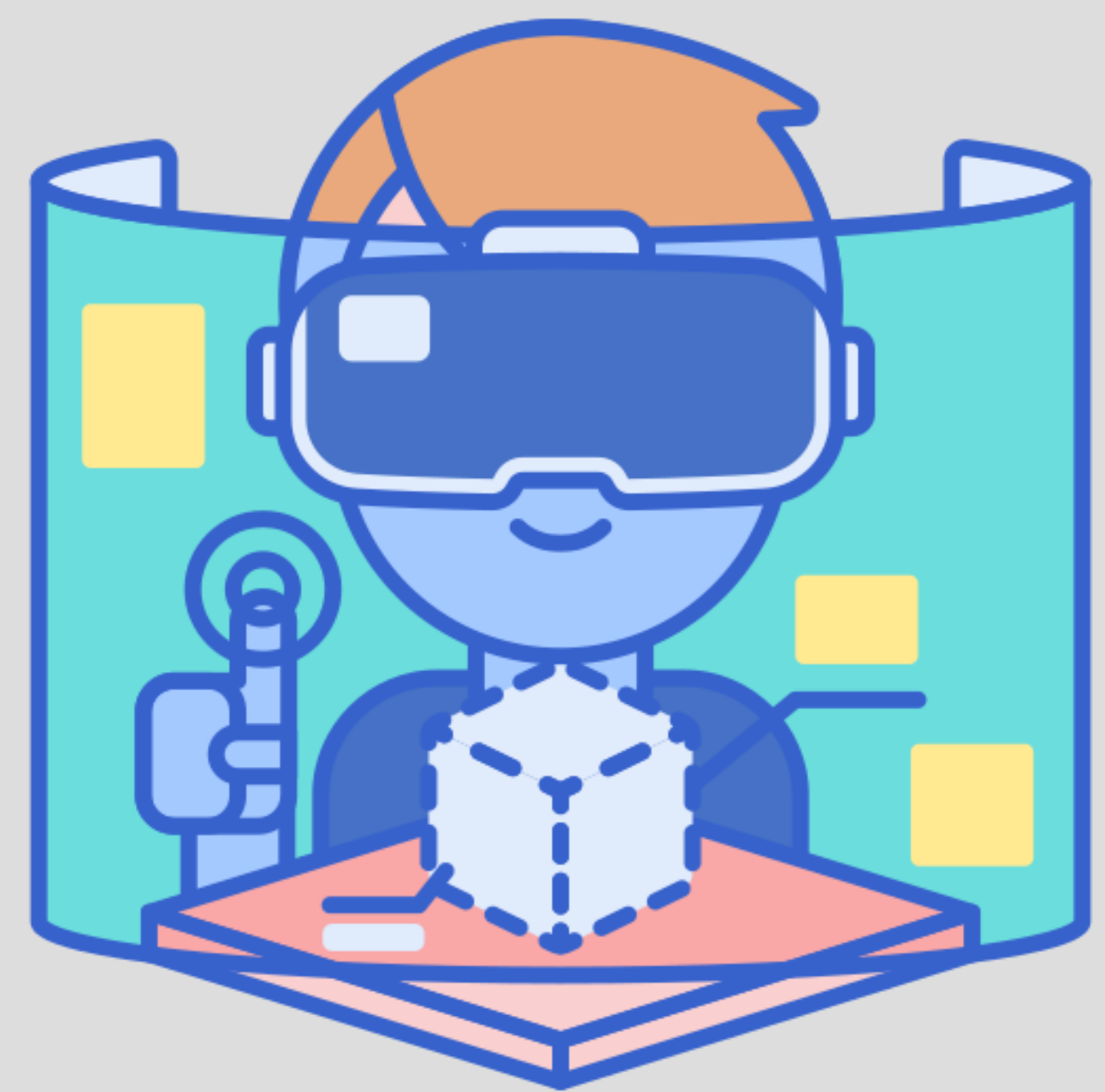


# EFFECTS OF VIRTUAL REALITY CHARACTERISTICS ON COLLABORATION BETWEEN LEARNERS

Authors  
 Name: Ahmet Hakan Dönmez  
 Email: a.h.donmez@student.tudelft.nl



## 01 RESEARCH QUESTION



Do visualizations of activities have an effect on an individual's situational awareness when collaborating with others inside Virtual Reality?

