IGR205 - Virtual-reality monitoring : How to distinguish between real vs VR memories

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Outline

01 Introduction

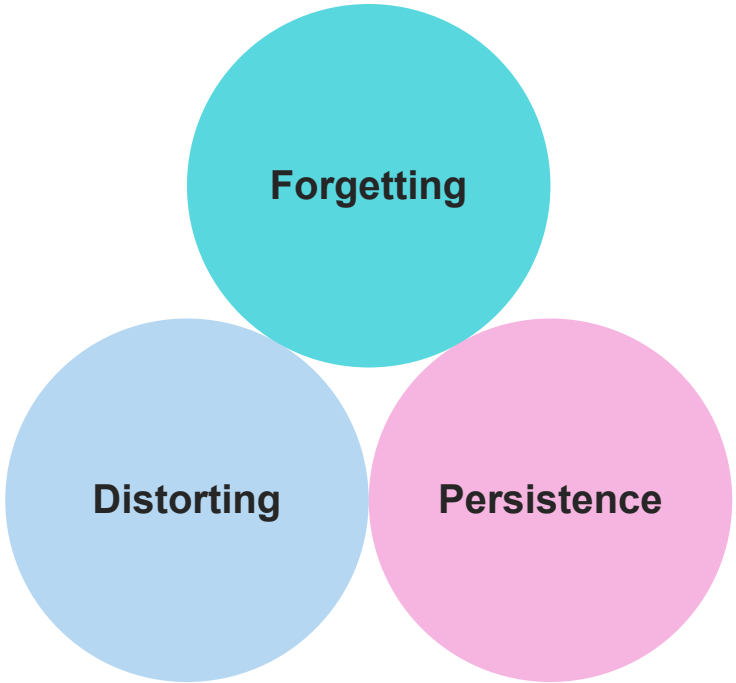
02 Protection mechanisms against source confusion

