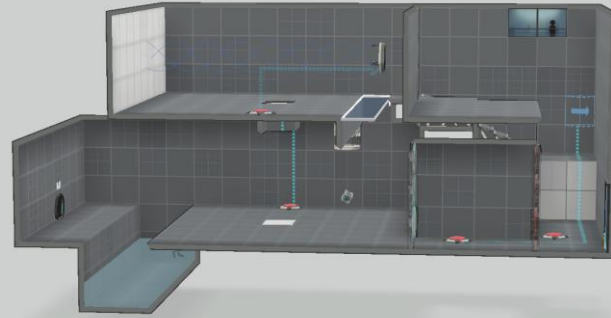
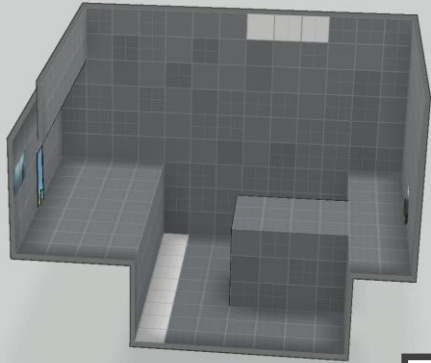
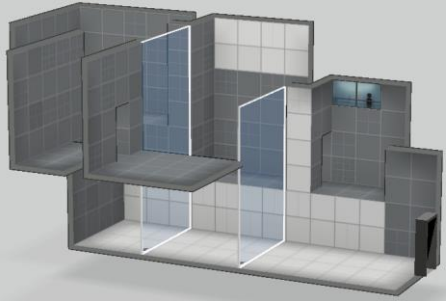
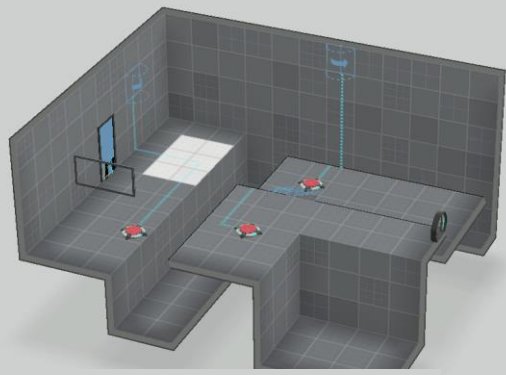
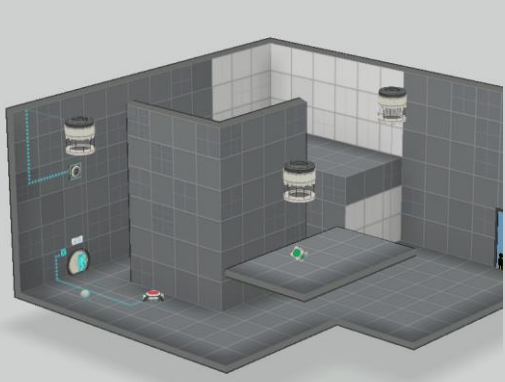
SERIALIZATION EXAMPLE



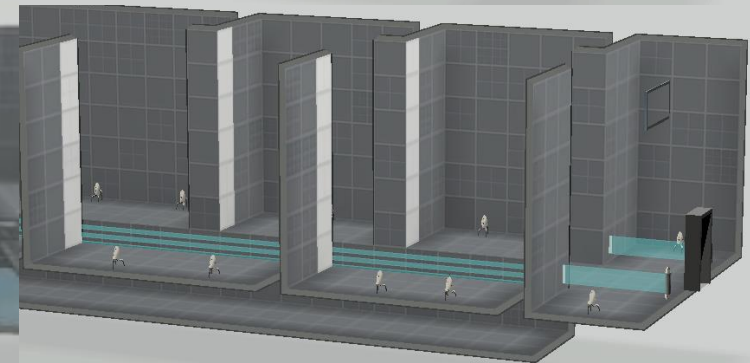
PARALLELIZATION EXAMPLE



SEPARATION EXAMPLE



ACTION BLOCKS



Rank	Mechanics / Focus	SURVEY		OBSERVATION	
		Playtest Rate		Having Fun?	Good Puzzles?
1	Dual-player puzzle sequences, share space, share information	7.5		YES	YES
2	Dual-player puzzle sequences, multiple space, share information	7.5		-	YES
3	Dual-player puzzle sequences, multiple space, information split	5		NO	-

Analysis:

- People care about how much information they can get from the process.
- Having clear goals and enough feedback is important in serialization game pattern design.

SERIALIZATION



			SURVEY	OBSERVATION	
Rank	Mechanics / Focus		Playtest Rate	Having Fun?	Good Puzzle?
1	Timing mechanics, continuous communication		8.3	YES	-
2	Timing mechanics, a lot of communication		7.5	-	-
3	Timing mechanics, one time communication		5.8	-	Yes

Analysis:

- Communication helps the player gain fun game experience.
- Puzzle mechanics that are easy to find and hard to execute fits this game pattern.

PARALLELIZATION



Rank	Mechanics / Focus	SURVEY		OBSERVATION	
		Playtest Rate		Having Fun?	Good Puzzle?
1	Dual-player puzzles with different roles, a lot of communication	8.2		YES	YES
2	Dual-player puzzles, a lot of communication required	6.5		-	-
3	Single-player puzzles, some communication required	5.7		NO	YES

Analysis:

- Having clear role division contributes separation gameplay.
- Players don't like to wait, single-player puzzles it not the ideal way to design co-op moment.

SEPARATION



Rank	Mechanics / Focus	Playtest Rate
1	Timing mechanics, continuous communication	8.3
2	Dual-player puzzles with different roles, a lot of communication	8.2
3	Dual-player puzzle sequences, share space, share information	7.5
4	Dual-player puzzle sequences, multiple space, share information	7.5
5	Timing mechanics, a lot of communication	7.5
6	Dual-player puzzles, a lot of communication required	6.7
7	Timing mechanics, one time communication	5.8
8	Single-player puzzles, some communication required	5.7
9	Dual-player puzzle sequences, multiple space, information split	5

Having Fun?	Good Puzzle?
YES	-
YES	YES
YES	YES
-	YES
-	-
-	-
-	YES
NO	YES
NO	-

- Having fun is the foundation of good co-op puzzle moment design.

ANALYSIS



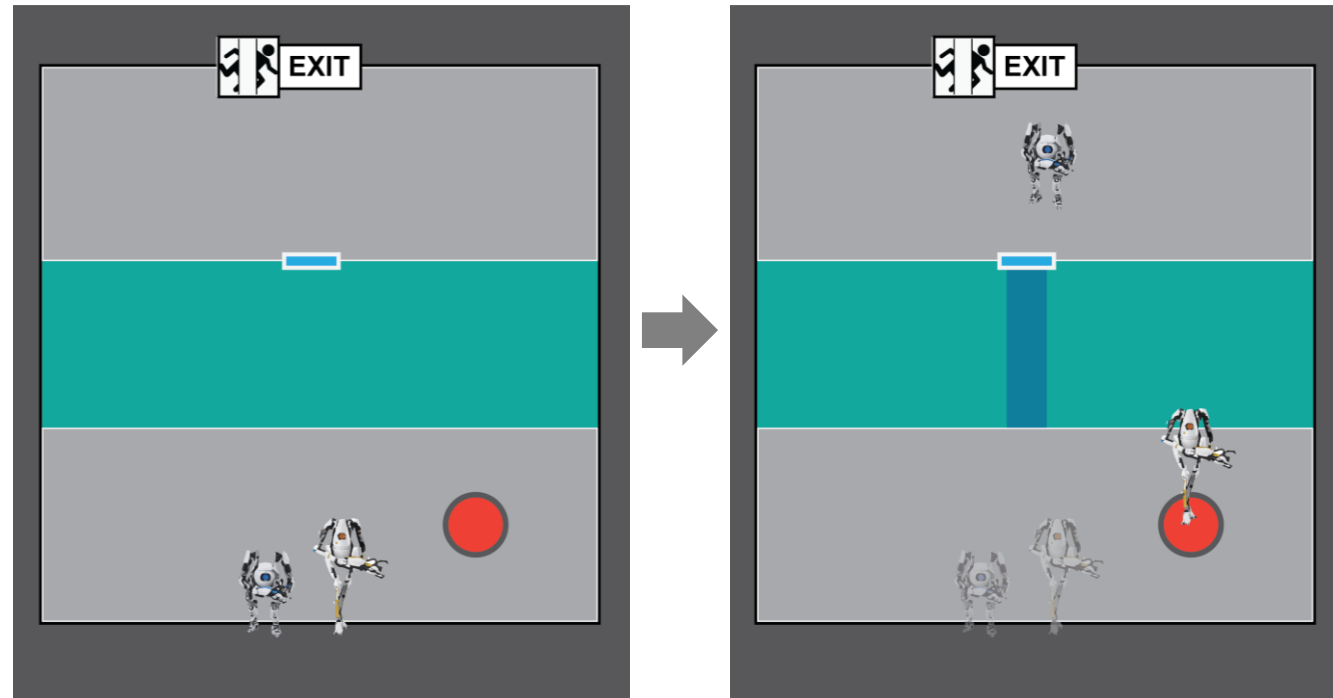
PRODUCTION PLAN

Goals for Production:

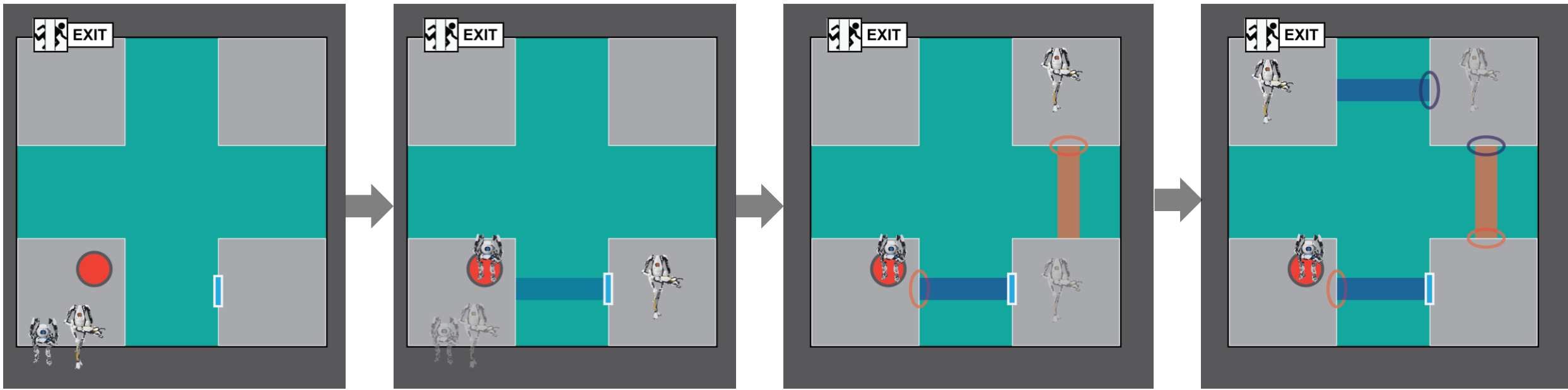
- Implementing good puzzle design theory
- Solving co-op design pattern problems

Solutions:

- Designing 4 levels, 3 tutorial levels for design patterns
- Using 4 stage best practice theory to design the 4th level



MECHANICS TWIST



SERIALIZATION DESIGN METHOD

Design Method:

- Duplicate the steps before approaching the final goal.
- Both players have something to do.
- Design mechanic twists (catches) in steps. *Pay attention to the portal wall color changing in image 3 and 4.*

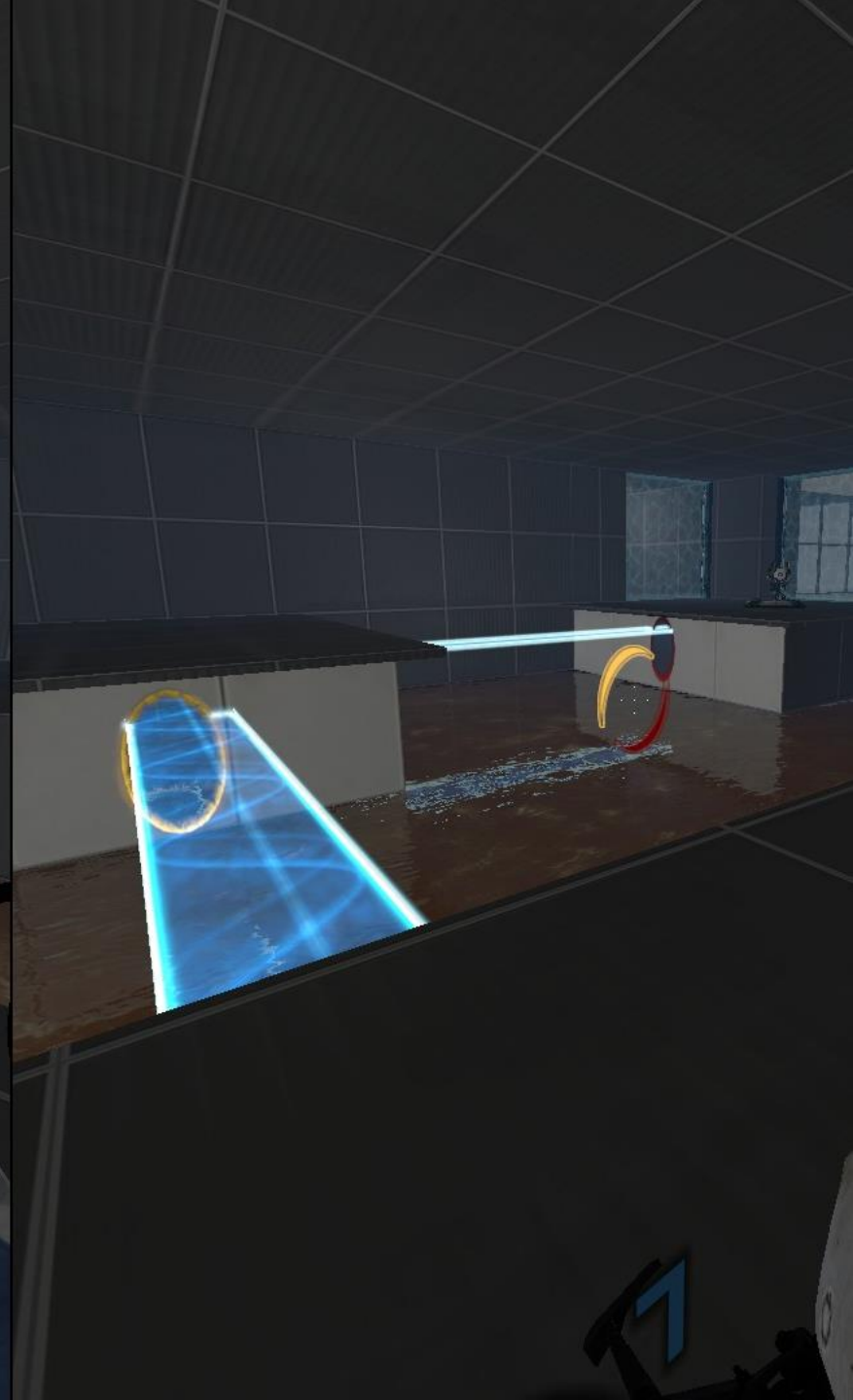
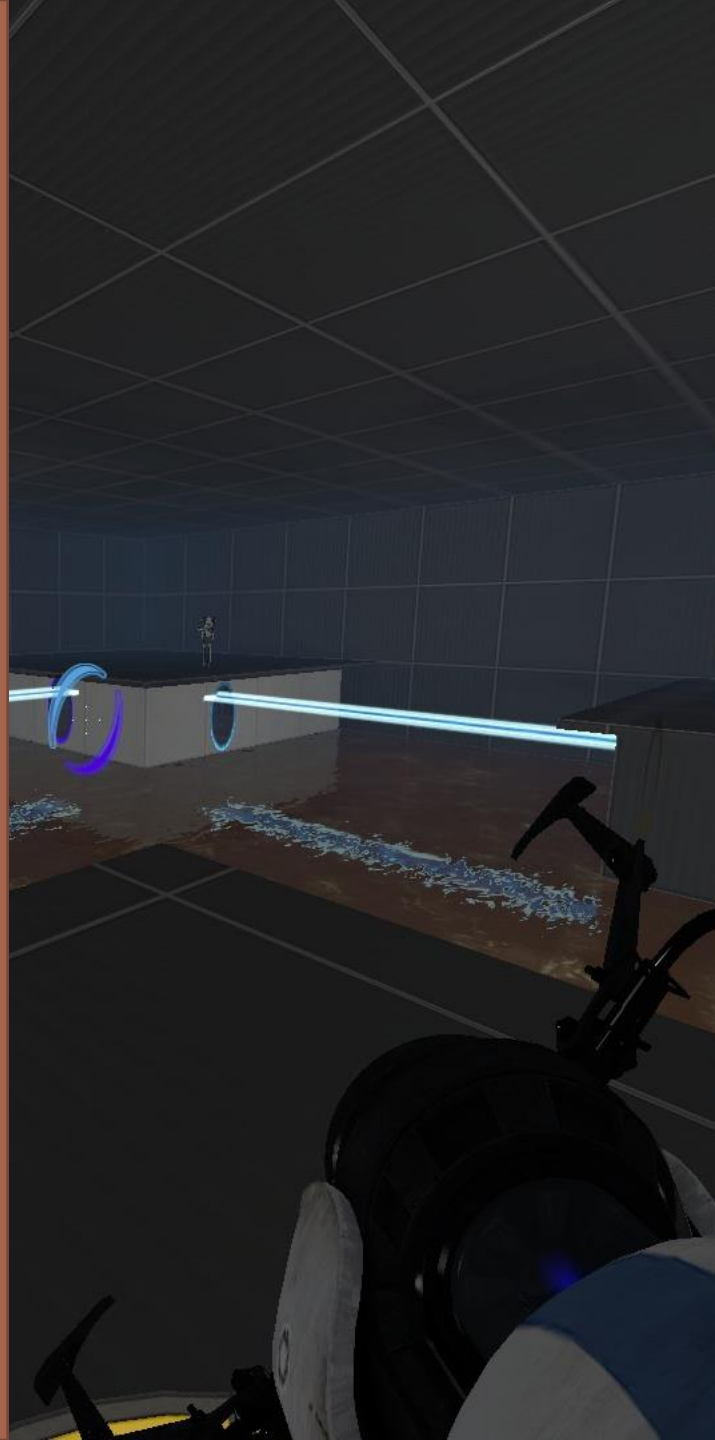
SERIALIZATION LEVEL

