Presence in Visual Mental Imagery

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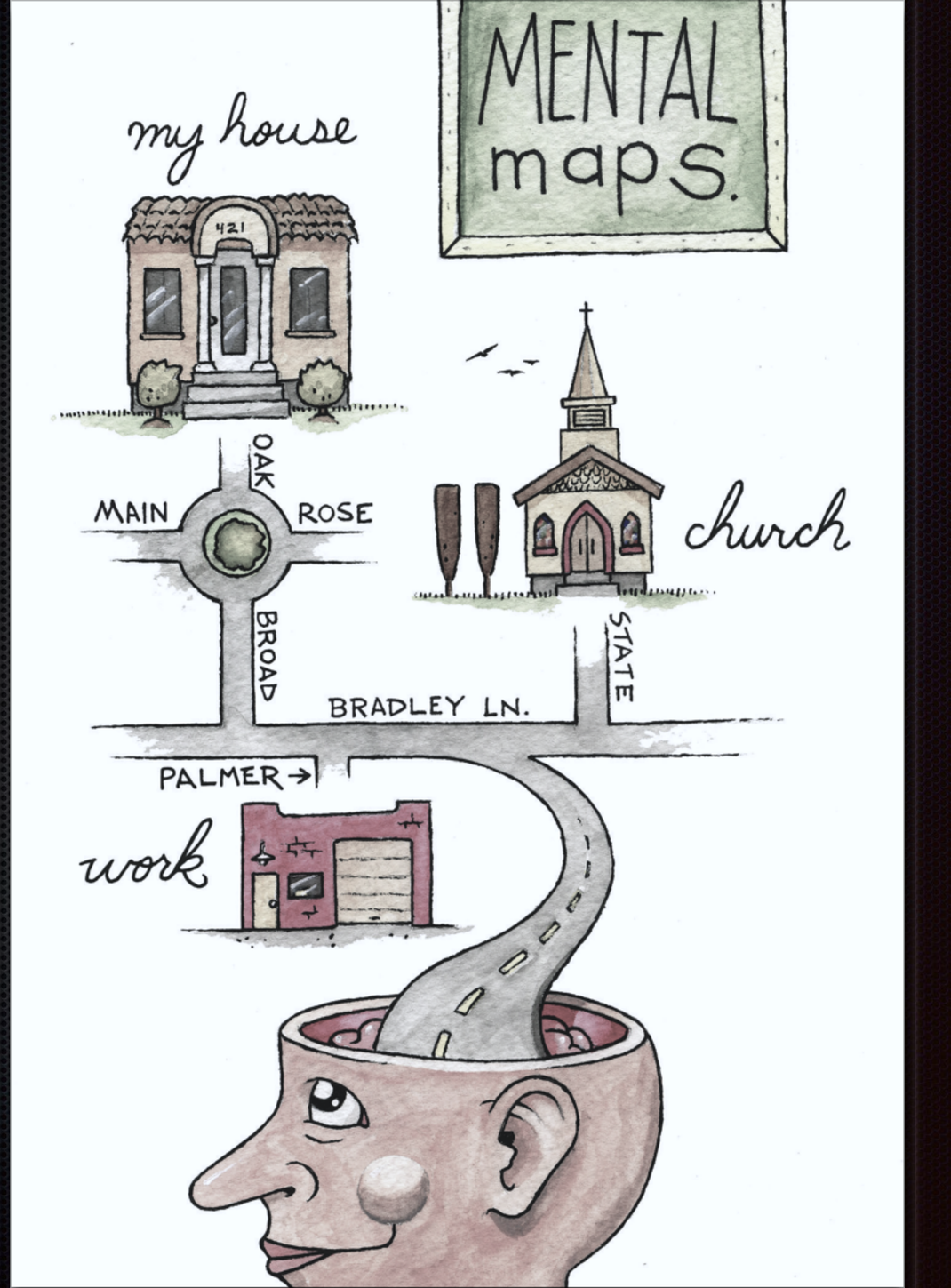
‘Presence’, the sense of being inside a virtual environment evoked with the help of computer mediation, is a subject well explored in the field of virtual reality. Studies on mental imagery confirm that we can intuitively evoke objects and spaces in our minds and interact with them temporally. **A sense of presence could be experienced in such self-evoked reality as well.**

The two main questions that they try to address in this paper are:

1. Does one experience a ‘sense of presence’ in mental imagery?

2. Can this sense of presence be objectively identified by analysing verbal expressions, gestures and movements?

They studied verbal expressions, physical movements and gestures, exhibited during mental imagery experiences in two scenarios - a guiding task and a mental walk exercise.