03 Experiment

04 Results & Conclusion

Introduction

Memory flaws



Persistence

Distorting

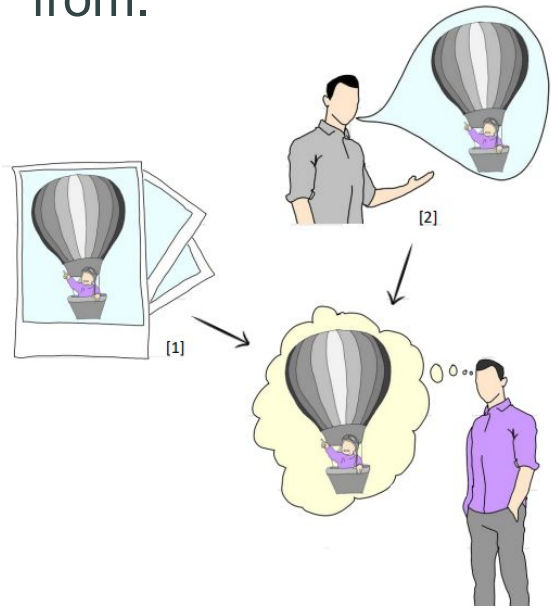
Suggestibility, source confusion, biais

Forgetting

Transience, absent mindedness, blocking

Source confusion

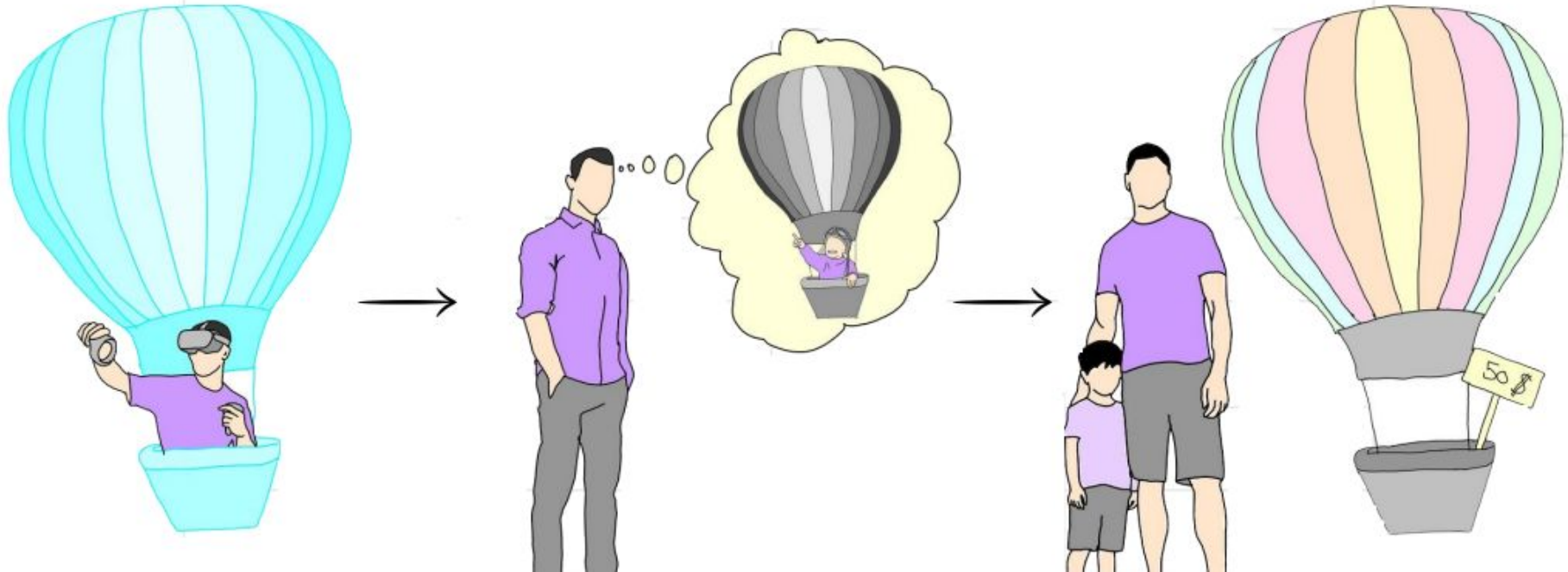
Occurs when someone does not remember where certain memories come from.



Example: US President Ronald Reagan and the movie “Wing and a Prayer”.

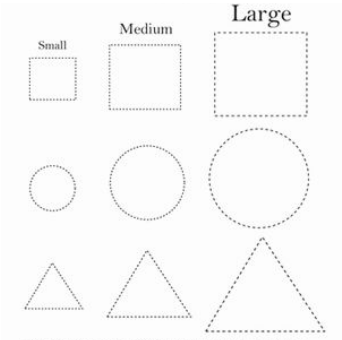
Impact of memories

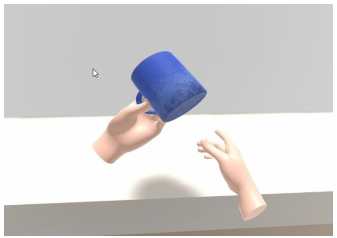
Memories could have a direct impact on the behavior of the person.



Hypothesis

1. Does adding an intrusive element to the VR context attract or disperse the brain's attention? How does it affect the formation of the memory process?
2. How do shape, size and number of details make a difference
3. Does time affect the final result?
4. Does object manipulation help identify the context?





Protection mechanisms against source memory confusion

Vision

Adding visual messages (This is a VR experiment).

Adding a floating character (pokémon characters) in front of the user.
Adding a bouncing ball.

Reshape the controller's hand.

Some loading visual effects.

Hearing

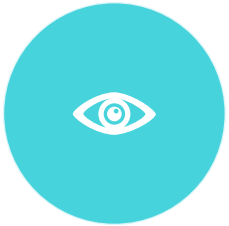
Adding a voice warning message.

Filtering the sounds

Touch

Make controllers vibrate if the user touches a static object.

Manipulate the object



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Reshape the controller's hand.

Some loading visual effects.