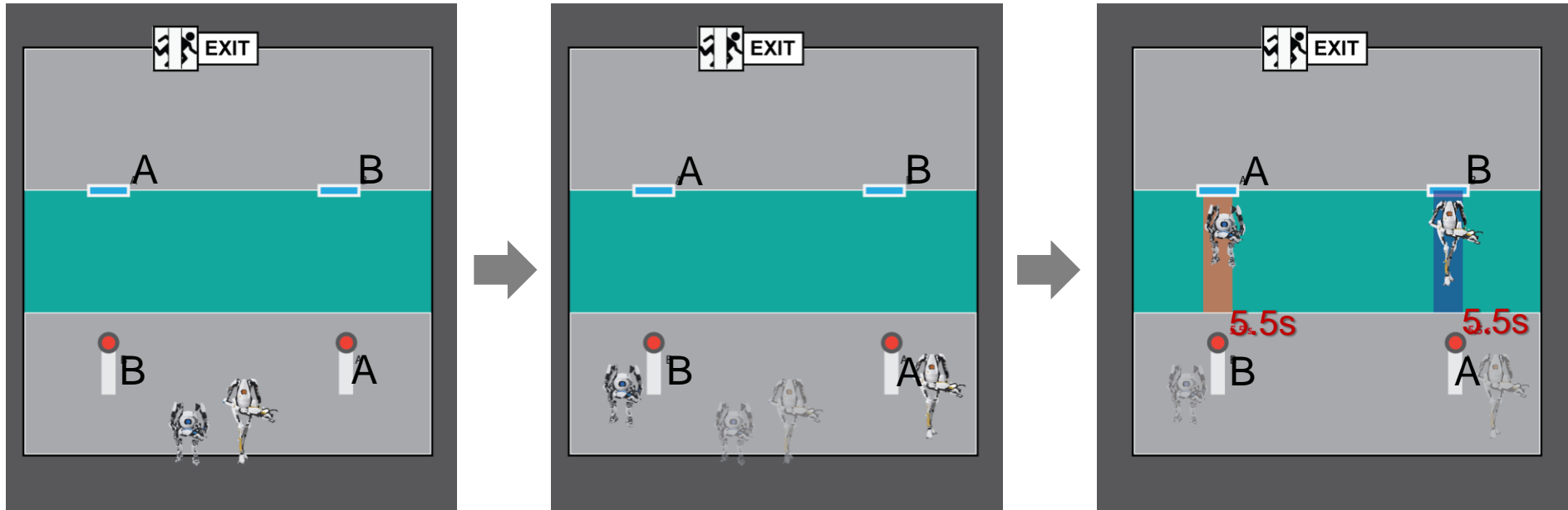
- Core Mechanics:

Light Bridge

- Main Challenge:

Using portal wall properly to create bridges between gaps.





PARALLELIZATION DESIGN METHOD

Design Method:

- Duplicate the goals for this action.
- They must help each other to achieve the goals.
- Make it challenging. *Timing mechanics. Players cannot waste time after pressing the buttons.*

PARALLEL -IZATION LEVEL

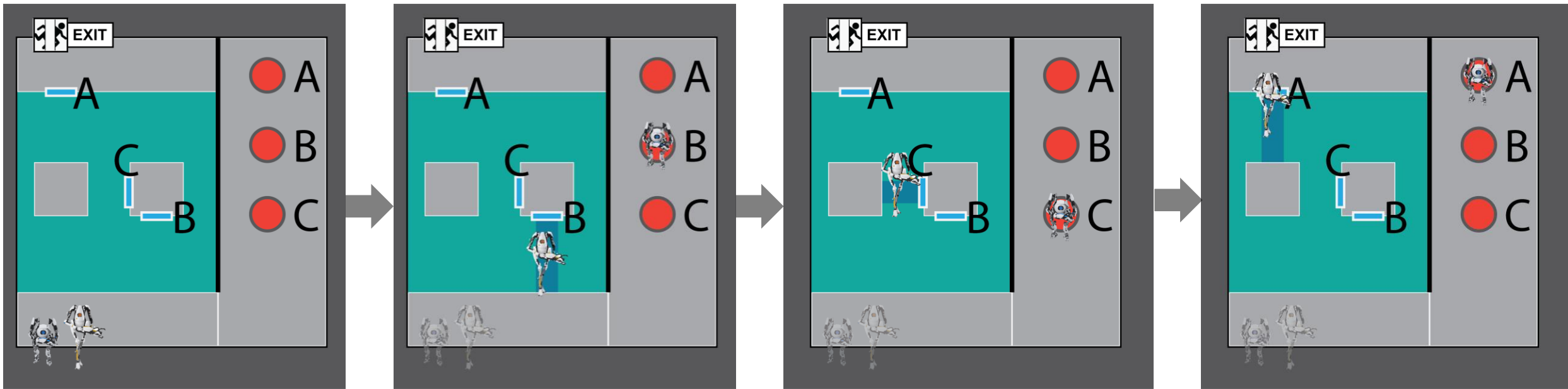
- Core Mechanics:

Light Bridge & Beam & Turrets

- Main Challenge:

Good Timing





SEPARATION DESIGN METHOD

Design Method:

- Remove tools/resources from the main scene and place them in another space.
- Players are having different roles in this puzzle solving process.