“Presence research should be opened up, beyond the domain of computer science and other technologically oriented disciplines, as the concept of presence is sufficiently similar to consciousness and it may help to transform research within domains outside virtual reality.

–Sanchez-Vives

Telepresence

How it started

Areas where it is used

Evaluation Method

Protocol analysis with the help of thinking aloud process where the externalization is through real time verbal expressions and associated physical gestures and movements.

It was followed by analysis of time taken and mapping of physical movements.

Scenario-1

Scenario-2

In both cases, the subjects were blindfolded and were in a sound proof experiment hall in order to completely depend on their mental imagery and have minimum interference from external perception during the mental tasks. They had enough space to physically move around. In addition, the order of the tasks was alternatively changed with each subsequent participant.

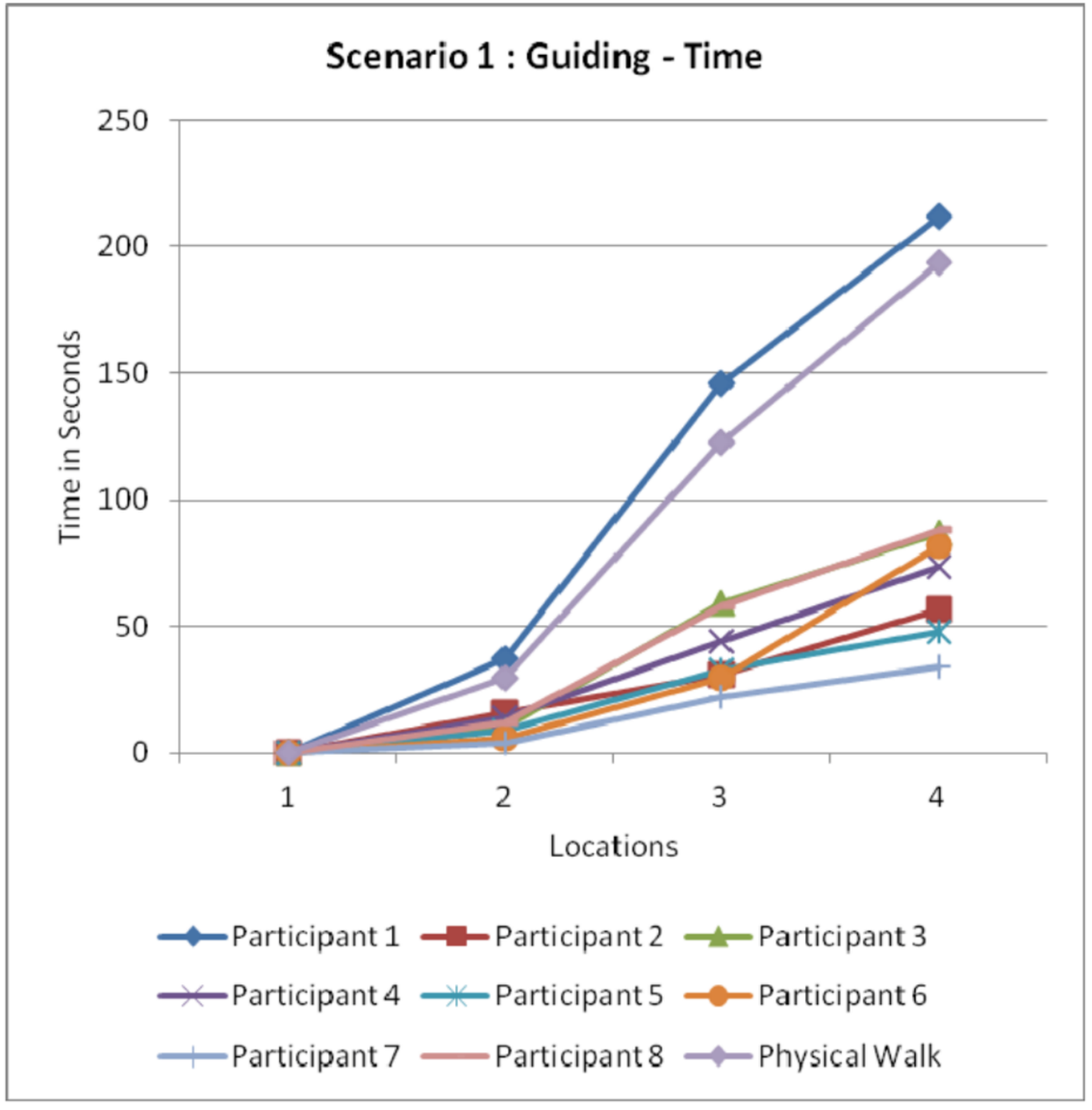
Experimental Setup

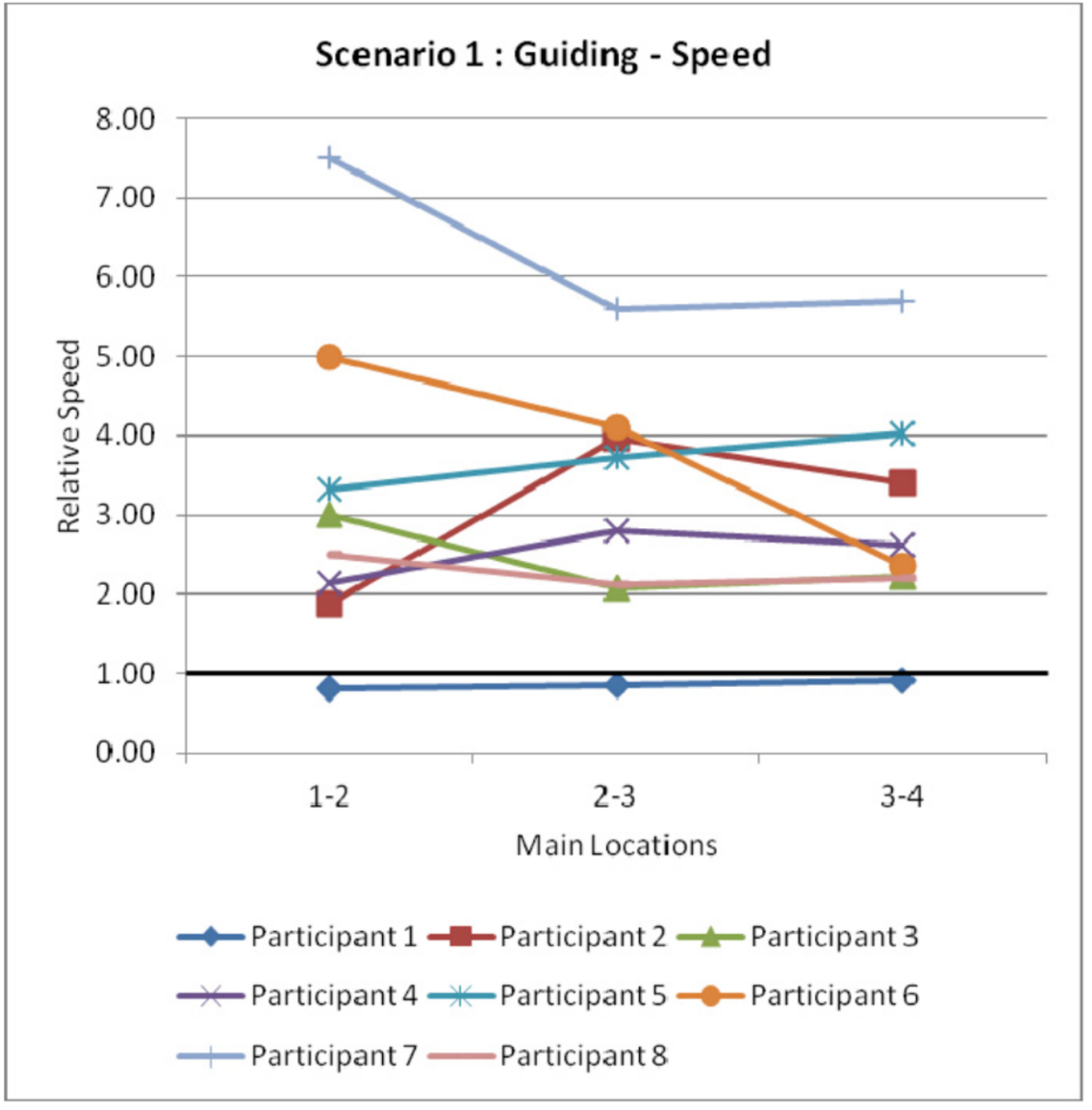
Stage 1: The task was given to the participant in writing. They were asked to recall the task once, just before the experiment started

