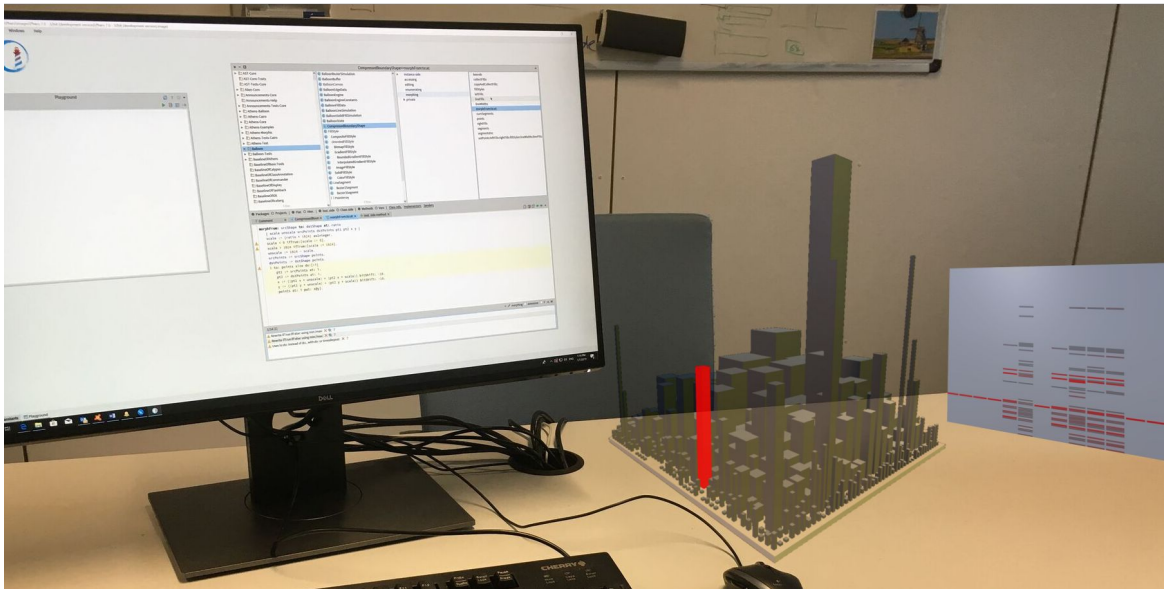
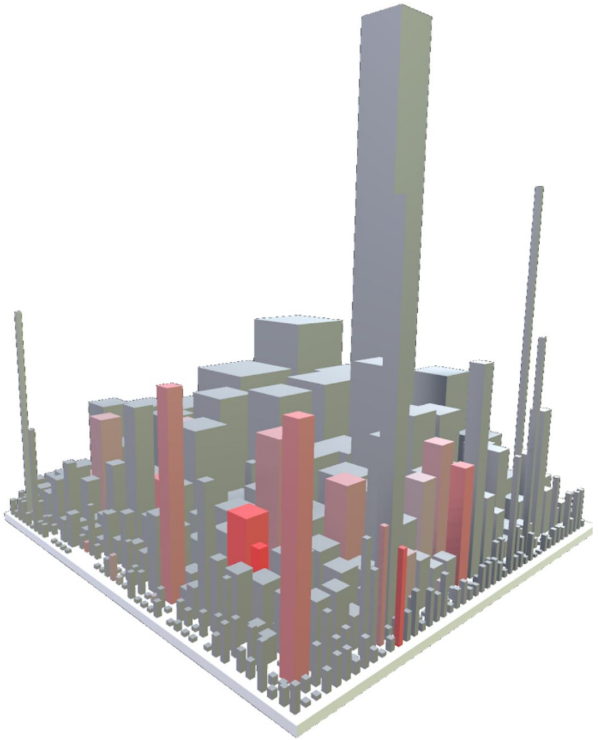
PerfVis: Visualization in Immersive Augmented Reality for Software Performance - A User Study



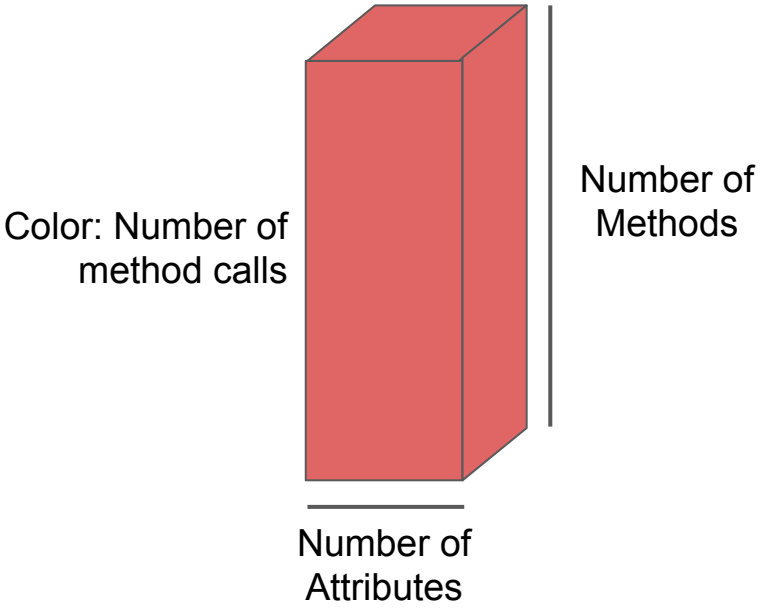
Bachelor thesis by Mario Hess,
supervised by Dr. Leonel Merino

mario.hess@students.unibe.ch leonelmerino@gmail.com http://scg.unibe.ch/research/perfvis