SEPARATION LEVEL

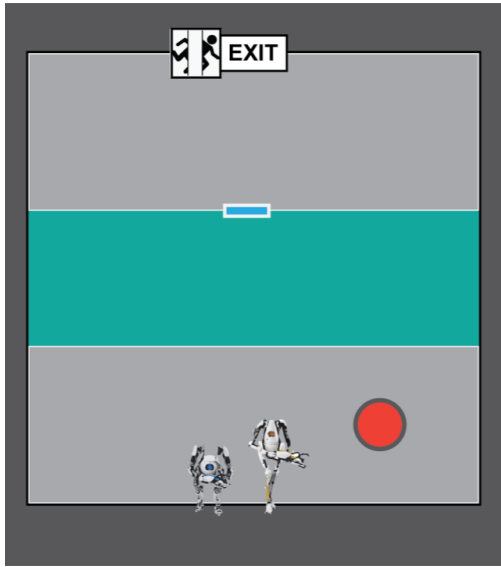
- Core Mechanics:

Beam & Buttons & Faith Plate

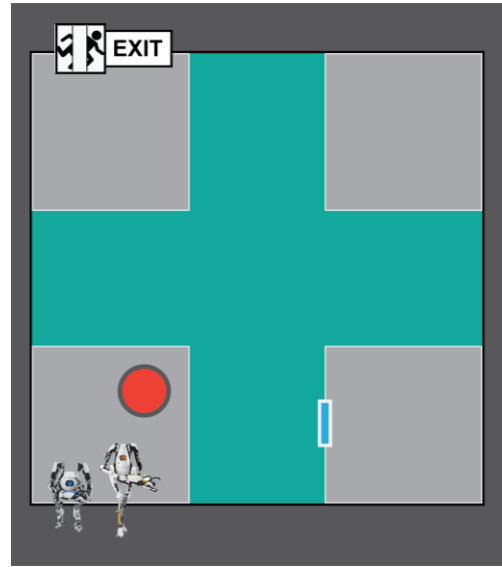
- Main Challenge:

Describing and exchanging information to the other

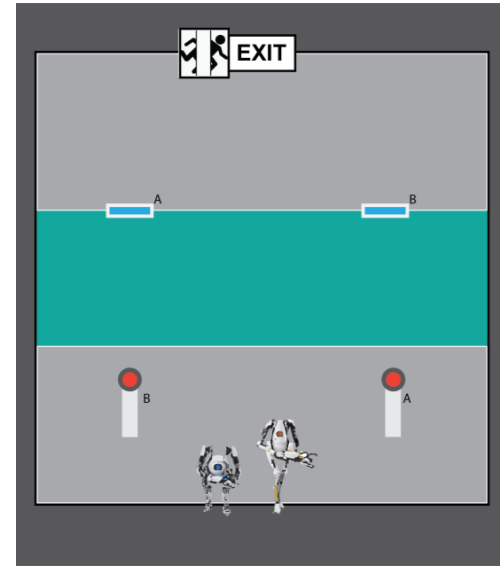




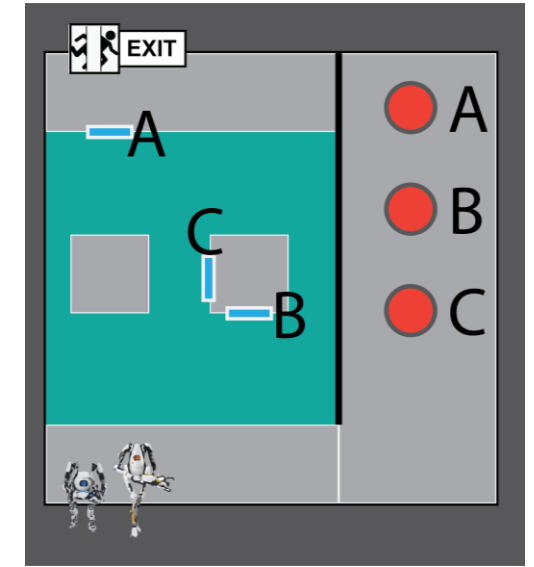
Original Mechanics



Serialization Method



Parallelization Method



Separation Method

MECHANICS TWIST RECAP

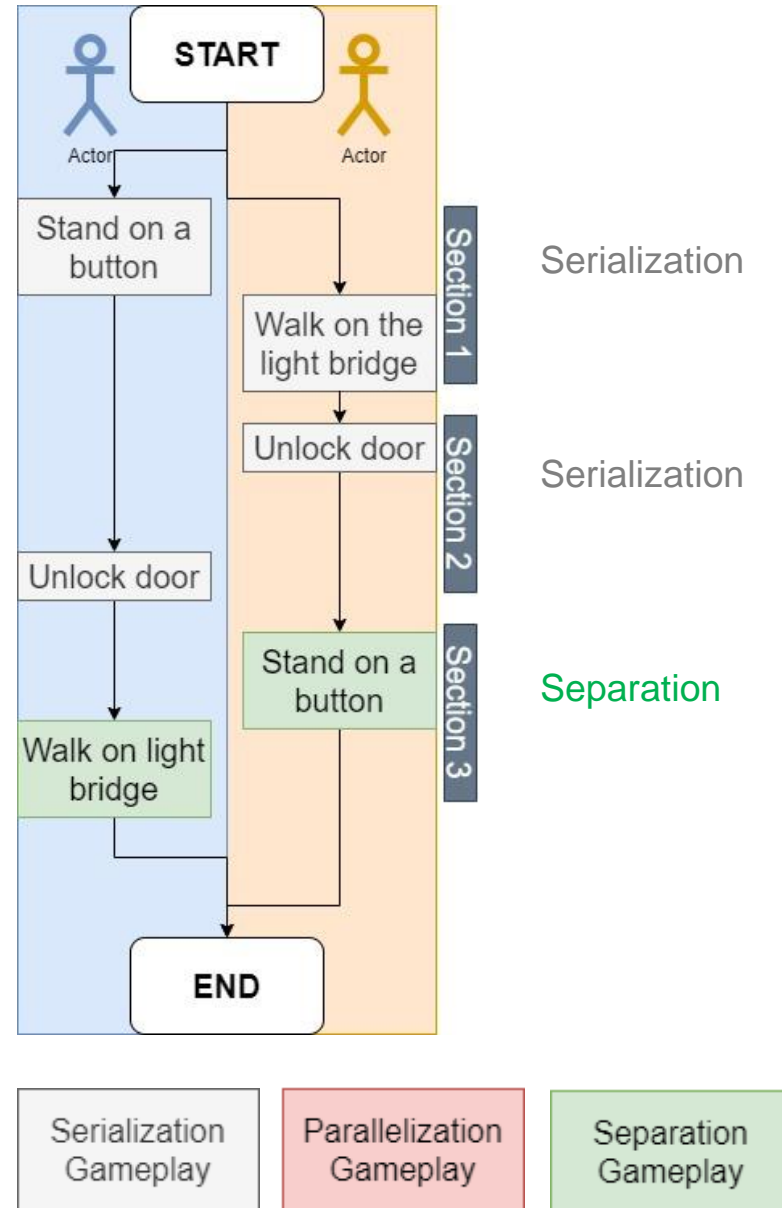
FINAL LEVEL

- Core Mechanics: Buttons, Light Bridges, Turrets, Beams, Lasers
- Section 1: Serialization with Parallelization
- Section 2: Parallelization with wow moment
- Section 3: Separation with Parallelization & Serialization

FINAL LEVEL DESIGN

STEP 1:

- Design gameplay mainly based on serialization design pattern.



FINAL LEVEL DESIGN

STEP 1:

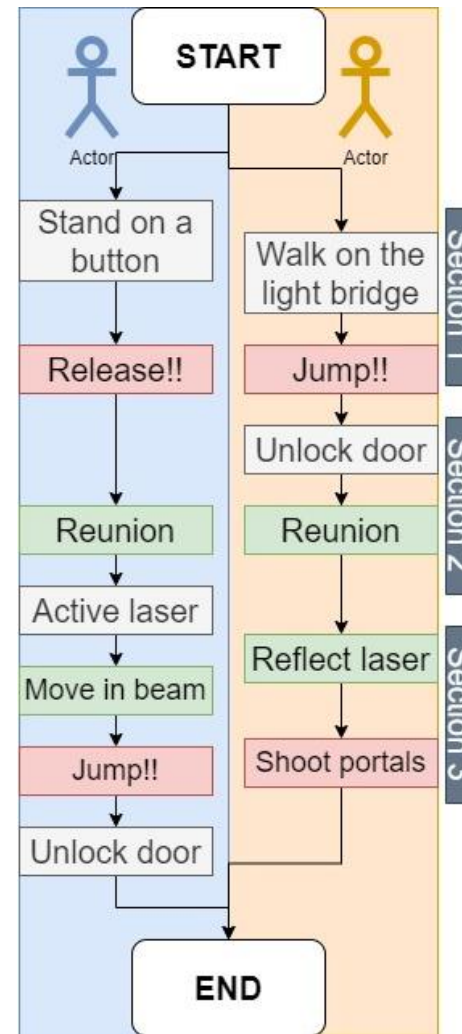
- Design gameplay mainly based on serialization design pattern.