Stage 2: In the hall, they were given the freedom to choose where to stand and to orient themselves however they preferred to, before starting the experiment. As soon as they did so, they were blindfolded.

Stage 3: They were cued to begin the task. From beginning to the end of the task, Stage 3 session was recorded on video for transcription of verbal expressions and study of gestures and movements.

Information Categories (Scenario-1)		
Analysis Method	**Sub Category**	**Codes (Elements of Sense of Presence in Mental Imagery, based on the protocols)**
Verbal Expressions	Body	Position
		Action
		Direction
		Orientation
	External Space	Distance
		Specific Location / Space / Building
		Elements / Things
		Relative position of elements with respect to other elements
		Properties
		Visual Sense
Physical Expressions	Orientation	Rotation / Orientation with respect to cognitive map
	Gestures	Self Position
		Relative position of elements with respect to self position
		Shapes and forms of elements
		Direction


Scenario 1 : Guiding - Time
250
200
150
100
50
0
Time in Seconds
1
2
3
4
Locations
Participant 1
Participant 2
Participant 3
Participant 4
Participant 5
Participant 6
Participant 7
Participant 8
Physical Walk


Scenario 1 : Guiding - Speed
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Relative Speed
1-2
2-3
3-4
Main Locations
Participant 1
Participant 2
Participant 3
Participant 4
Participant 5
Participant 6
Participant 7
Participant 8

Scenario 2: Participant 7

Starting Point (IDC)

00:00:00	I'm at IDC entrance.
00:00:01	
00:00:02	
00:00:03	Then I take a path towards...
00:00:04	
00:00:05	

Intermediate point 1 (Echo Point)

00:00:08	and this is the... arch... in the corridor.
00:00:09	
00:00:10	
00:00:11	Then I...
00:00:12	
00:00:13	walk forward towards main building.
00:00:14	