Hearing

~~Adding a voice warning message.~~

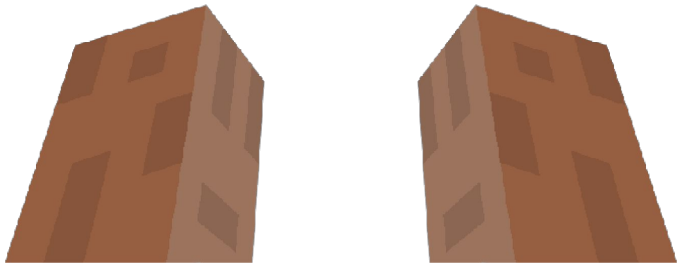
~~Filtering the sounds~~

Touch

~~Make controllers vibrate if the user touches a static object.~~

Manipulate the objects

Solution : Reshaping the controllers



Minecraft Steve hands

Motivation :

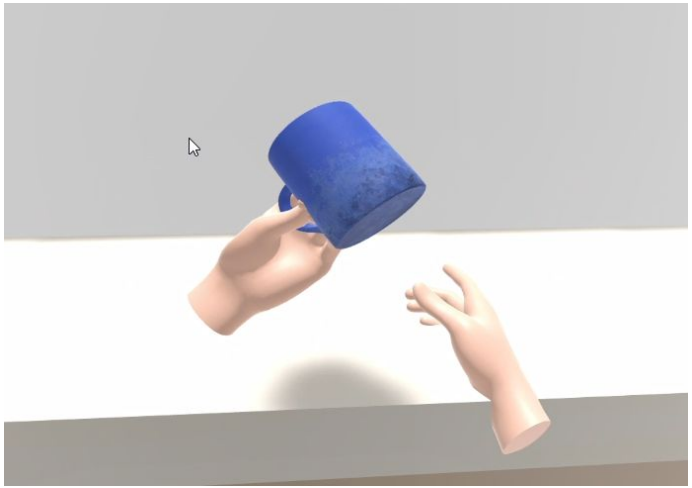
- Hands are present in front of the user all the time
- Not a familiar shape of the hands

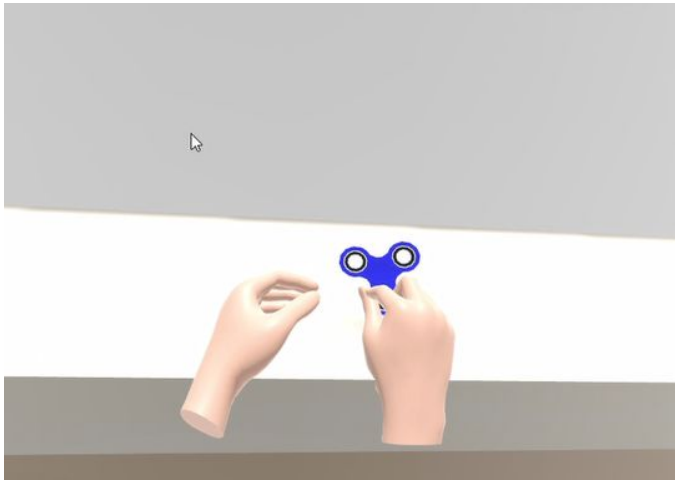
Solution : Adding a visual message

Motivation :

Adding a constant reminder for the user that this is a VR experience would of course help decrease source confusion

Solution : Object manipulation

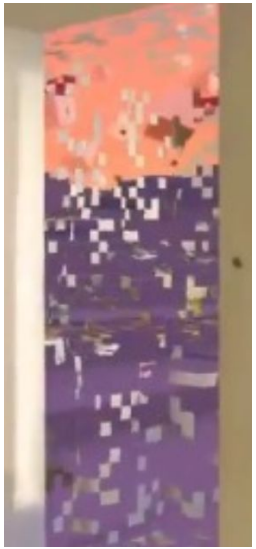


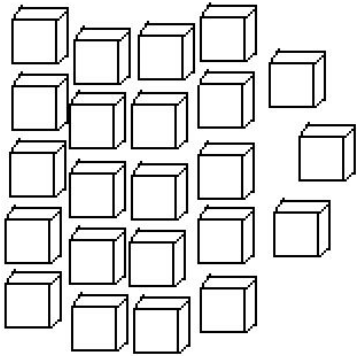


Motivation :

Adds details to the interaction making it easier to remember the source of the memory.