STEP 2:

- Add different types of gameplay.

STEP 3:

- Add a catch / reunion moment for wow moments.



Serialization + Parallelization

Parallelization + Reunion

Separation + Catch + Parallelization

Serialization
Gameplay

Parallelization
Gameplay

Separation
Gameplay

FINAL LEVEL DESIGN

STEP 1:

- Design gameplay mainly based on serialization design pattern.

STEP 2:

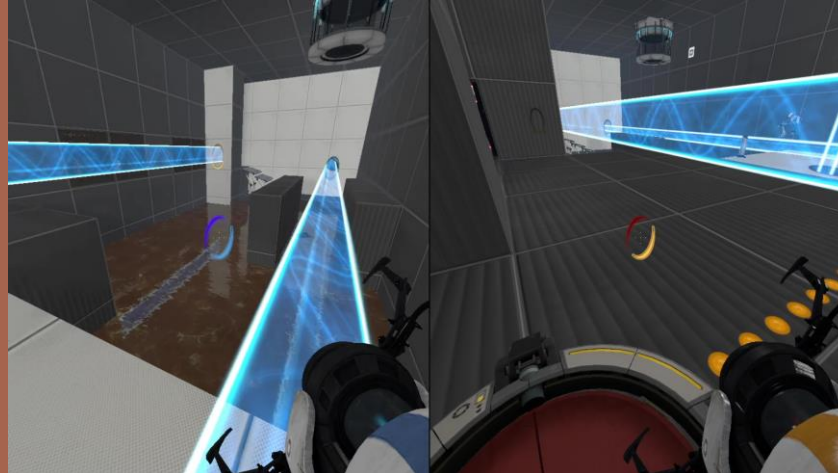
- Add different types of gameplay.

STEP 3:

- Add a catch / reunion moment for wow moments.

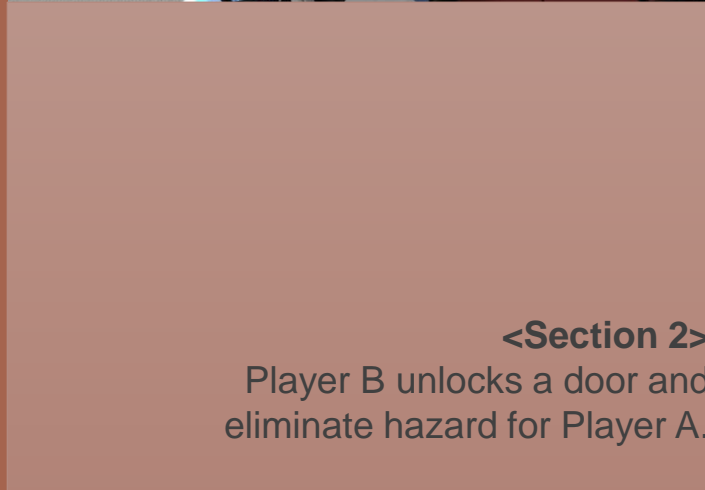
STEP 4:

- Gameplay balance based on playtest results.
 - Possible pass for a single player
 - Too hard/easy challenges
 - Too much/little information



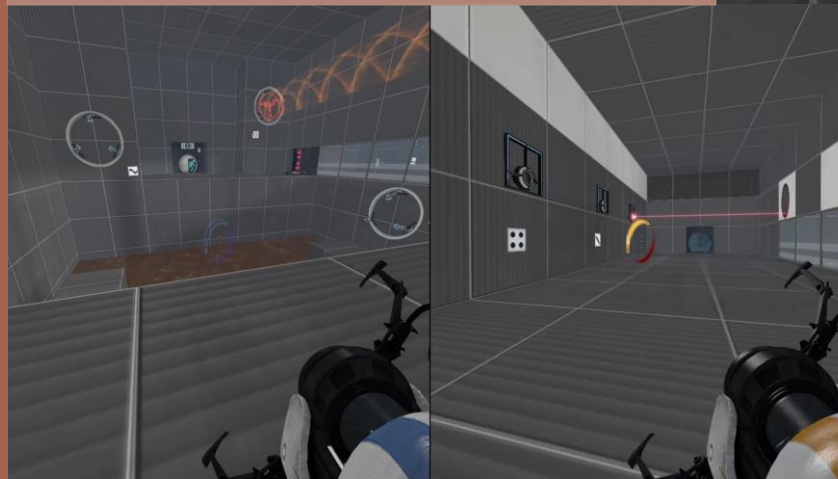
<Section 1>

Player A stands on a button.
Player B walks on the light bridge.



<Section 2>

Player B unlocks a door and eliminate hazard for Player A.



<Section 3>

Player A controls the states of beams.
Player B directs Player A in another room.

AGENDA



High Concept



Researches



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Data Analysis



Conclusion

CHECKLIST

- A good puzzle should have a clear goal and an easy rule. Players must understand the mechanics and learn the skillset before the test.
 - They were able to accomplish the level.
 - They understood the mechanics well.
 - They did not have trouble in execution.
- A good co-op game moment should provide abundant gameplay to both players, and they both experience fun.
 - They must feel the importance of their partners.
 - They must feel they are equally important.

SURVEY

- Were you able to finish this level?
- Which of the following would you use to describe the overall difficulty on figuring out the puzzle solutions?
(From easy to hard)
- Which of the following would you use to describe the overall difficulty on execution?
(From easy to hard)
- Which of the following would you use to describe the communication between you and your partner?
(From no communication to communicate a lot)
- Which of the following would you use to describe the role you played in this level?
(From being protagonist to being carried).
- Rate the importance of the following attributes for the co-op gameplay.

Percentage of player completion:

100%

100%

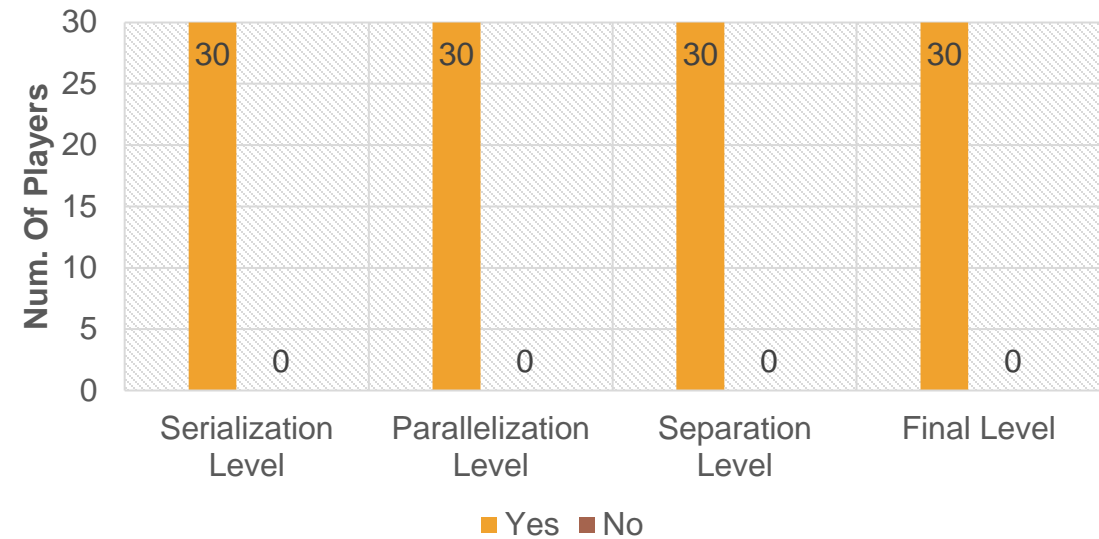
100%

100%

SURVEY

❖ Were you able to finish this level?