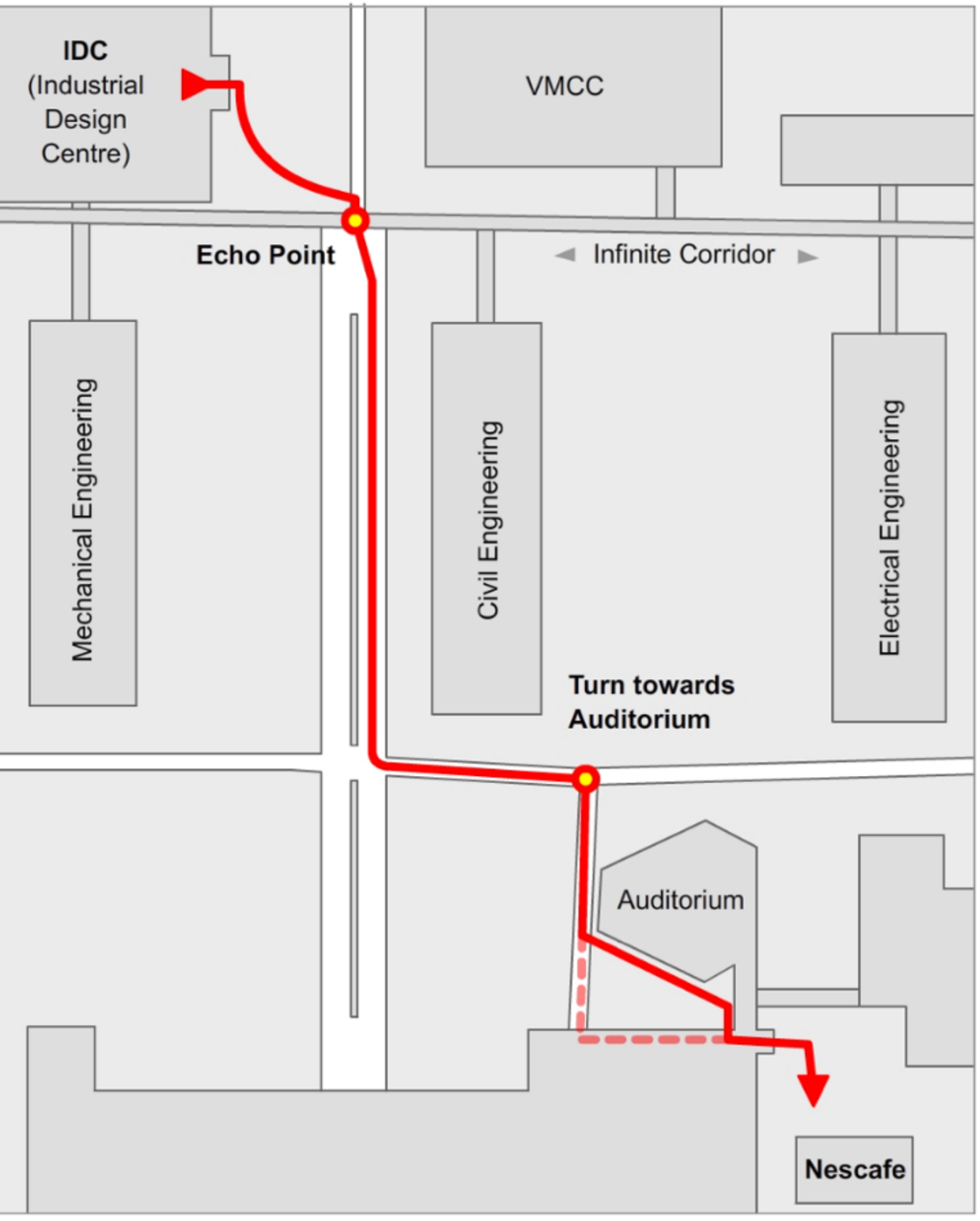
Intermediate point 2 (Turn towards Auditorium)