Solution : Loading visual effect

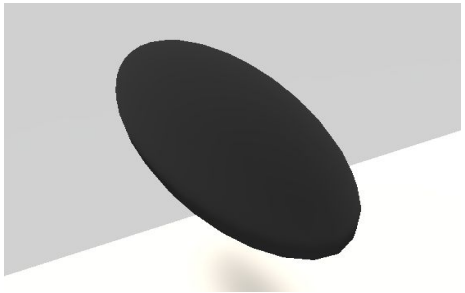
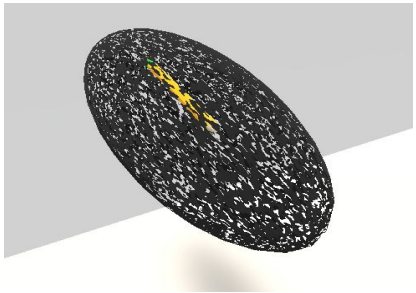
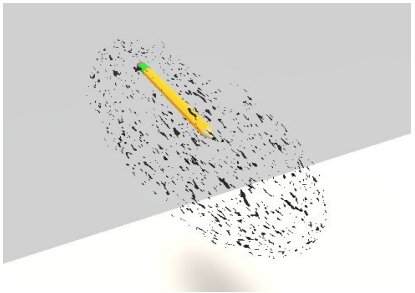
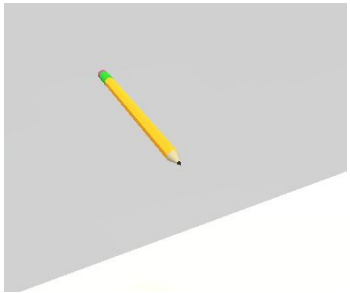




Motivation :

Using visual transformation as a cue to distinguish the real and virtual objects and reduce the source memory confusion.

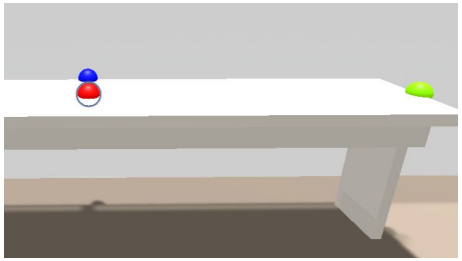
Solution : Loading visual effect

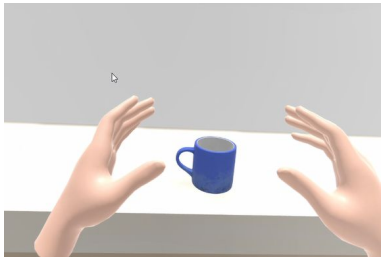
Motivation :

Using visual transformation as a cue to distinguish the real and virtual objects and reduce the source memory confusion.

Experiment



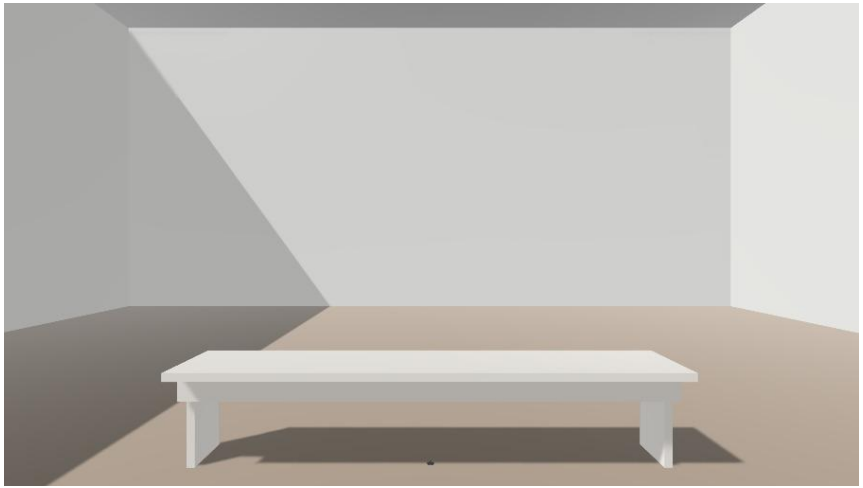
Steps



Experiment steps :