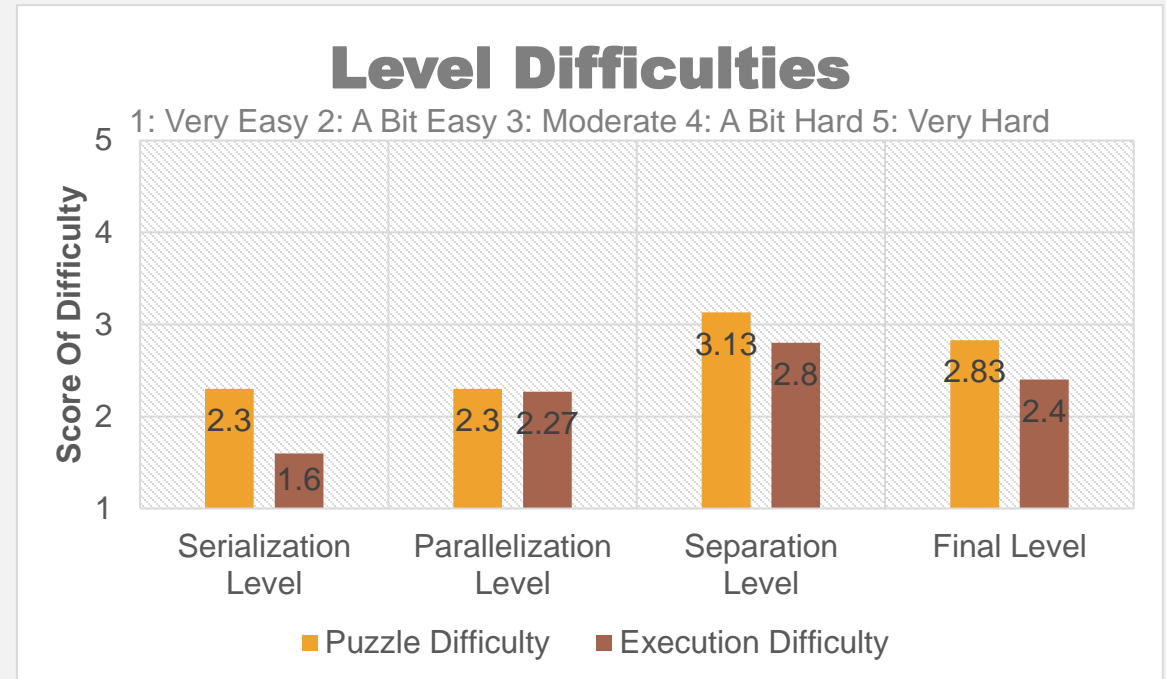
Level Completion



- All players are able to finish the levels.

SURVEY

- ❖ Which of the following would you use to describe the difficulty on puzzle solutions?
- ❖ (Which of the following would you use to describe the difficulty on execution?)



- Puzzles are easy to execute.
- Puzzle difficulties are increasing in a moderate range.

CHECKLIST

- A good puzzle should have a clear goal and an easy rule. Players must understand the mechanics and learn the skillset before the test.
 - They were able to accomplish the level.
 - They understood the mechanics well.
 - They did not have trouble in execution.

- A good co-op game moment should provide abundant gameplay to both players, and they both experience fun.
 - They must feel the importance of their partners.
 - They must feel they are equally important.

SURVEY

❖ Which of the following would you use to describe the communication between you and your partner?

Percentage of communication:

All the time

50%

57%

60%

67%

A lot

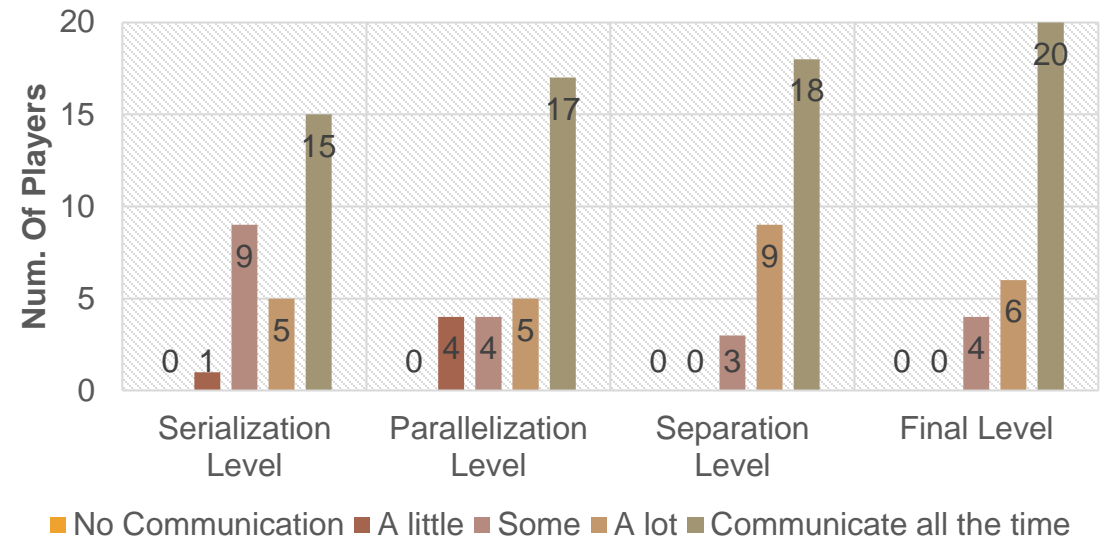
67%

73%

80%

87%

Communication Scale



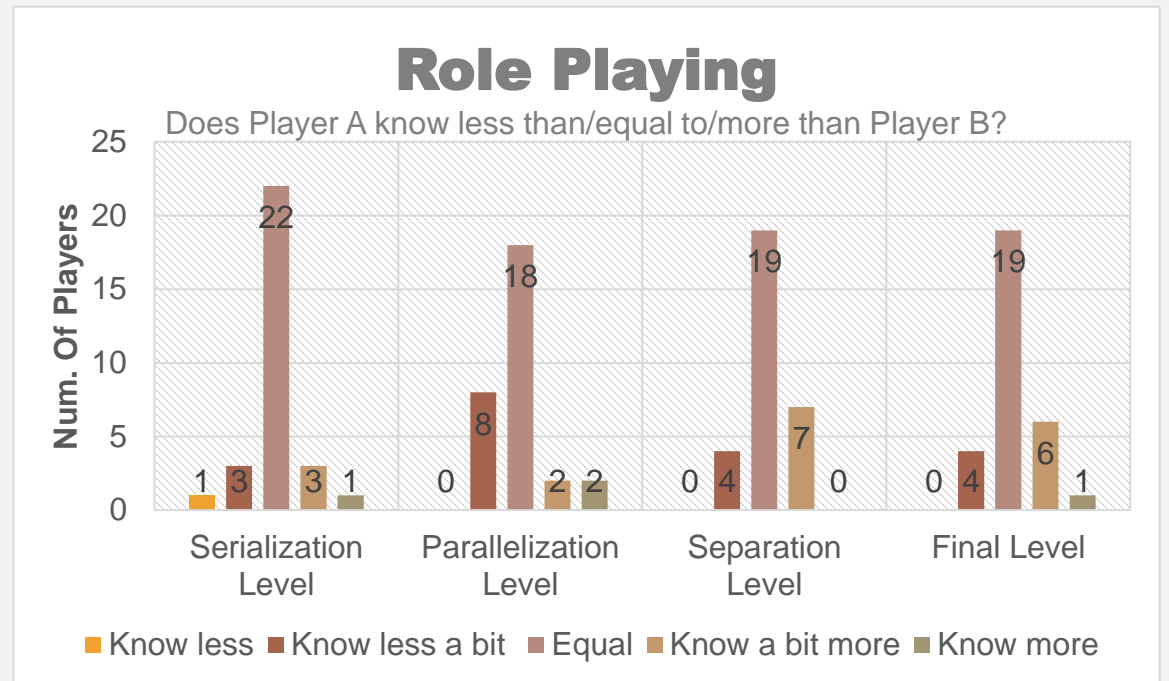
- Many players communicate all the time while playing.
- Communication is increasing in later levels.

Percentage of Knowledge match:

Equal	73%	60%	63%	63%
Equal or A bit	93%	93%	100%	97%

SURVEY

❖ Which of the following would you use to describe the role you played?



- Players' knowledge matches.
- Player themselves are also important in the game.

CHECKLIST

- ✓ A good puzzle should have a clear goal and an easy rule. Players must understand the mechanics and learn the skillset before the test.
 - ✓ They were able to accomplish the level.
 - ✓ They understood the mechanics well.
 - ✓ They did not have trouble in execution.
- ✓ A good co-op game moment should provide abundant gameplay to both players, and they both experience fun.
 - ✓ They must feel the importance of their partners.
 - ✓ They must feel they are equally important.