## 02 BACKGROUND



**Visualization of activities:** Making actions and activities of users visible to each other in the virtual that would not be visible in the real.

**Situational Awareness:** A persons perception of the elements of the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future" (Endsley, 1988)

## 03 METHODOLOGY

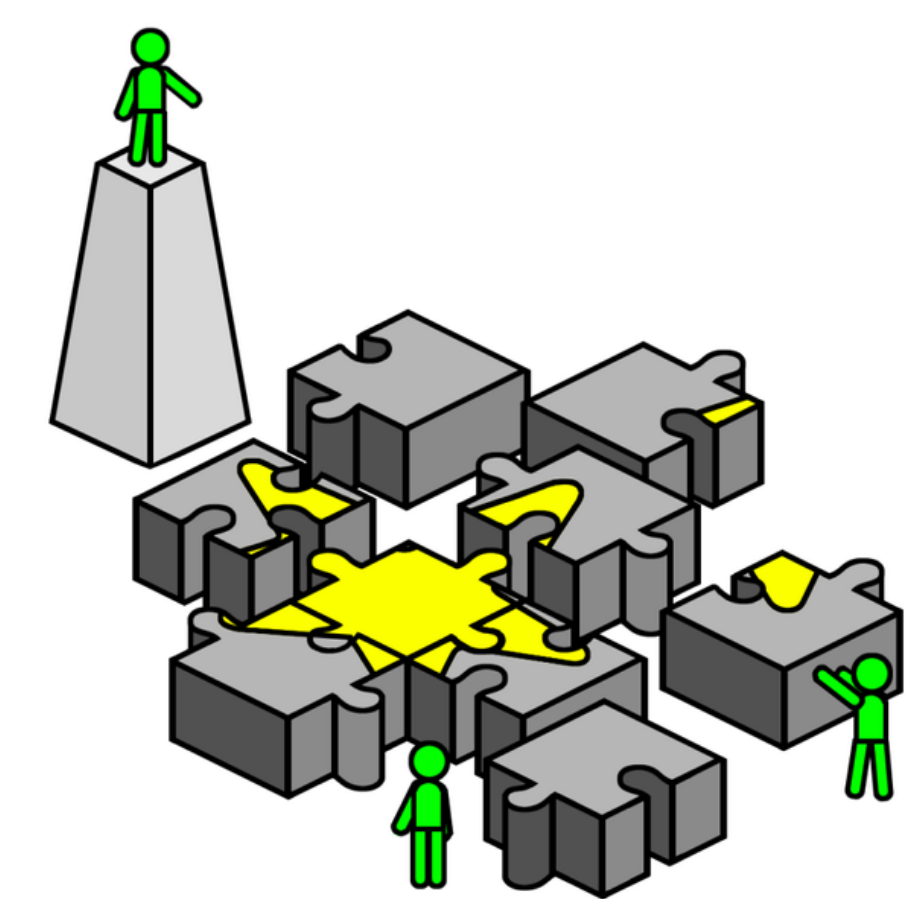


Figure 1: Control Group

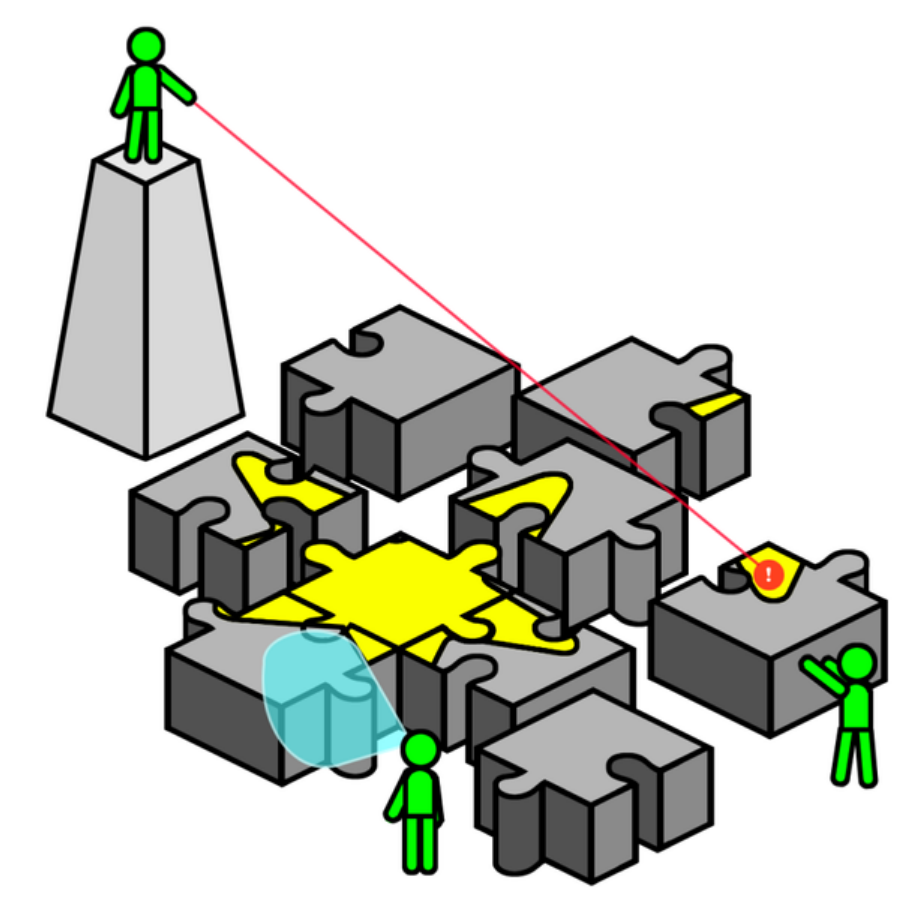
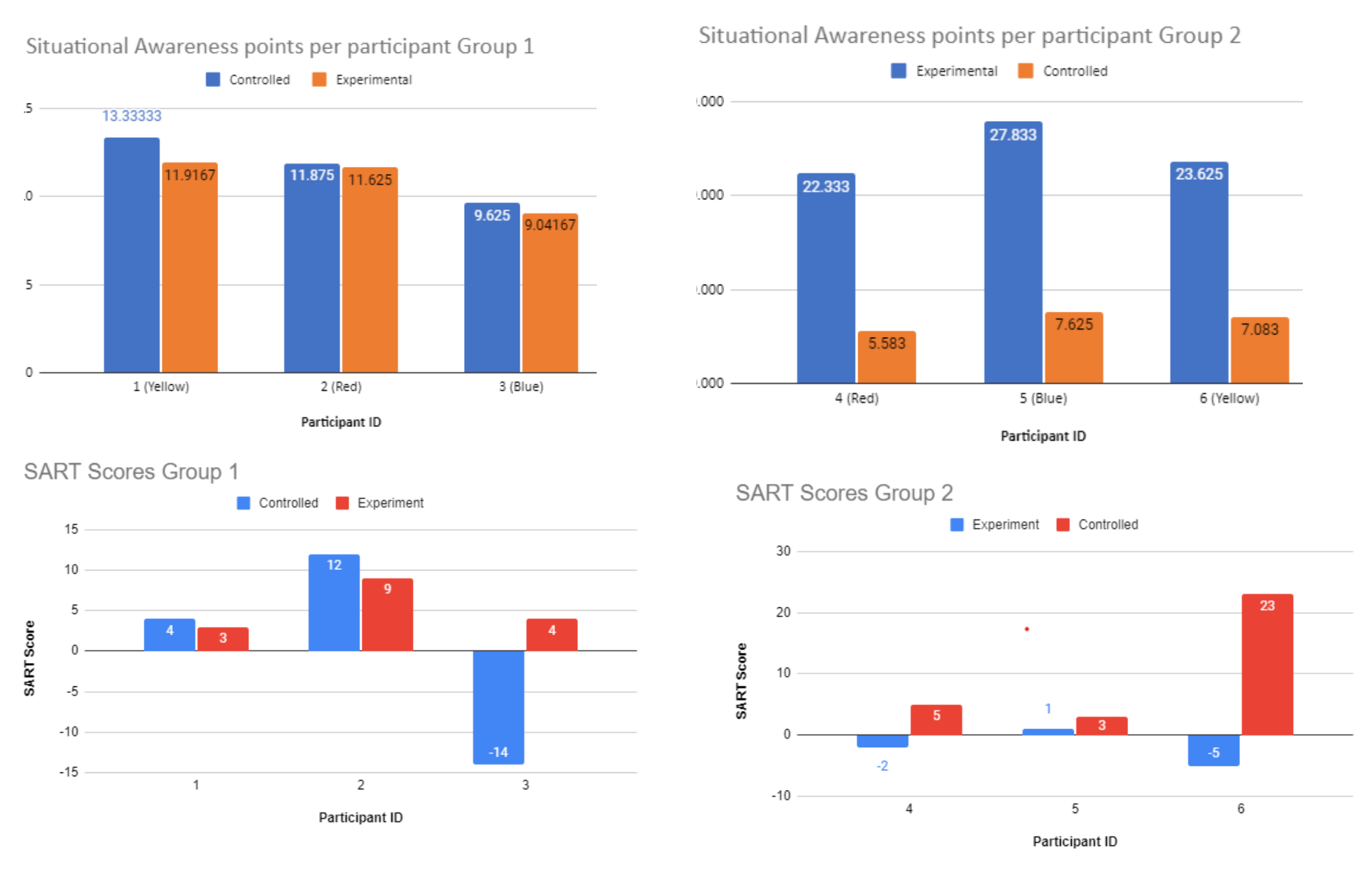