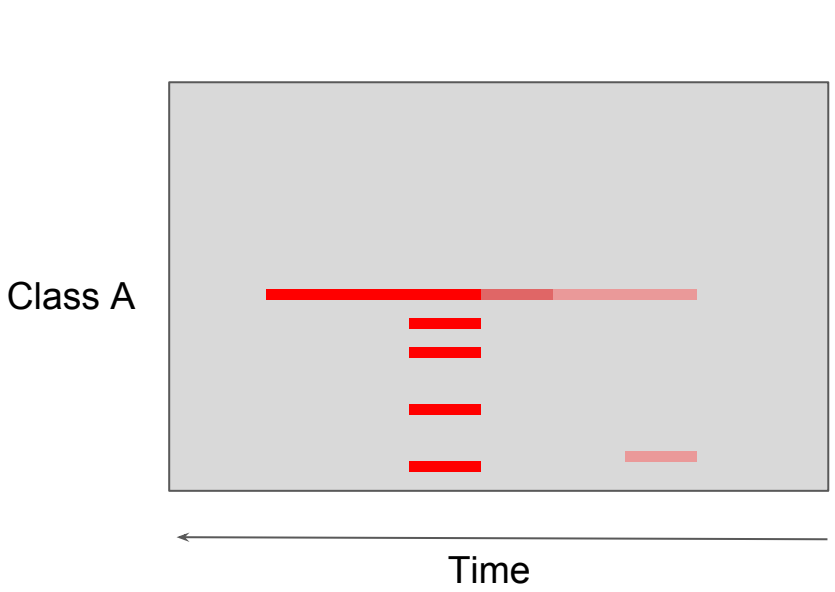
PerfVis

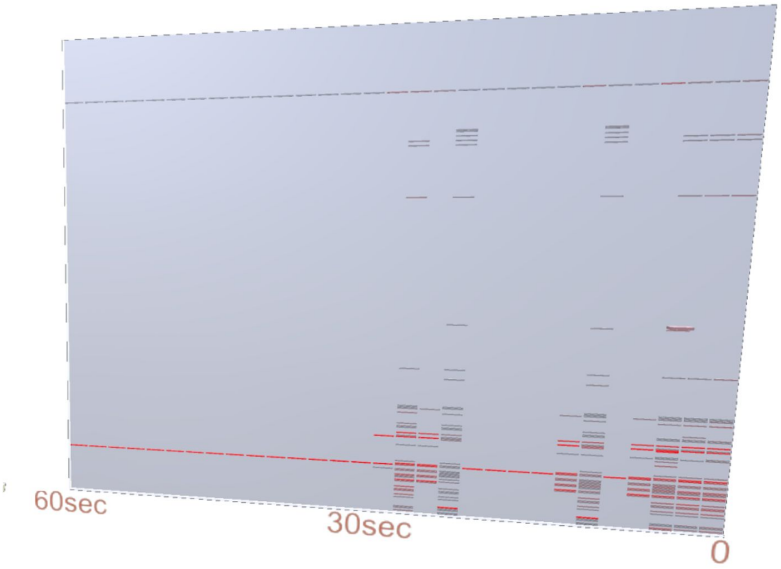


City Visualization



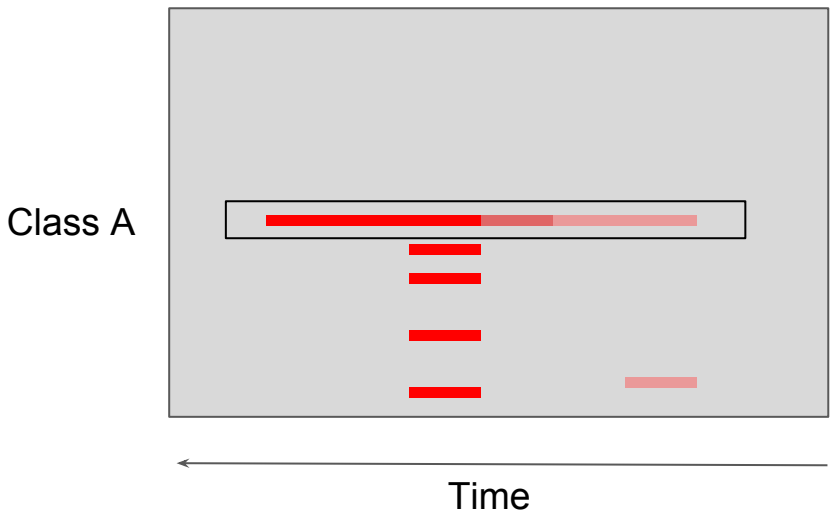
PerfVis

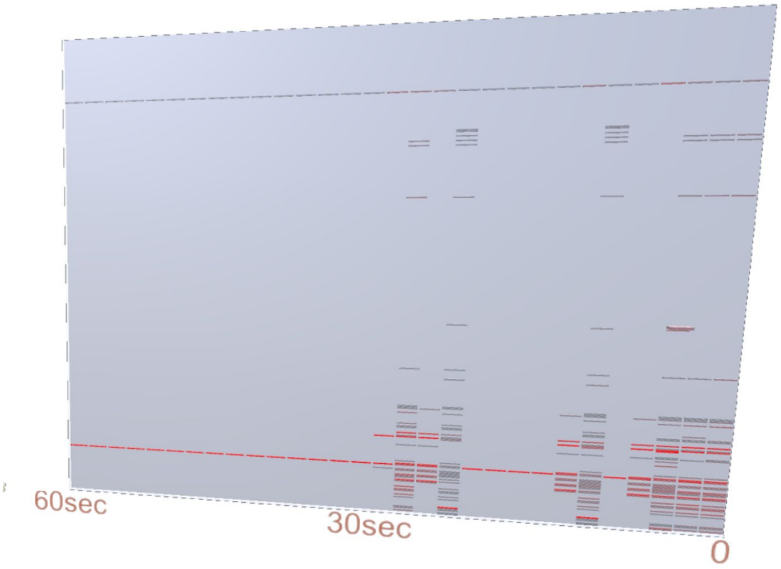




Scatter Plot

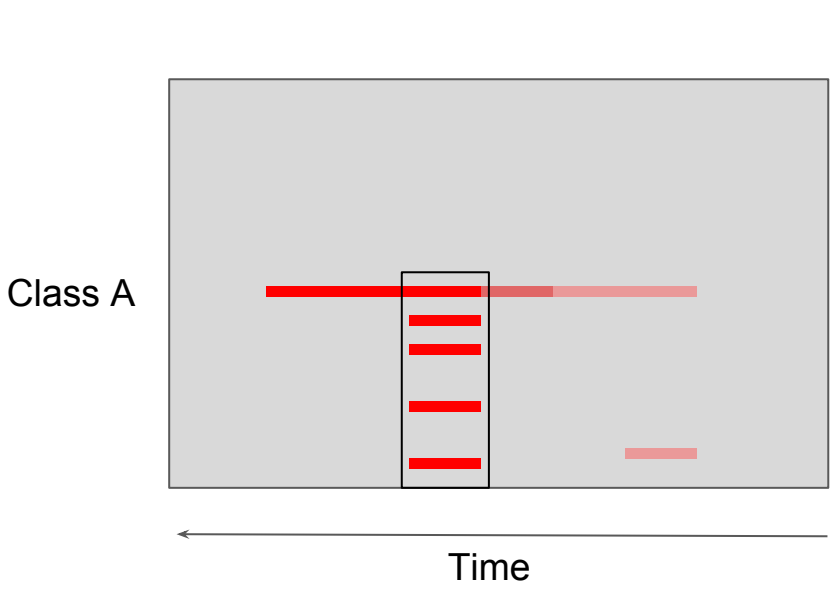
PerfVis

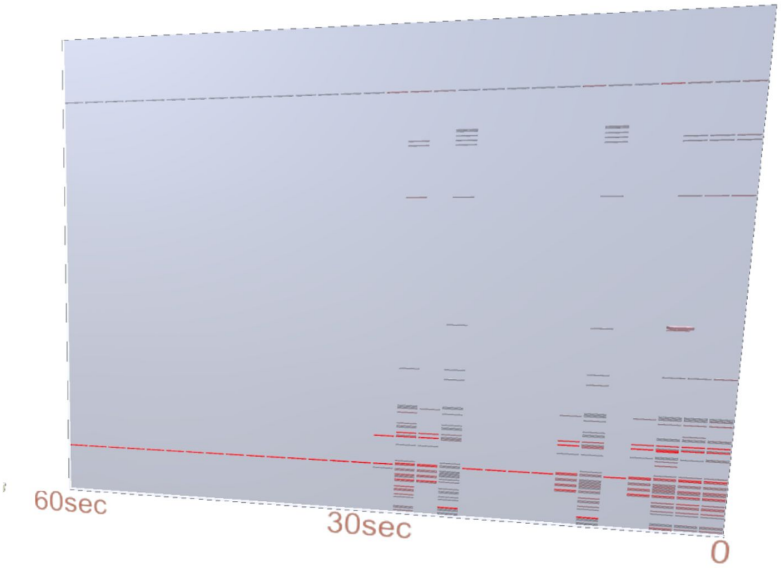




Scatter Plot

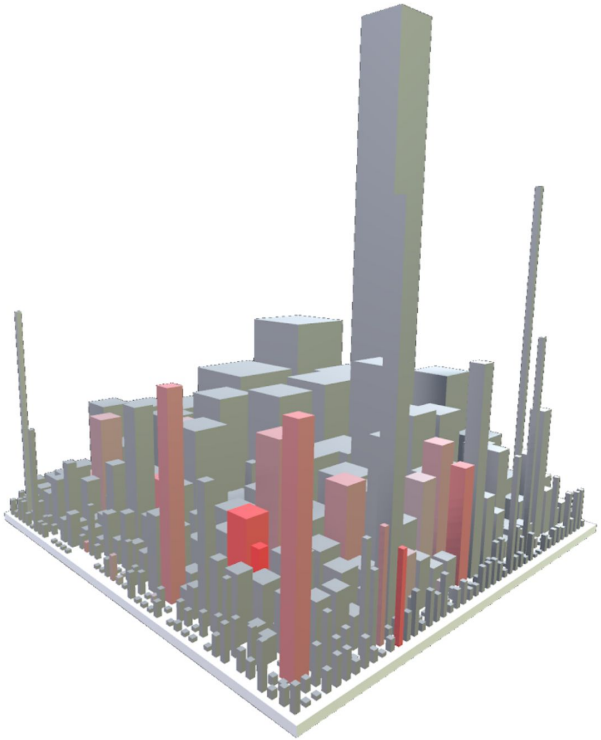
PerfVis



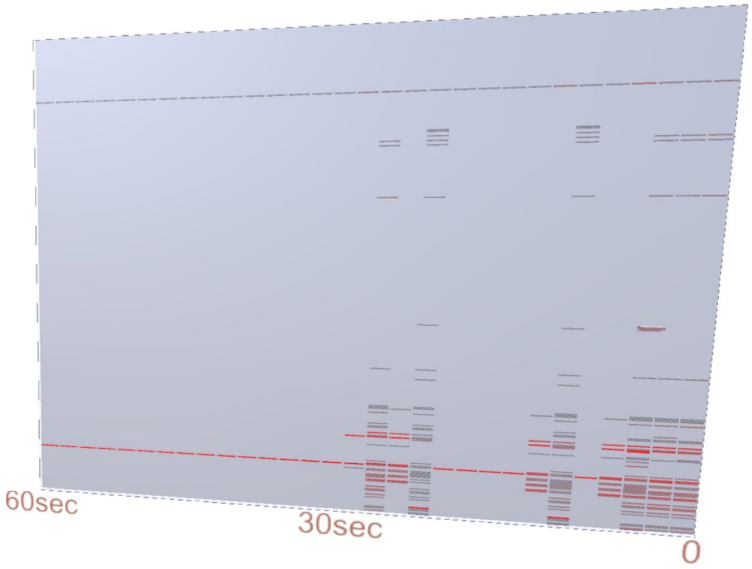


Scatter Plot

PerfVis



City Visualization



Scatter Plot

User Study

- Initial evaluation
- Assess effectiveness of our tool through:
  - User Performance
  - User Experience
- Compare to PerfVis deployed on a computer screen
- Within-subject design