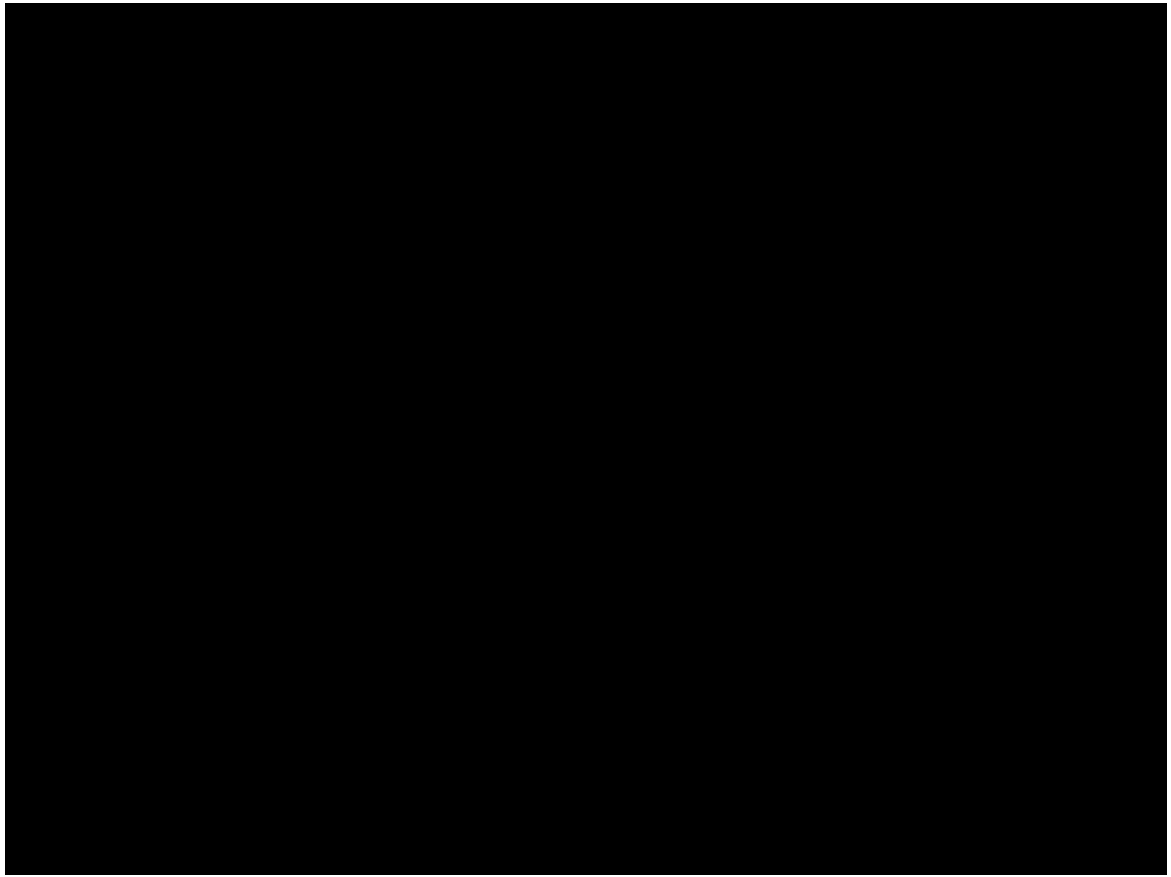
- Set up experiment environment (configure guardian in VR device, virtual table alignment and etc)
- Debrief the participant about the experiment, explain everything to them
- The participant sits down on a chair in front of a table
- We start off with a virtual object that will be shown for 10 seconds
- Place real object in front of them at the same time
- Removes headset when they hear the alarm after 10 seconds
- Check real object
- Put headset back on after they hear the alarm after 10 seconds
- After they finish with all the items the participant was asked to fill in a spreadsheet with all the objects names in it and say whether they’re real, virtual, how confident they are with the answer