Figure 2: Experiment Group

- 2 groups of 3 participants have attempted to solve a collaborative maze in Virtual Reality (VR).
- Each group experienced two conditions: a **controlled condition without visualization tools**, and an **experimental condition with visualization tools and highlighting**.
- The participants' conversations have been transcribed using **AI tools**, and a questionnaire called the **Situation Awareness Rating Technique (SART)**, combined with the **Situational Awareness Linked Indicators Adapted to Novel Tasks (SALIENT)** framework have been administered to measure their situational awareness.
- After **1 week**, the **control group** have used the **visualization tools**, and vice versa, to compare the effects.

**Independent Variable:** visualization of activities  
**Dependent Variable:** individuals' situational awareness.  
**Materials:** VR headsets, controllers, positional trackers, and a maze game have been utilized for the experiment.

## 04 RESULTS



## 05 CONCLUSIONS



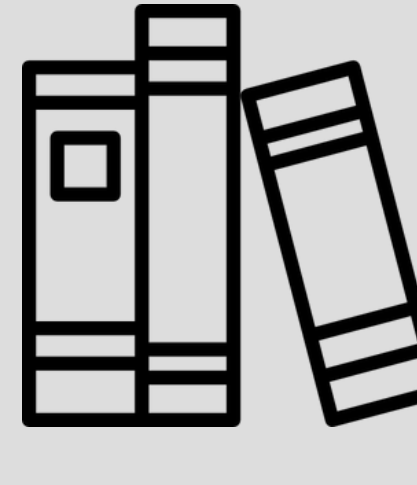
- **Visualization of activities** may not immediately enhance situational awareness as per **SART scores**.
- **SALIENT scores** suggest visualization tools **can improve situational awareness** by facilitating effective communication.
- **Discrepancy** between **SART** and **SALIENT** scores highlights the **complexity** of measuring **situational awareness**.
- **Individual differences** and **potential grading bias** may impact results.
- Findings underscore the complexity of **collaborative learning in VR** and the need for **further research**.

## 06 LIMITATIONS



- **Small sample size**, limiting **generalizability**.
- **Individual differences** may impact VR interactions and tool usage.
- **Discrepancy** between **SART** and **SALIENT** scores raises questions about situational awareness measurement.
- Future studies should explore **individual differences**, **alternative measures** of situational awareness, and **larger, diverse samples**.

## 07 REFERENCES



Selcon, S.J. & Taylor, R.M. (1989). Evaluation of the Situational Awareness Rating Technique (SART) as a tool for aircrew systems design. Proceedings of the AGARD AMP Symposium on Situational Awareness in Aerospace Operations, CP478. Seuilly-sur Seine, France: NATO AGARD.

Drey, T. et al. (2022) 'Towards Collaborative Learning in Virtual Reality: A Comparison of Co-Located Symmetric and Asymmetric Pair-Learning', Conference on Human Factors in Computing Systems - Proceedings. doi: 10.1145/3491102.3517641.