Immersive Augmented Reality

Computer Screen

User Study

User Performance

Correctness

Completion Time

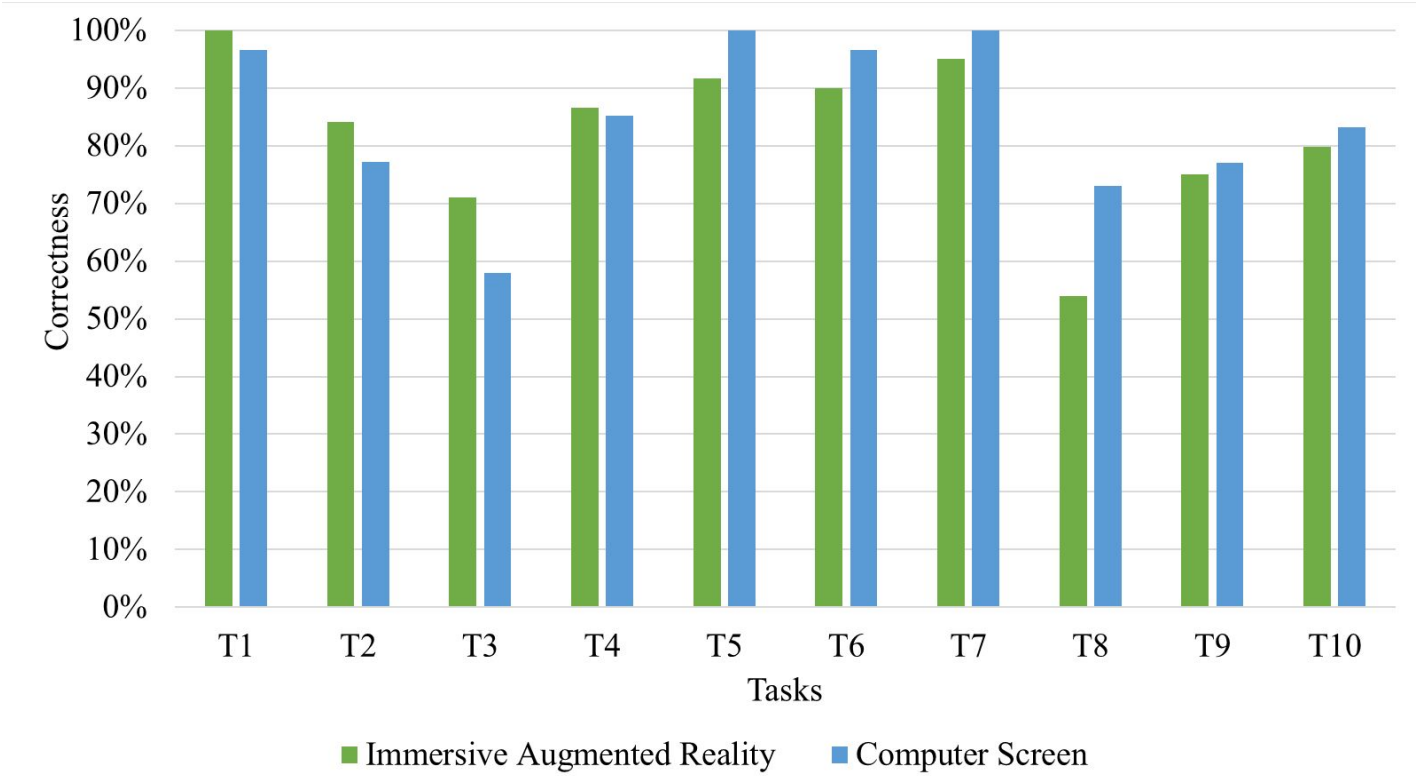
Recollection

User Experience

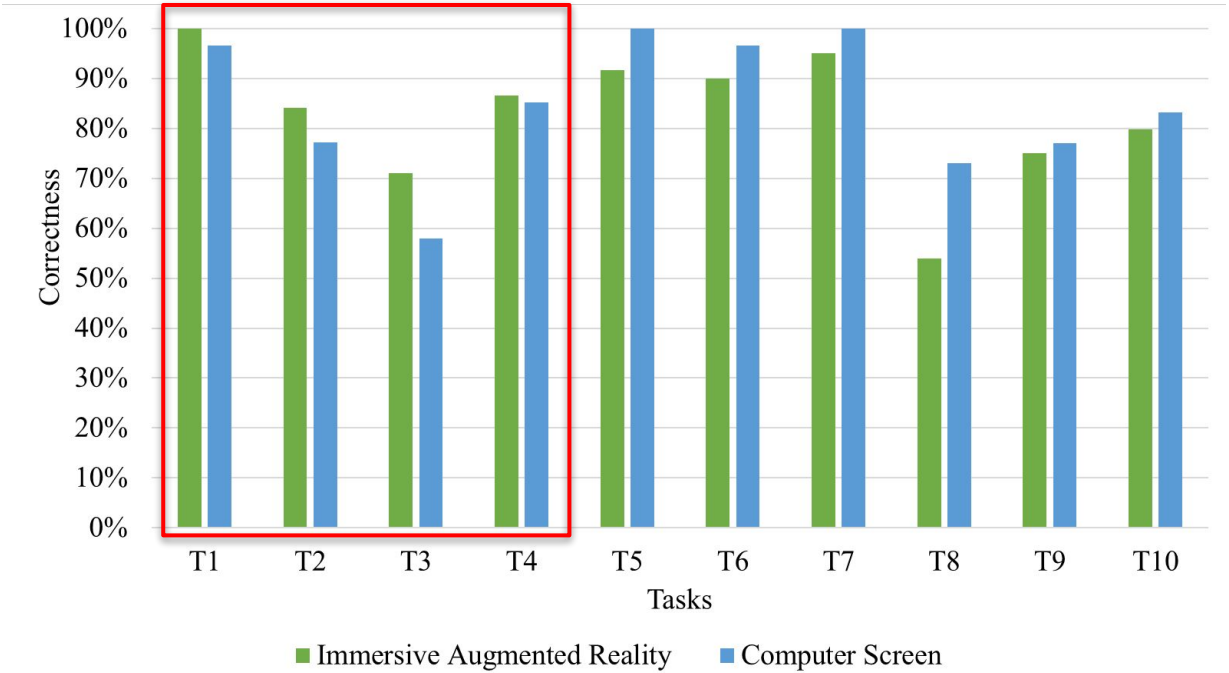
Emotions

Cognitive Load

Correctness

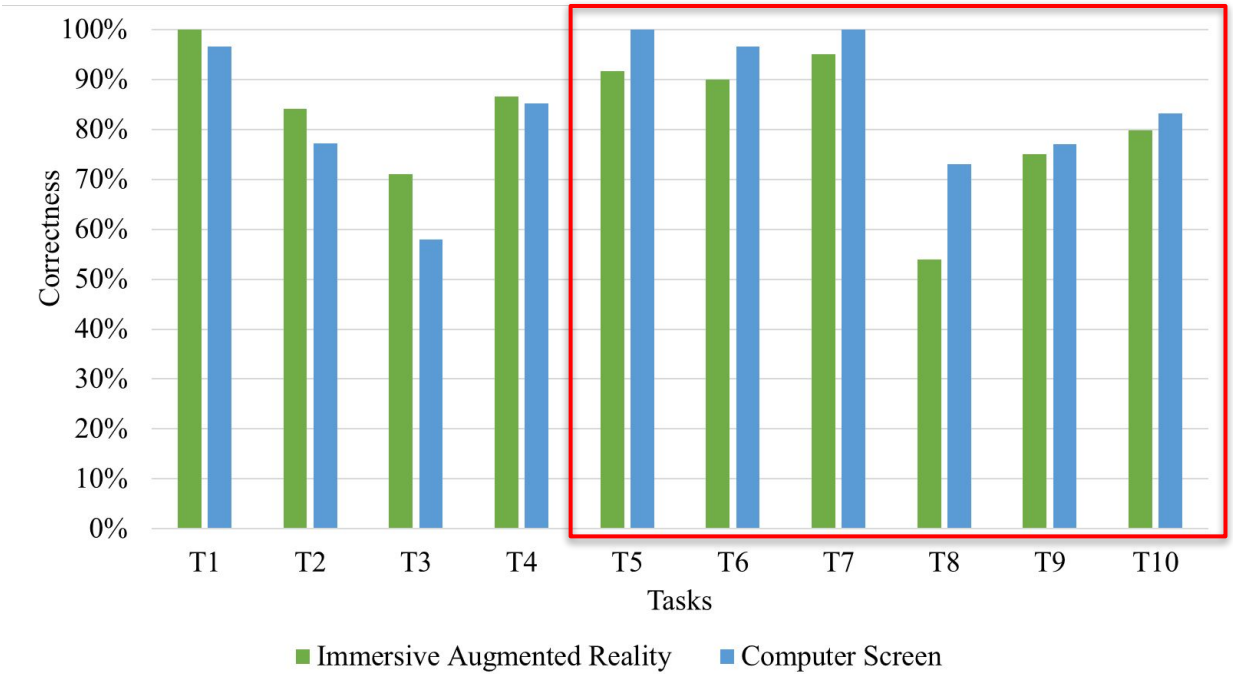


Correctness



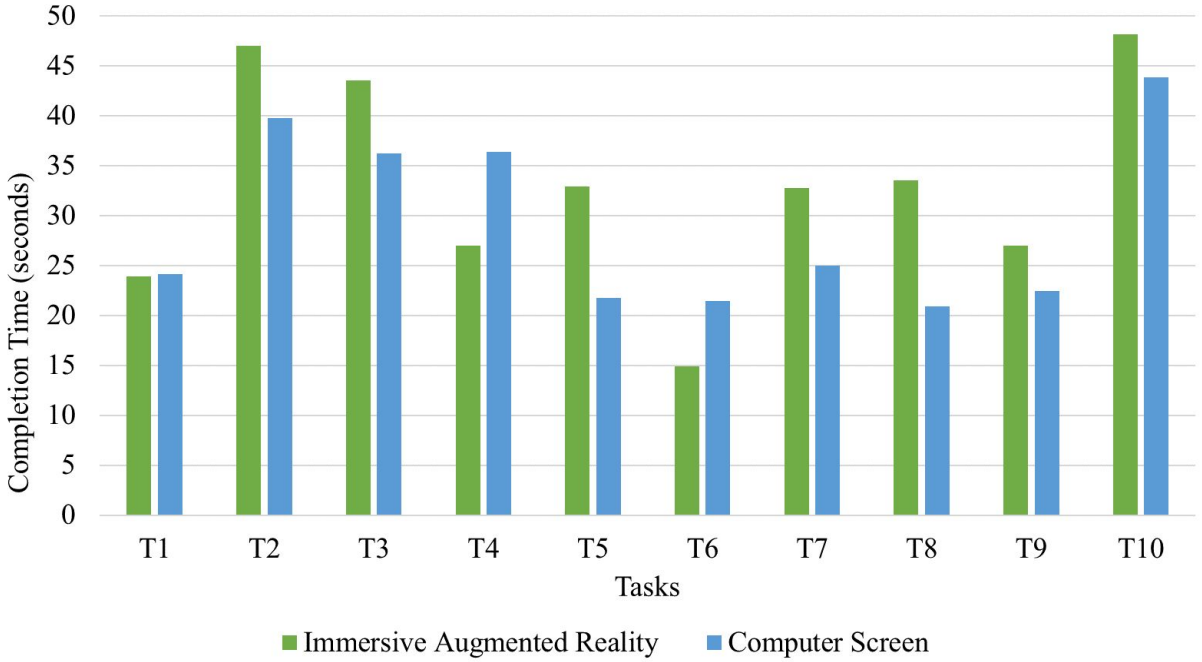
Participants in immersive augmented reality seem to slightly outperform participants using a computer screen in overview tasks.

Correctness



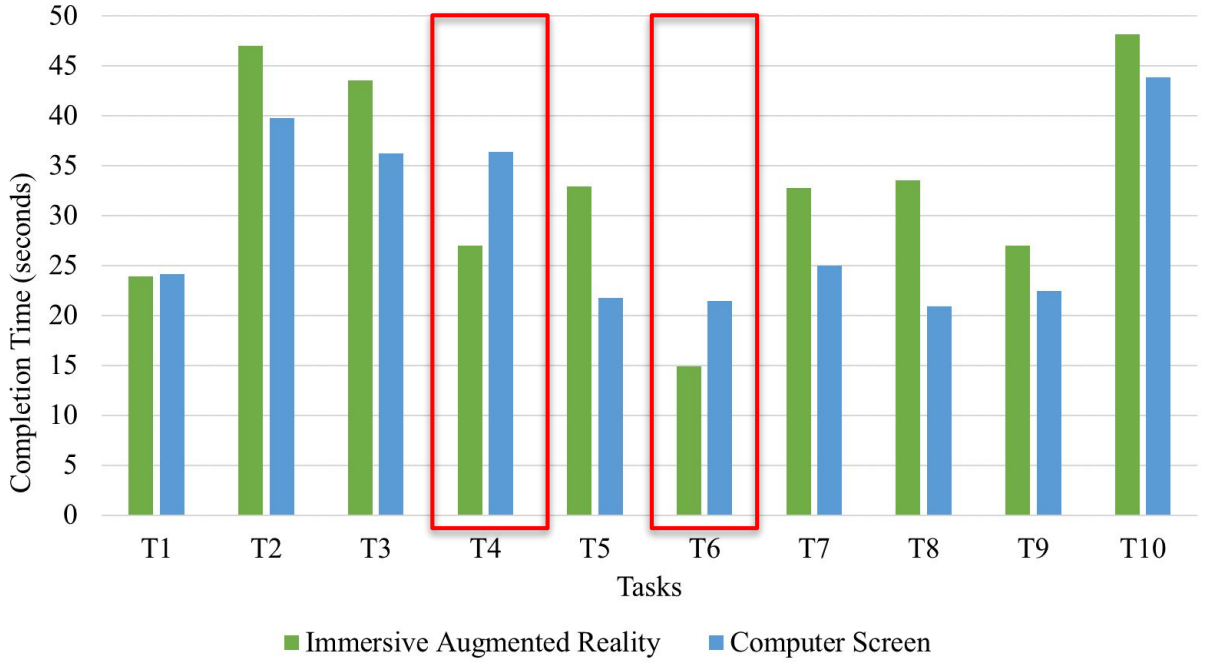
As expected, correctness is predominantly higher when using a computer screen.