Environment



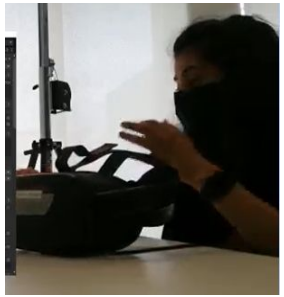
Samples of the objects

Experiment with one of the participants



Results & Conclusion

Participants



Angela
Manipulation = allowed
Result = right after each part of the experiment
Type of spreadsheet = separate spreadsheet

Sara
Manipulation = allowed
Result = 18 hours after the experiment
Type of spreadsheet = Merged spreadsheet

Rami
Manipulation = not allowed
Result = right after each part of the experiment
Type of spreadsheet = separate spreadsheet

Karen
Manipulation = not allowed
Result = 18 hours after the experiment
Type of spreadsheet = Merged spreadsheet

Spreadsheet

Object	VR	Real	Level of confidence (1-5)	I don't know
USB flash drive				
Headset				
ruler				
Glasses				
Keyboard				
Key				
Clock				
mouse				
Remote control				
pencil				
fidget spinner				
Pencil case				
Highlighter				
Mug				

Object	VR	Real	Level of confidence (1-5)	I don't know
Scissors				
Wallet				
Tape (Scotch)				
Fixed Phone				
Tablet				
Bottle				
Lamp				
Camera				
Stapler				
Ipod				
Eraser				
Speaker				

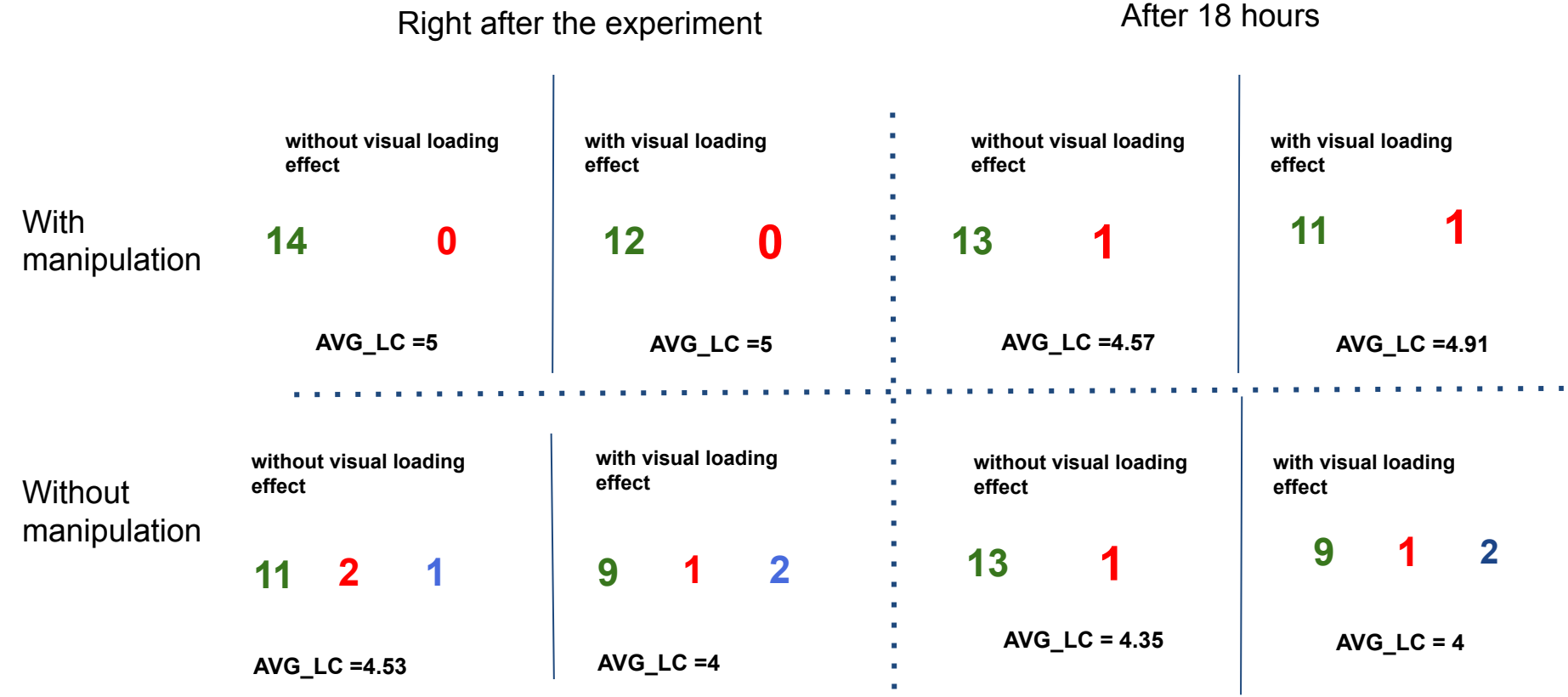
Object	VR	Real	Level of confidence (1-5)	I don't know
USB flash drive				
Headset				
Ipod				
Stapler				
ruler				
Bottle				
Wallet				
Glasses				
Keyboard				
Key				
Scissors				
Tape (Scotch)				
Clock				
Tablet				
mouse				
Remote control				
pencil				
Fixed Phone				
fidget spinner				
Lamp				
Pencil case				
Camera				
Highlighter				
Eraser				
Mug				
Speaker				