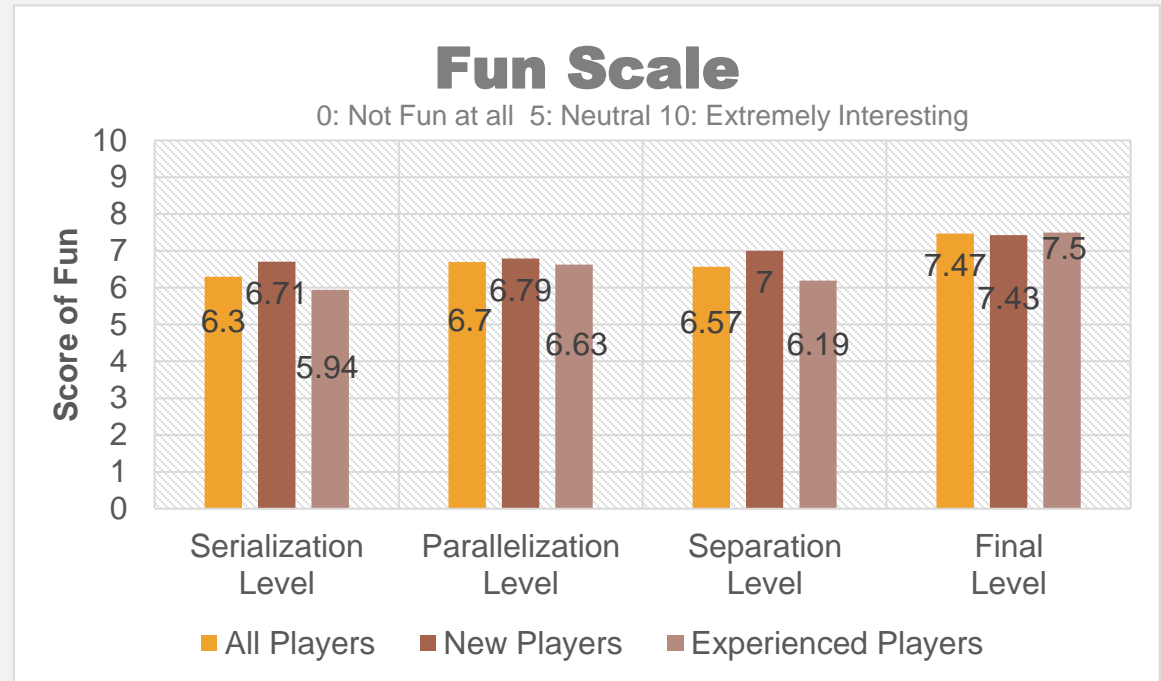
CHECKLIST

- ❑ **Co-op Gameplay** – Fun is more important than puzzles
- ❑ **Serialization** – Puzzle Solving
 - ❑ The audience hold high tolerance for serialization levels because they can hardly accomplish the puzzles by themselves.
- ❑ **Parallelization** – Timing Challenges
 - ❑ Rather than designing logic puzzle sequences, challenges could fit the parallelization patten much more.
- ❑ **Separation** – Information Sharing
 - ❑ There should be of chances for the players to communicate and exchange information.

SURVEY

❖ Please pick up a score for the overall enjoyment you have in this level.

New Player: 14
Experienced: 16



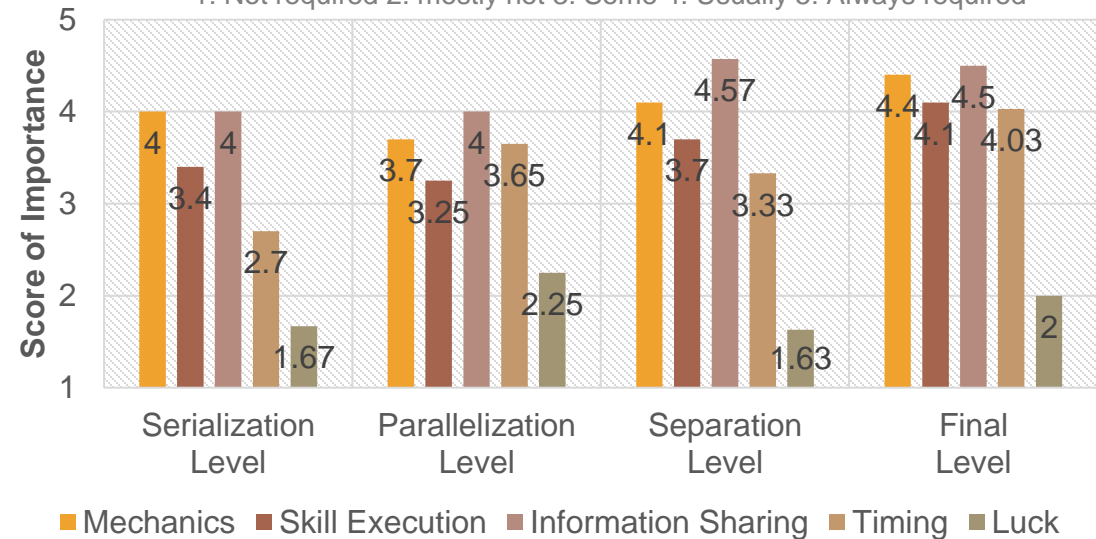
- In the first three levels, experienced players were having less fun probably because they had high expectation.
- However, they voted highest score for the final level.
- Final level owned the highest score for both group with little difference.

SURVEY

- ❖ Which of the following would you use to describe the communication between you and your partner?

Attribute Importance

1: Not required 2: mostly not 3: Some 4: Usually 5: Always required



- Information sharing is always most important in levels.
- Mechanic understanding is also important in all levels.
- Parallelization and separation levels require good timing skills.
- Good luck is never the key to solve the puzzles.
- Final level has a good combination of required skillset.

CHECKLIST

Co-op Gameplay – Fun is more important than puzzles

Serialization – Puzzle Solving

- The audience hold high tolerance for serialization levels because they can hardly accomplish the puzzles by themselves.

Parallelization – Timing Challenges

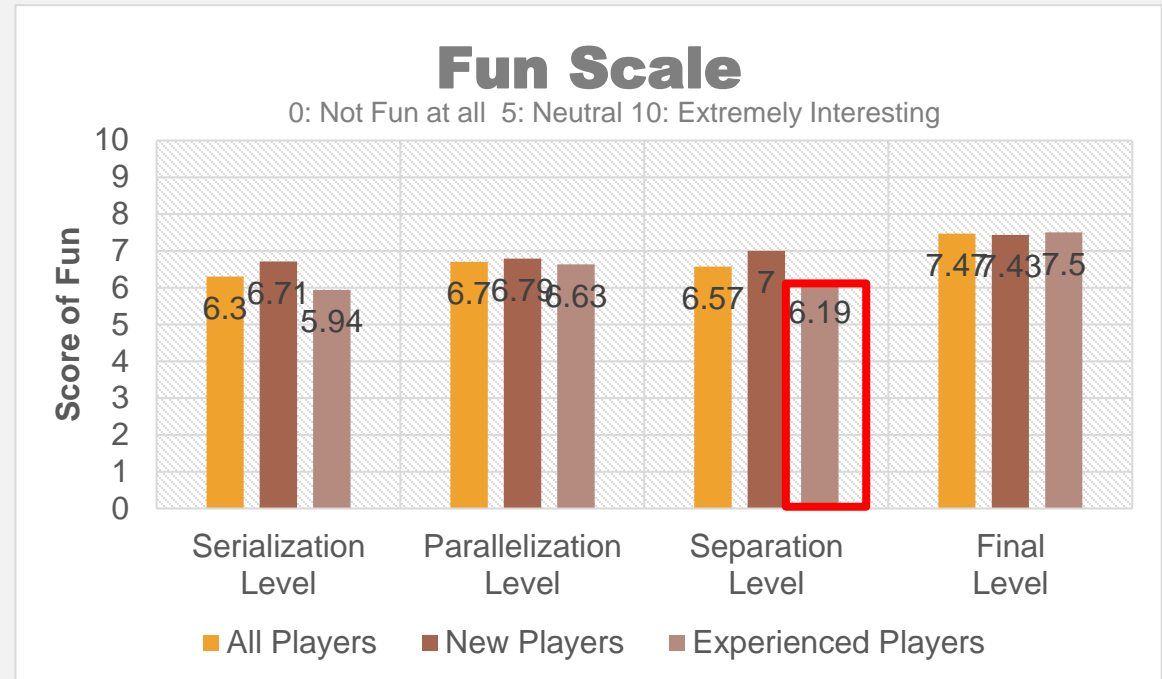
- Rather than designing logic puzzle sequences, challenges could fit the parallelization patten much more.