Completion Time



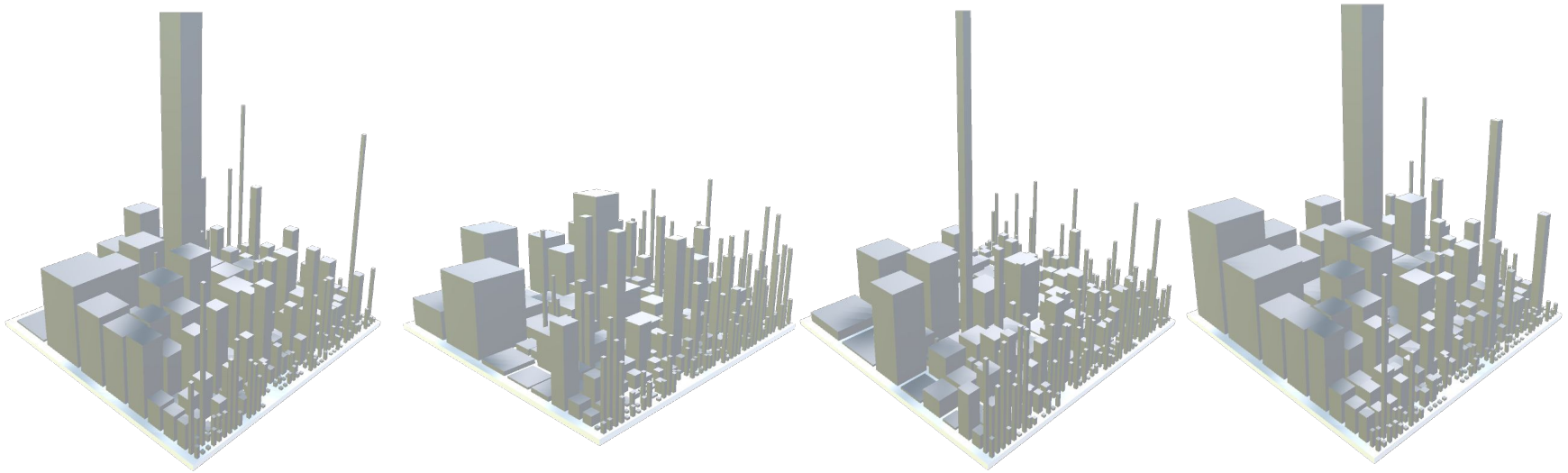
As expected, completion time is mostly lower in when working with a computer screen.

Completion Time



As expected, completion time is mostly lower in when working with a computer screen.

Recollection

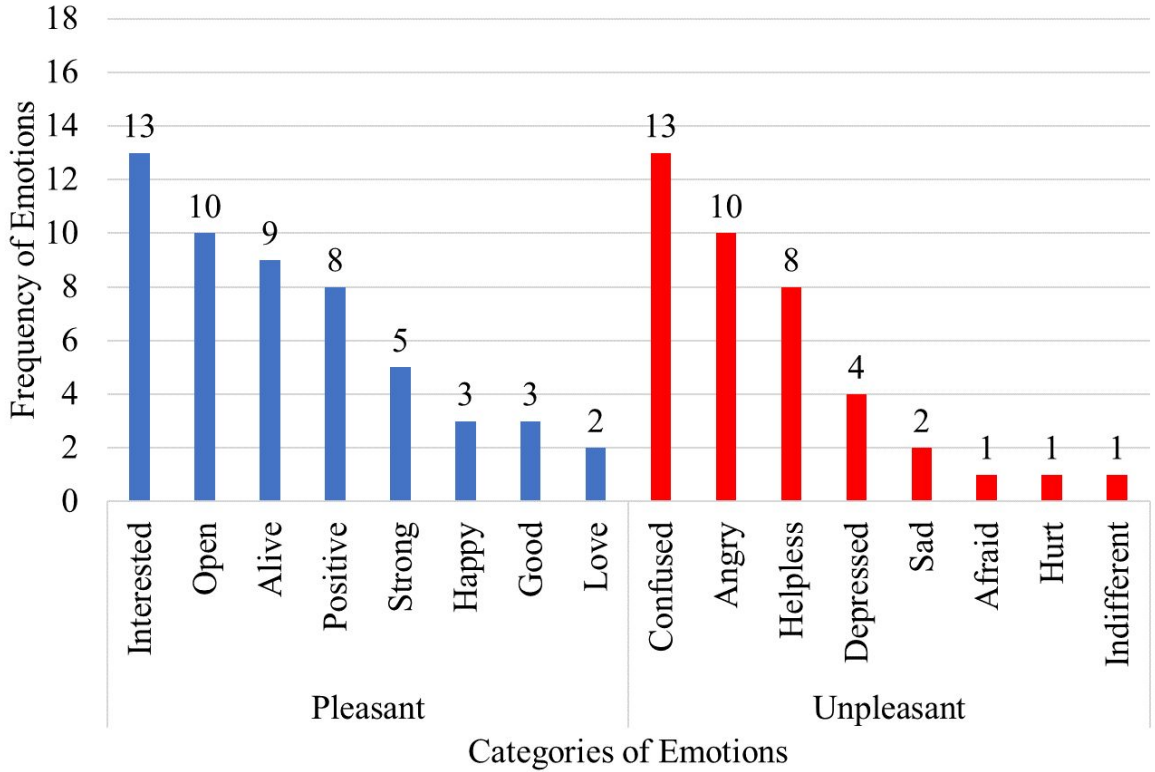


“With which of these software cities did you complete the set of tasks?”

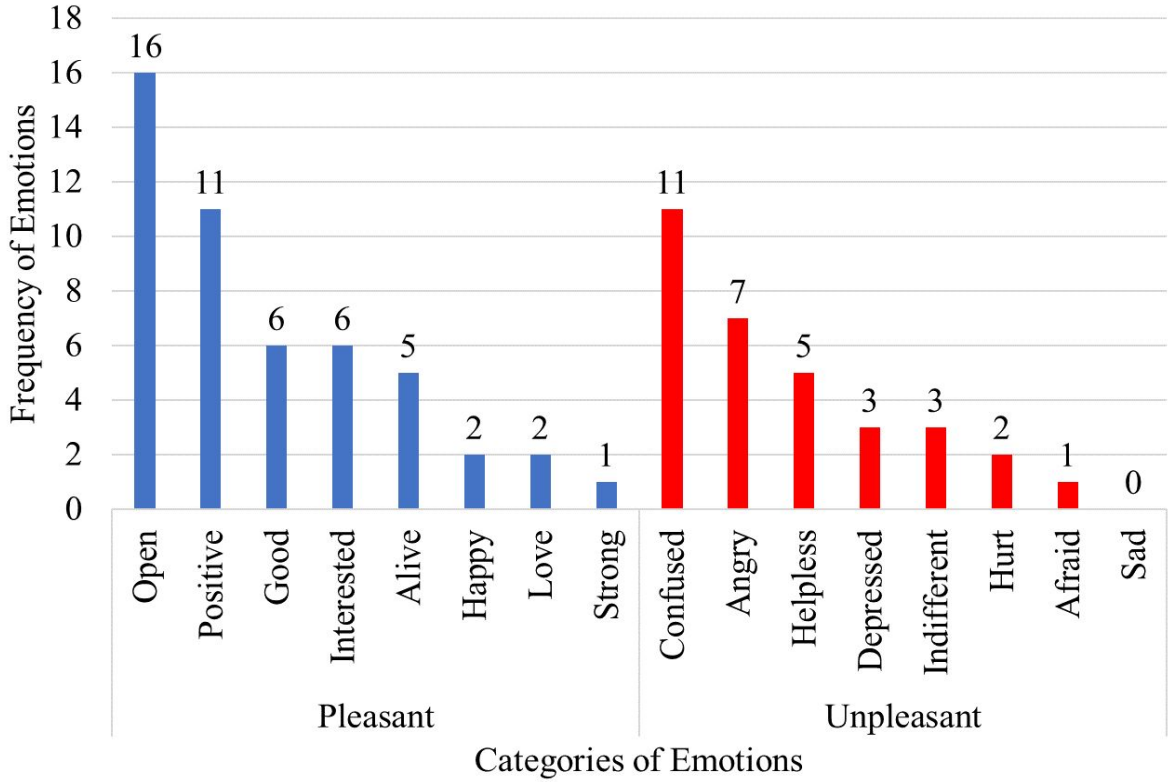
Emotions

“Please pick 10 emotions you experienced during the experiment.”