Results

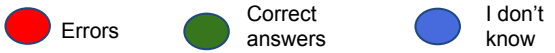
Errors

Correct answers

I don't know



Does object manipulation help distinguish real from VR?



As we see, the level of confidence increase with manipulation.

With manipulation

without visual loading effect

13 **1**

AVG_LC =4.57

Without manipulation

without visual loading effect

13 **1**

AVG_LC = 4.35

After 18 hours

Does adding an intrusive element to the VR context attract or disperse the brain's attention ?

Errors

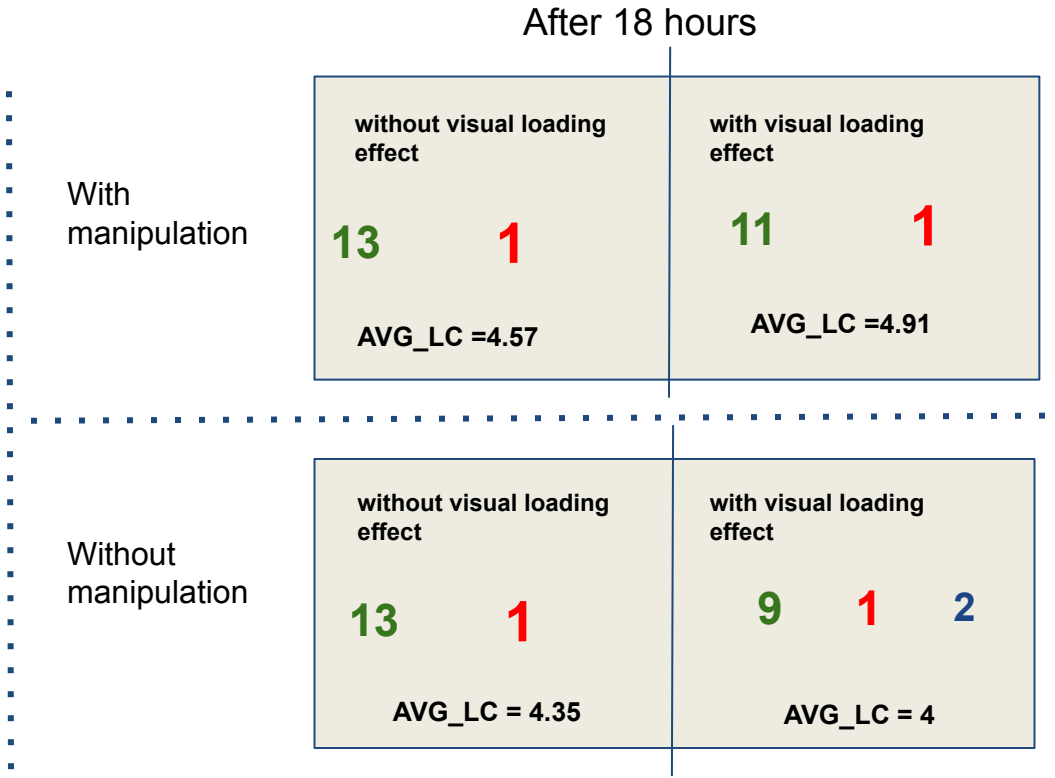
Correct answers

I don't know

Adding the visual loading effect doesn't affect the number of errors.

Based on the participant statement, they were confused because of our solution since they focus more on the loading effect itself and forget the object.

Our solution works better with manipulation mechanism.

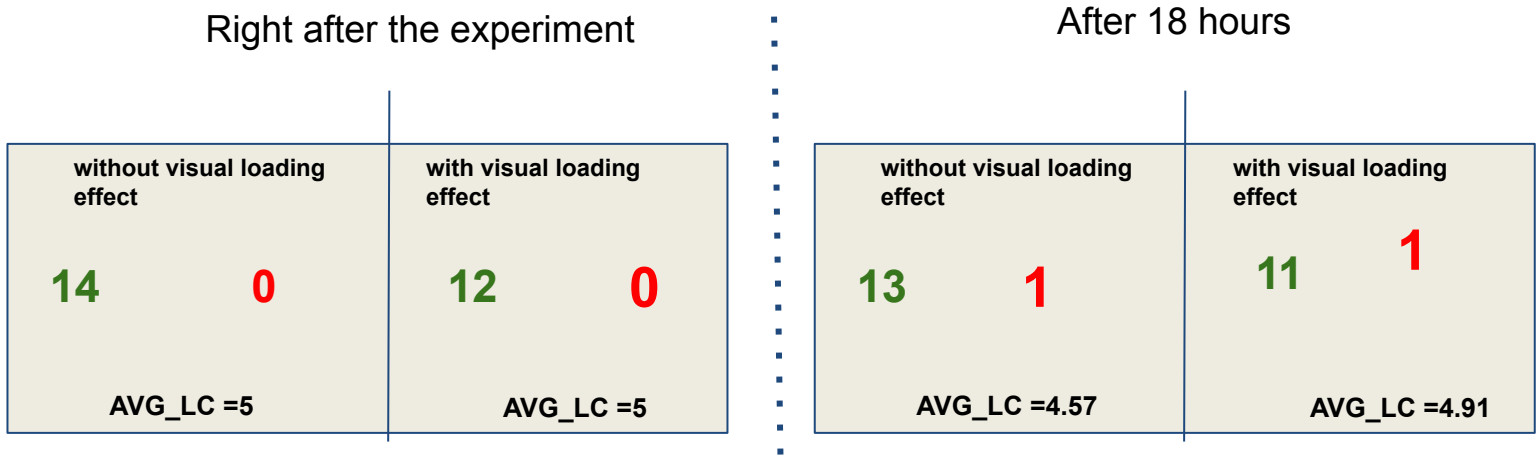


Does time affects the final result ?

Errors

Correct answers

I don't know



As expected, participant who fill the spreadsheet right after the experiment manage to get perfect score with high level of confidence.

How do shape, size and number of details make a difference when remembering an object?

The common errors were :

- Key.
- Remote control.
- Speaker.

All these objects were small or not very detailed.

When we have asked the participant about which objects they remember the most they answered with ‘Lamp’ and ‘Keyboard’ which are large.

Conclusion

The experiment didn’t work as we expected, we weren’t able to prove the efficiency of our solution “visual loading effect”.
Participants didn’t get confused with the VR and reality in the first place.

Possible reasons:

- Not enough participants
- Not enough objects
- Virtual objects and environment are not realistic enough.
- The experiment was tiring for the participants.