Separation – Information Sharing

- There should be of chances for the players to communicate and exchange information.

SURVEY

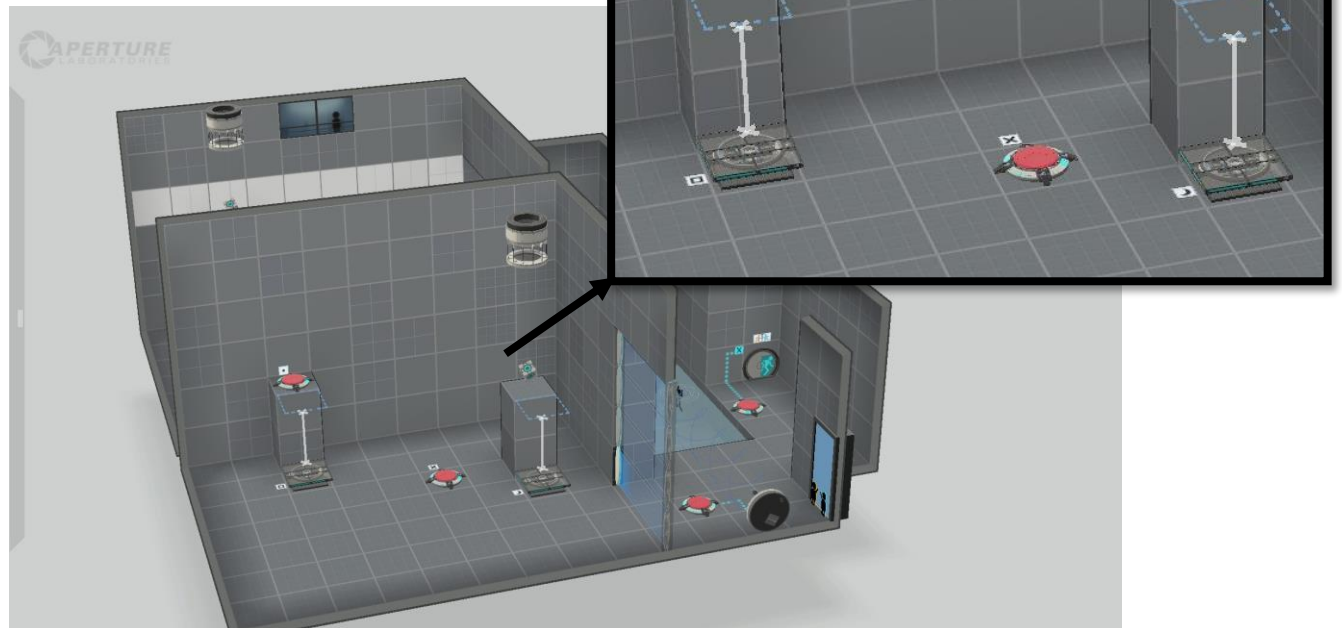
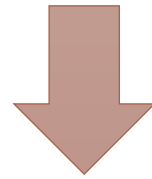
- ❖ Which of the following would you use to describe the difficulty on puzzle solutions?
- ❖ (Which of the following would you use to describe the difficulty on execution?)



IMPROVEMENT

Method 1:

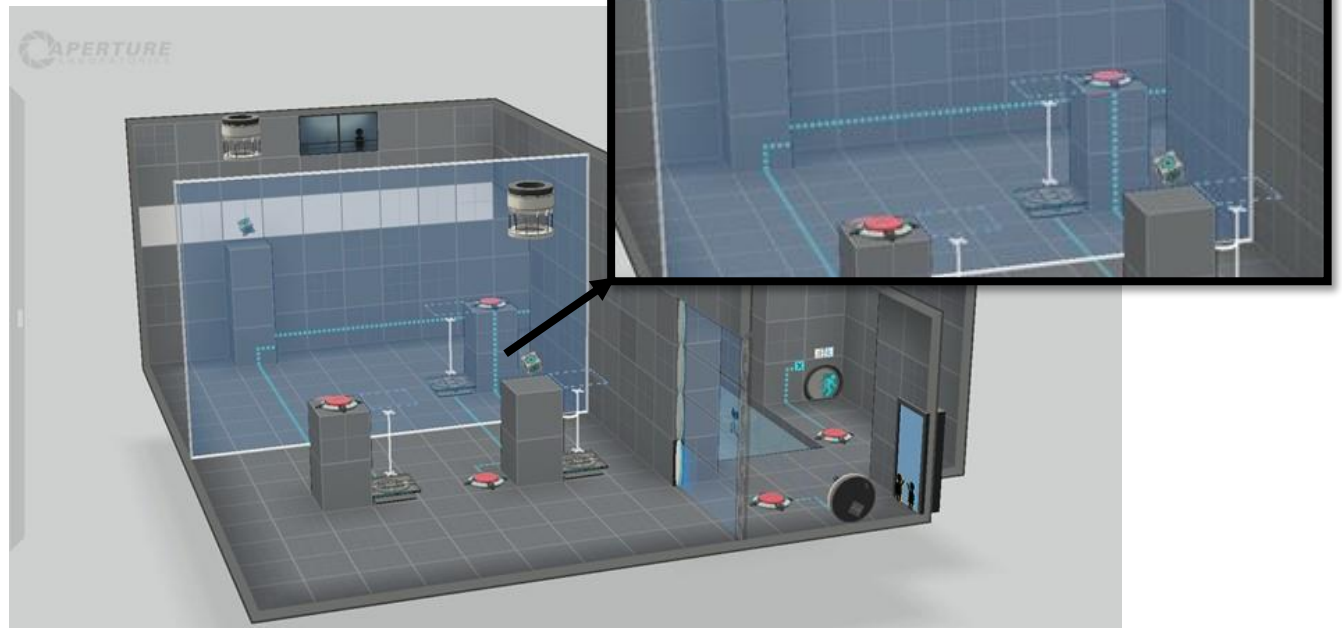
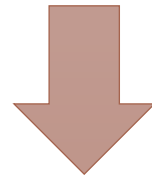
- Add unique symbols on the objects
- Provide a cheaper way to describe things



IMPROVEMENT

Method 2:

- Use windows instead of walls
- Share information to both players



AGENDA



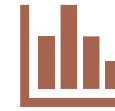
High Concept



Researches



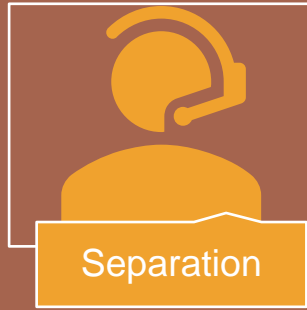
Plan of
Artifact



Playtest and
Data Analysis



Conclusion



3 Co-op Design Patterns



4 Stage Co-op Puzzle Design

BEST PRACTICE RECAP

- Having fun is more important than puzzle itself.
- Multiple design patterns provide gameplay in different ways.
- Communication (information sharing) is always important.
- Players don't like wait when their partner is operating with objects.

- Serialization design pattern and separation design pattern have advantages in increasing game difficulties.
- Parallelization design pattern have advantages in increasing fun.
- Setting clear goals when design serialization and separation puzzles is a key to success.
- Moderate hardness to parallelization challenges is another key to success.



CONCLUSION

THANK YOU !!

Q&A?

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SCREENSHOTS

[1] Screenshots from game *Snapper Clips*

[2] Screenshots from game *Biped*

[3] Screenshots from game *Portal 2*

[4] Screenshots from game *Brothers: A Tale of Two Sons*

[5] Screenshots from game *A Way Out*

[6] Screenshots from game *Unravel 2*

[7] Screenshots from game *Tick Tock: A Tale for Two*

[8] Screenshots from game *Overcooked 2*

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