Emotions Immersive Augmented Reality

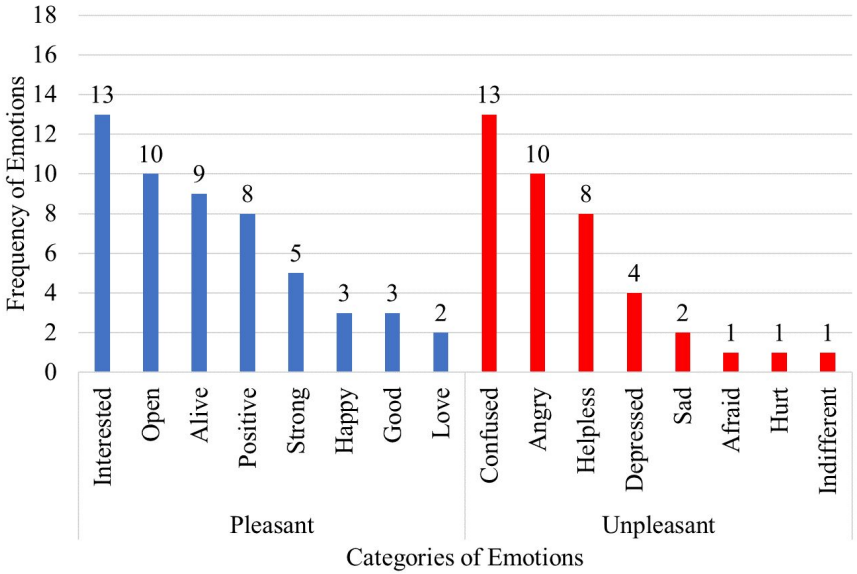


Emotions Computer Screen

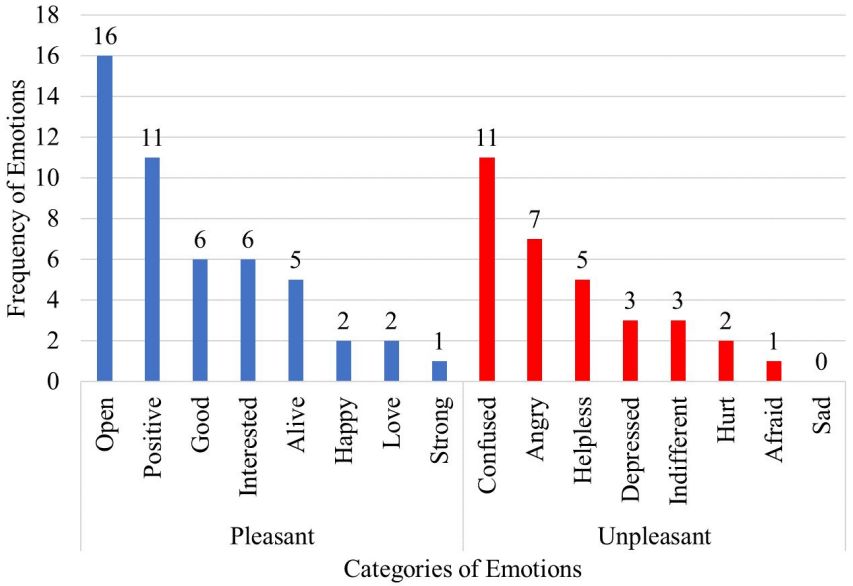


Emotions

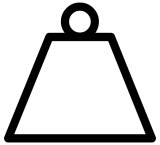
Immersive Augmented Reality



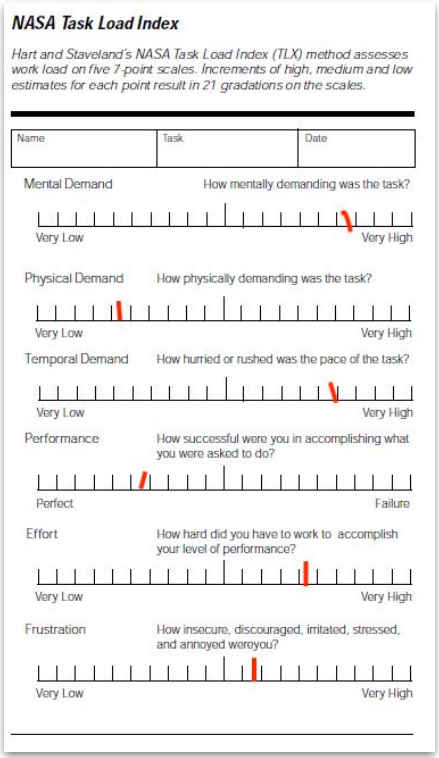
Computer Screen



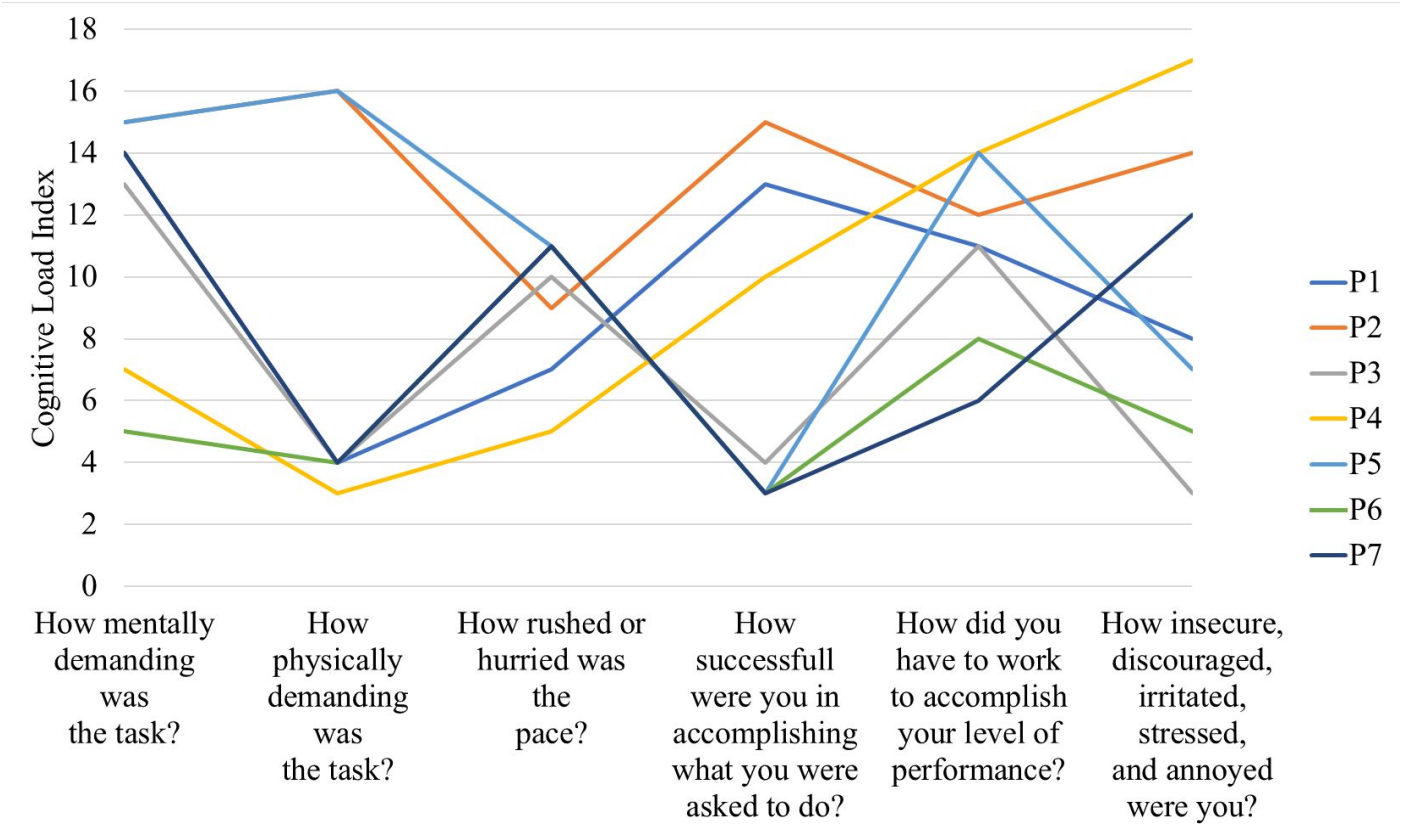
Cognitive Load **NASA TLX**



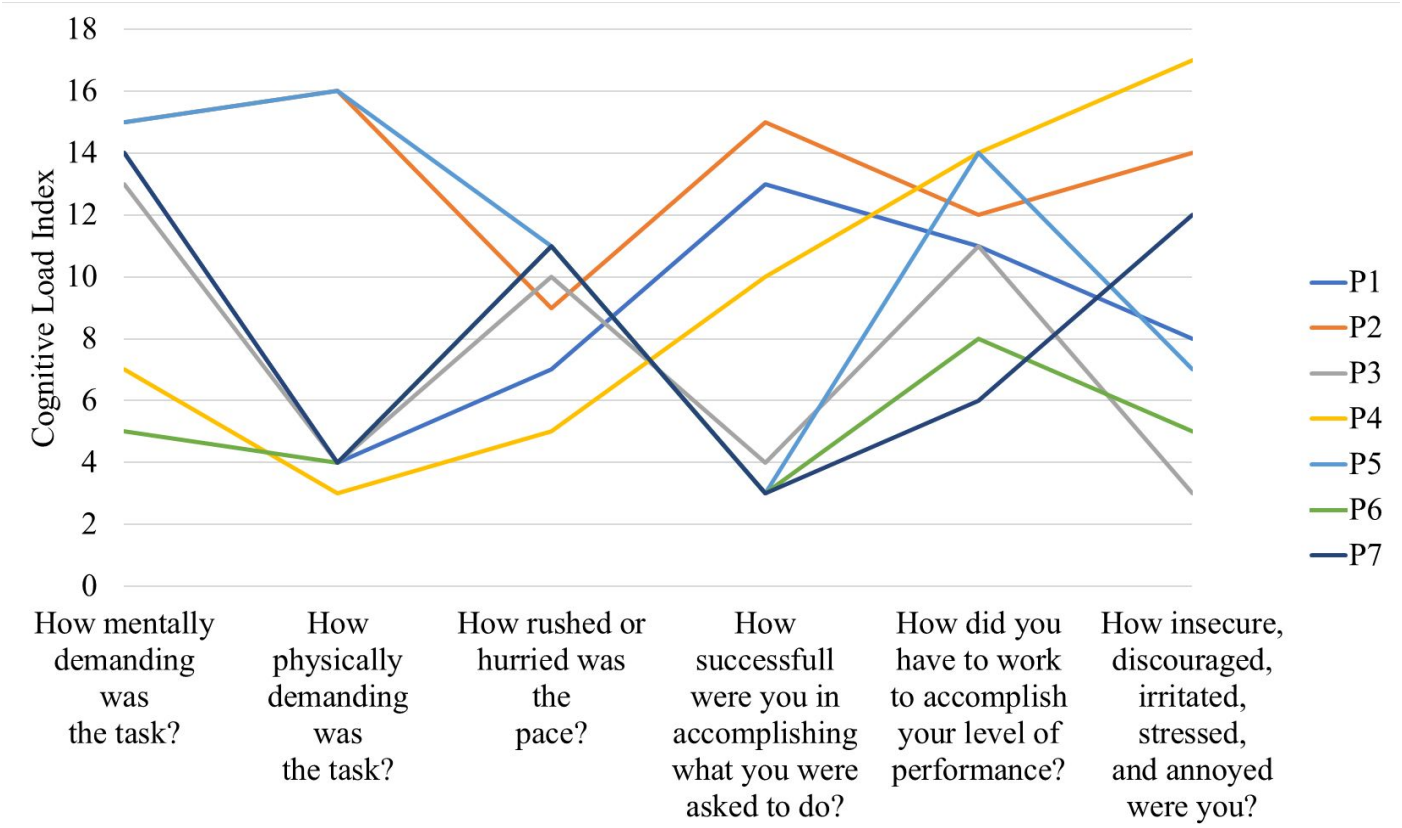
- How mentally demanding was the task? - Mental Demand
- How physically demanding was the task? - Physical Demand
- How hurried or rushed was the pace of the task? - Temporal Demand
- How successful were you in accomplishing what you were asked to do? - Performance
- How hard did you have to work to accomplish your level of performance? - Effort
- How insecure, discouraged, irritated, stressed and annoyed were you? - Frustration