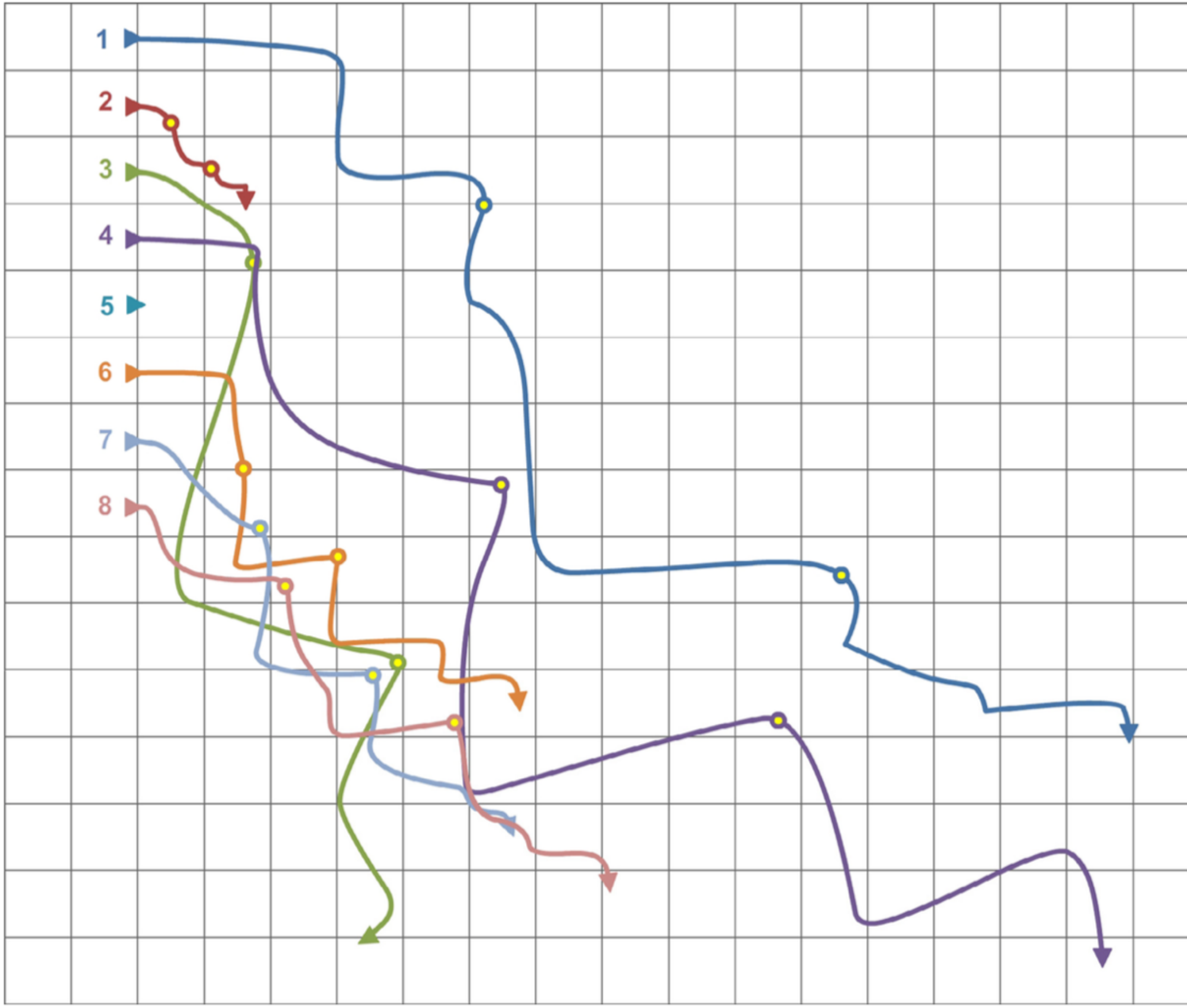
00:00:21	And then...
00:00:22	
00:00:23	I reach that sub... corridor sort of.
00:00:24	
00:00:25	
00:00:26	and then I walk...
00:00:27	

Ending Point (Nescafe Stall)

00:00:38	Just main building has...
00:00:39	
00:00:40	finished.
00:00:41	And I'm here...
00:00:42	
00:00:43	And Nescafe... on this side.
00:00:44	

Although the time taken was shorter, it shows considerable correlations (Pearson correlation coefficient between average time taken during Physical Walk (real-world scenario) and Mental Walk r = 0.997)


IDC
(Industrial
Design
Centre)
VMCC
Echo Point
Infinite Corridor
Mechanical Engineering
Civil Engineering
Electrical Engineering
Turn towards
Auditorium
Auditorium
Nescafe


1
2
3
4
5
6
7
8

It shows that the spatial imagery was constantly updating in order to give the illusion of movement. While they did not take steps to physically move, the imagery moved (towards them) and rotated accordingly (similar to a first-person video game view, or a virtual reality CAVE system with changing surroundings).

After the experiments it was intriguing to note that the participants referred to the mental imagery space as a place they just visited and the mental events as something that happened a few minutes before, which also strongly implied their experience of presence. It is similar to the case of post-virtual reality experience of the sense of ‘being there’

Conclusion

One surely experiences a sense of presence in mental imagery, similar to being in a virtual reality environment. In the case of virtual reality, presence is evoked since our external perception is mediated, leading to an illusion of reality similar to our physical world. In mental imagery the spaces are evoked endogenously by our mind without the help of any external perception, bringing about an experience of presence.