Cognitive Load **Immersive Augmented Reality**



Cognitive Load **Immersive Augmented Reality**



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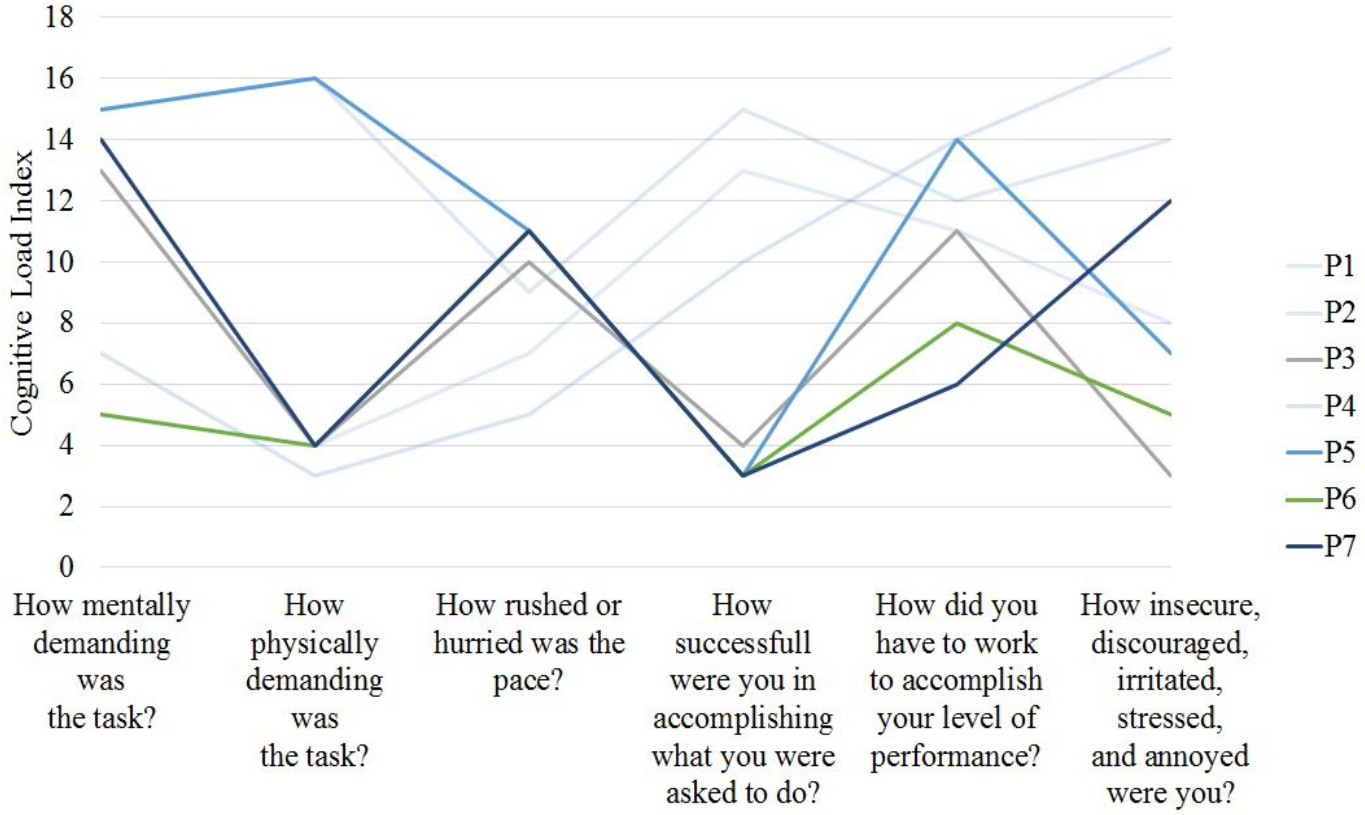
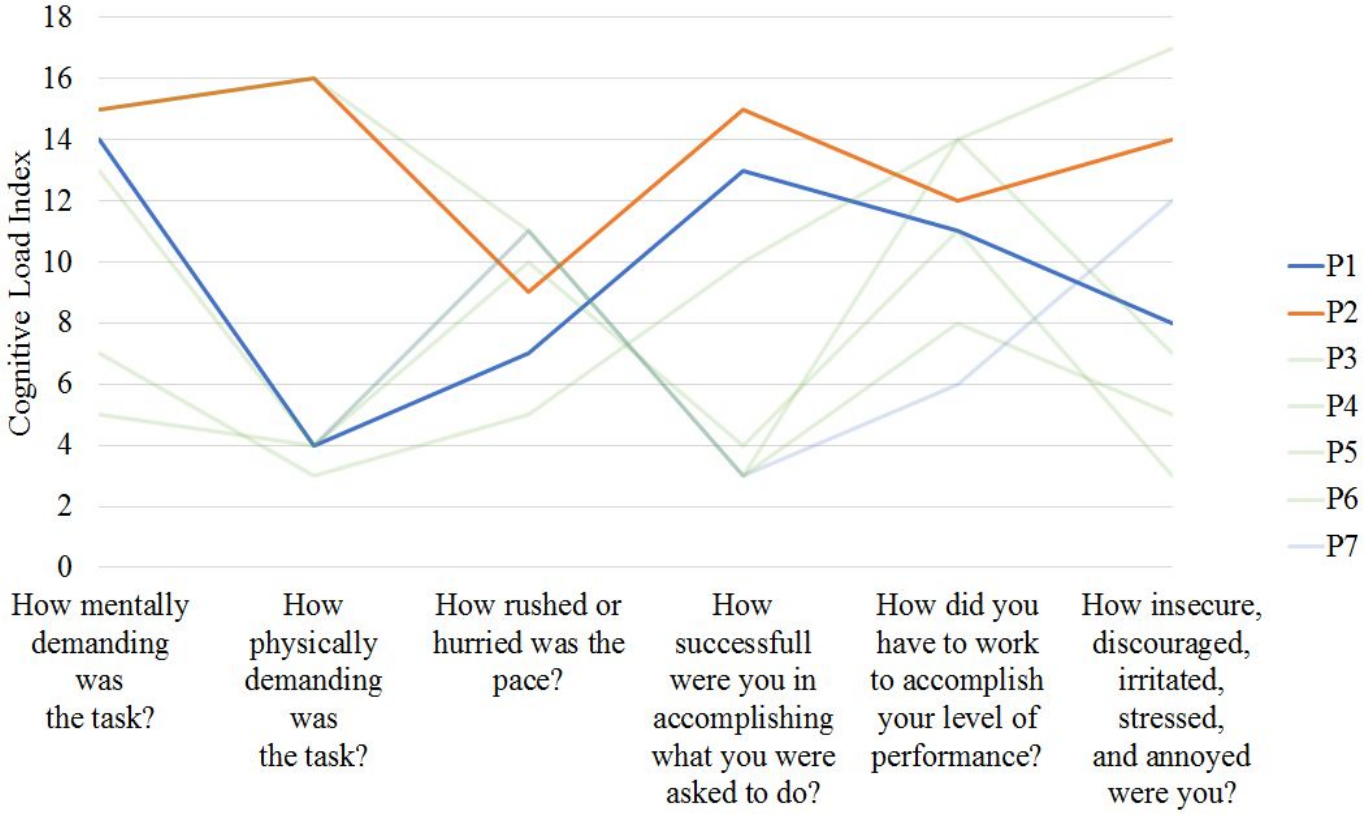
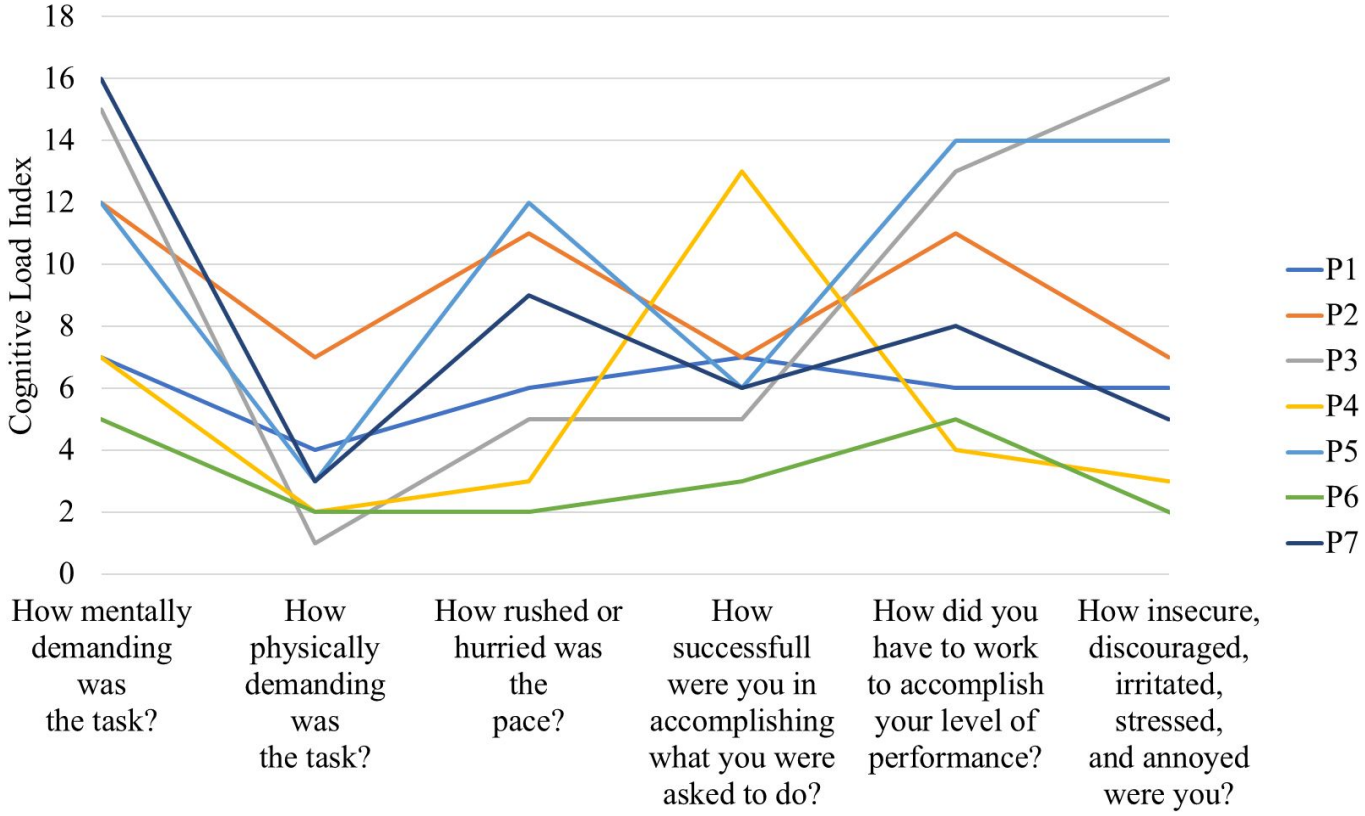


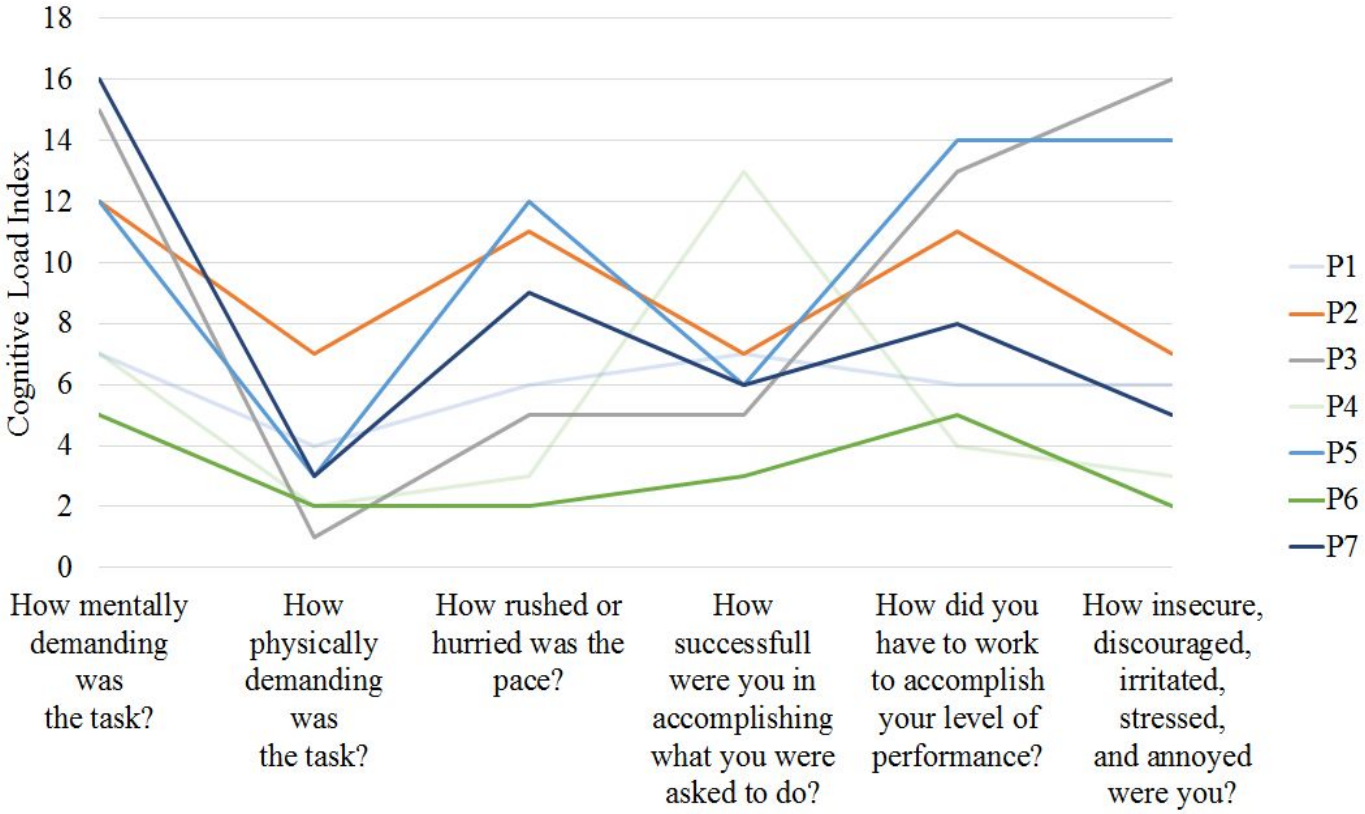
Cognitive Load **Immersive Augmented Reality**



Cognitive Load **Computer Screen**

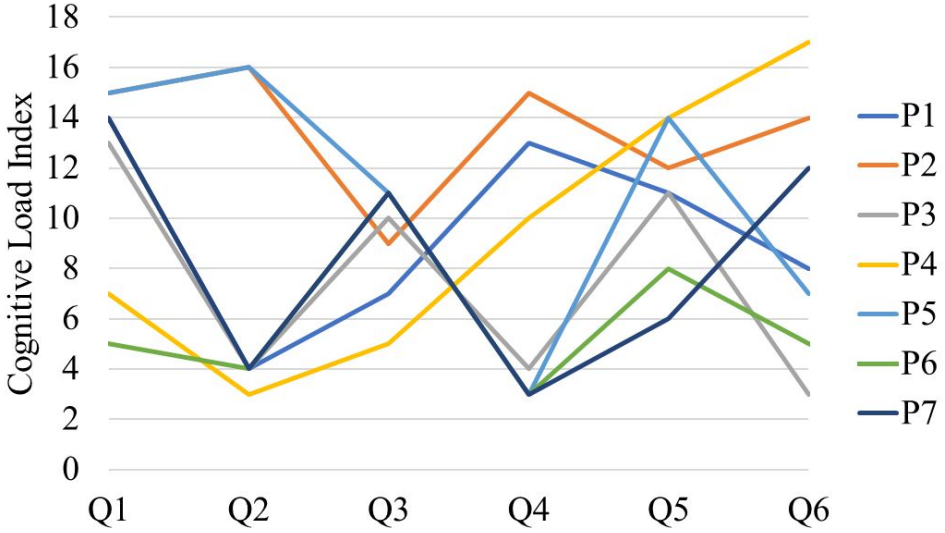


Cognitive Load **Computer Screen**

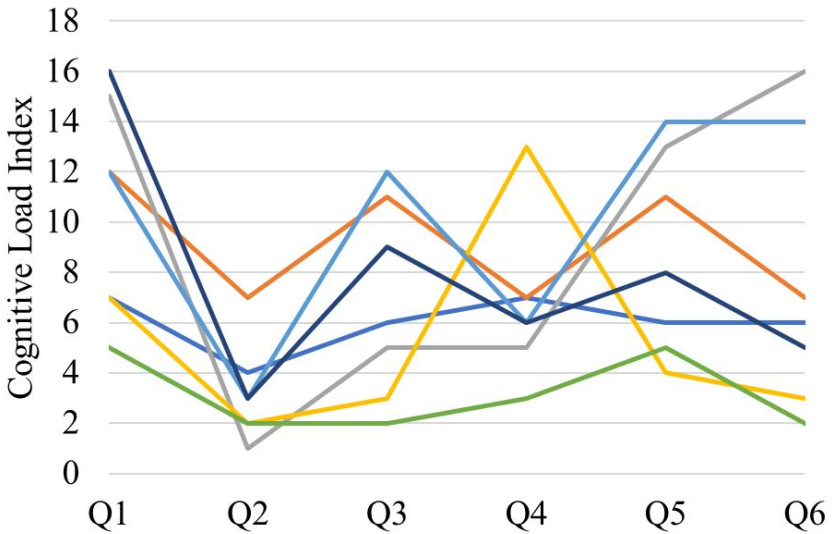


Cognitive Load

Immersive Augmented Reality

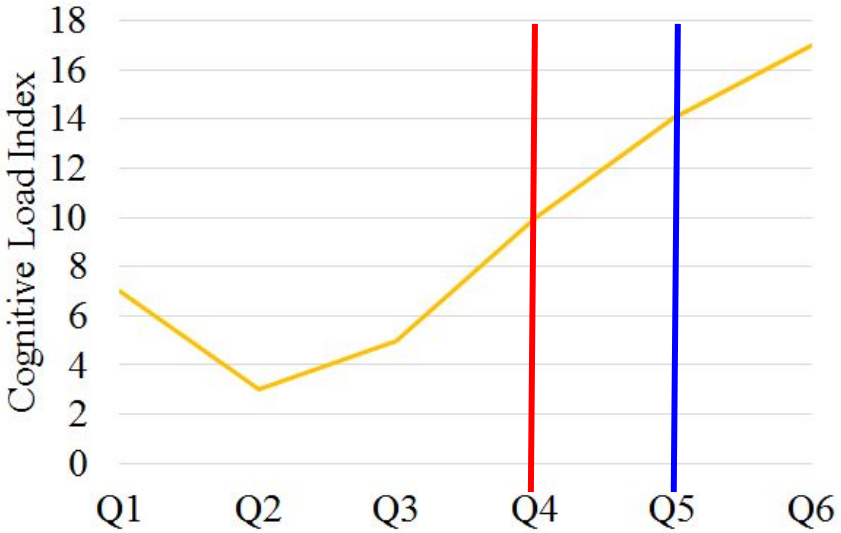


Computer Screen

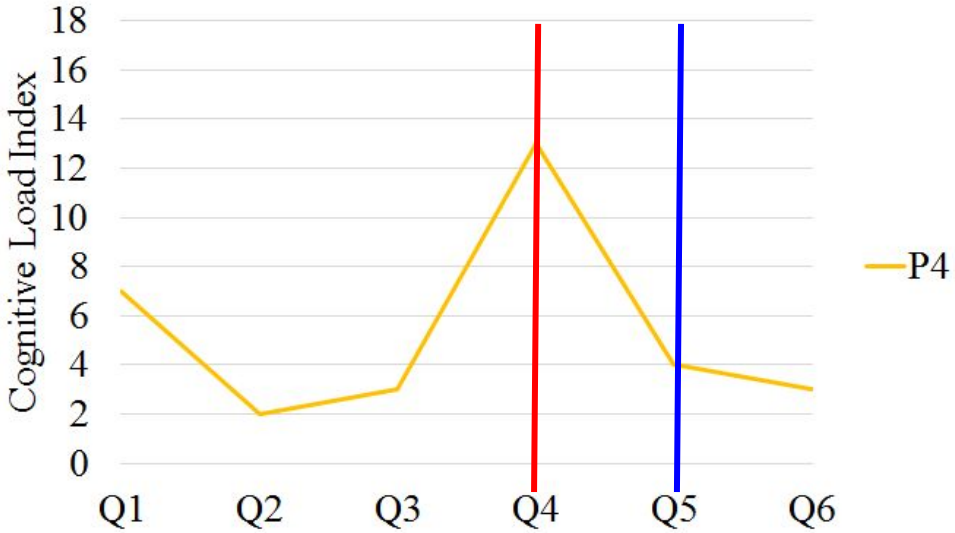


Cognitive Load

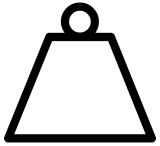
Immersive Augmented Reality



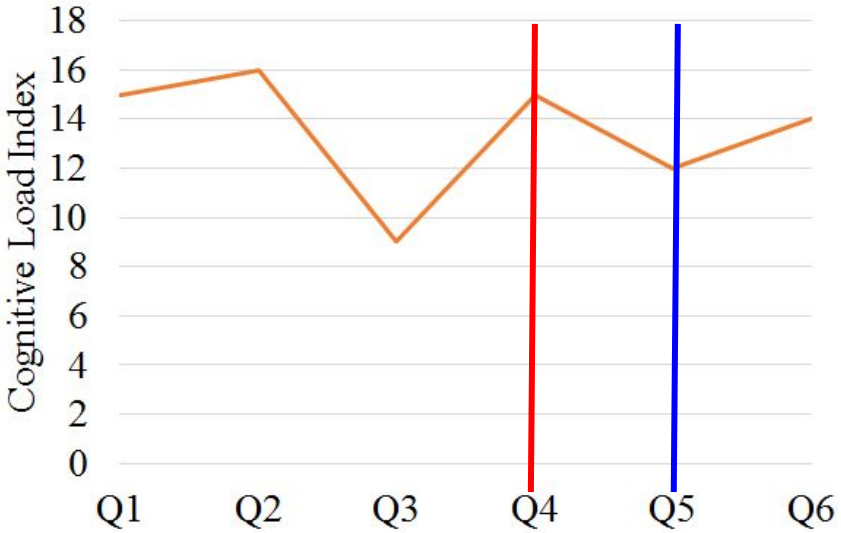
Computer Screen



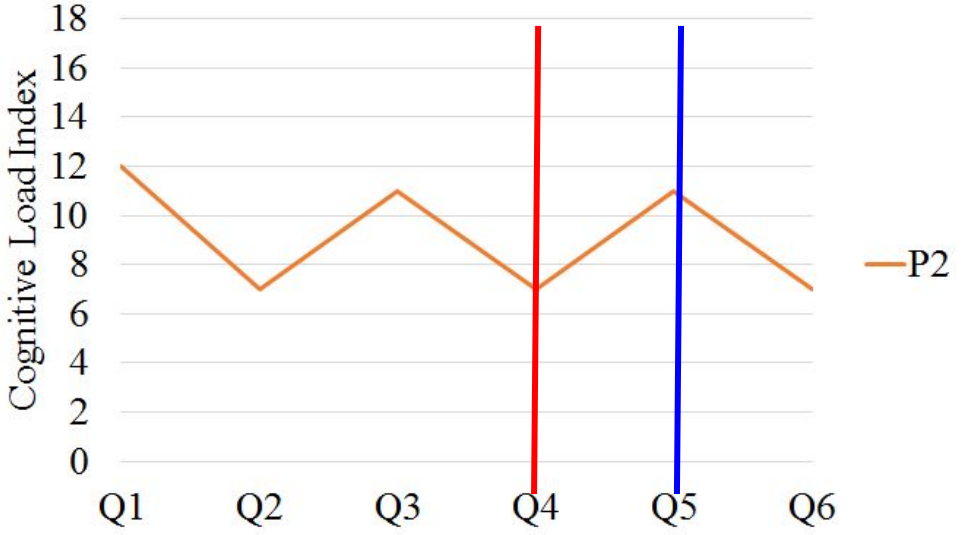
Cognitive Load



Immersive Augmented Reality



Computer Screen



Cognitive Load

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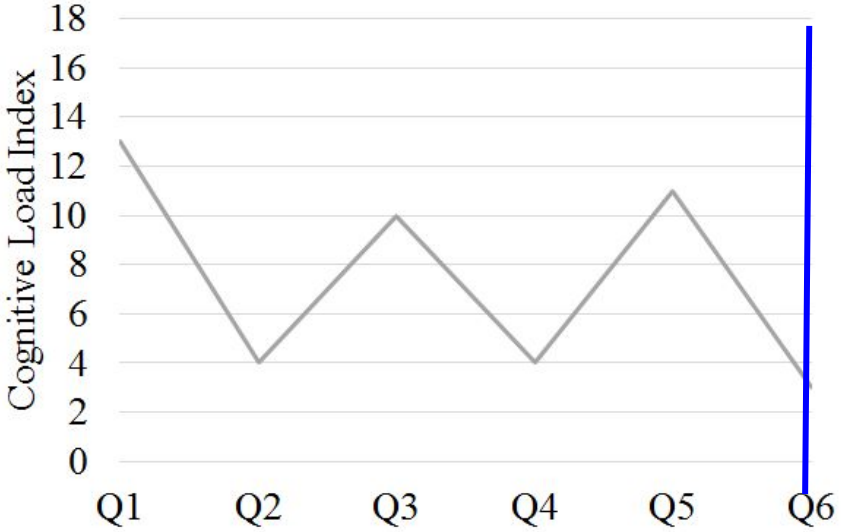

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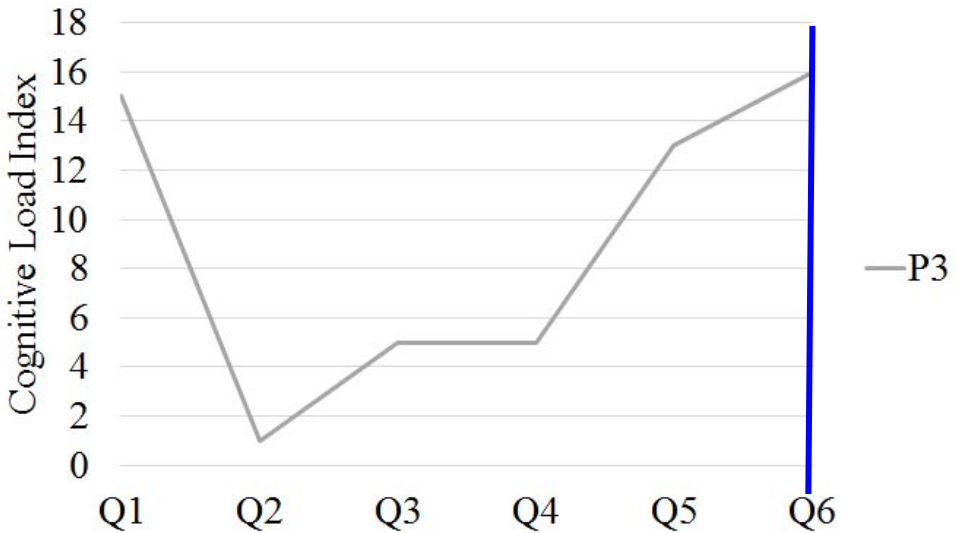
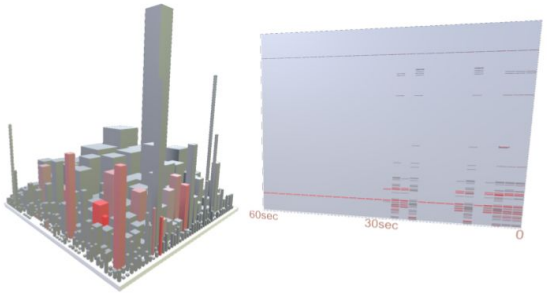


Conclusion

- **Compare PerfVis to a similar deployment using a computer screen**
- **User performance as expected**
- **User experience not as expected**
- **Future work**
  - **Adding features**
  - **Improving the scatter plot**

Conclusion

PerfVis



City Visualization

Scatter Plot

4

User Study

- Initial evaluation
- Assess effectiveness of our tool through:
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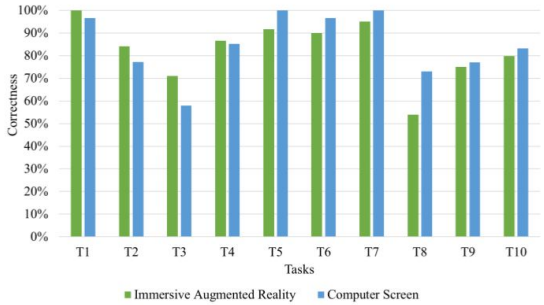
- Within-subject design

Immersive Augmented Reality

Computer Screen

6

Correctness



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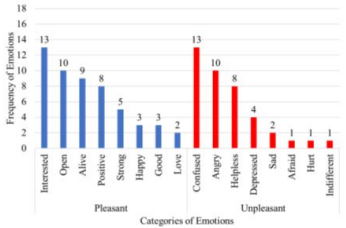
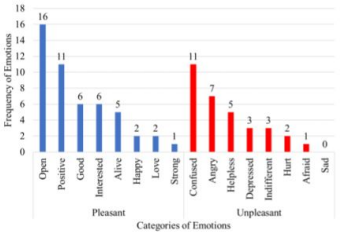
Emotions

Immersive Augmented Reality



Computer Screen



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