Christian's Research Review

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Differences between blind people's cognitive maps after proximity and distant exploration of virtual environments

Citation

(Cobo et al. 2017)

Introduction

According to the authors,

> There have been three traditional hypothesis about whether blind people can understand and manipulate spatial concepts.

1. Deficiency
   - Argues that blind people are unable to develop spatial thought
2. Inefficiency
   - Blind people *can* understand spatial thought, but cannot understand to the same level as someone who is not blind
3. Difference
   - Blind people are just as capable of spatial thought

Many studies have been done, and a significant portion seem to support the Difference hypothesis.

Study

The authors developed an Android app using Unity3D. This app allowed participants to "explore" and/or "look" around a room containing furniture, objects, etc, by using the touchscreen and the gyroscope.

The authors wanted to specifically test "distant-exploration" and its effectiveness:

> We propose a distant-exploration approach where blind people can explore the room by controlling the direction of the avatar's line of sight. Feedback regarding obstacles beyond the reach of the cane may be obtained with no need of making the avatar to walk along the virtual space.

Conclusion

The authors found a significant difference in understanding and required exploration time when using the "distant-exploration" approach. The sample size was limited though, and more research is needed to come to a sound conclusion and methodology.

Lessons Learned

Further Questions

1. What were the feedback forms used?

Image Accessibility for Screen Reader Users: A Systematic Review and a Road Map

Citation

(Oh, Joh, and Lee 2021)

Introduction

Oh, Joh, and Lee (2021) reviewed 33 papers (using PRISMA guidelines) with two goals in mind:

1. Understand the current accessibility solutions for screen reader users to "view" images
2. Identify gaps in understanding and suggest a research roadmap

They discovered several things:

- The types of images, visual information, input devices, and feedback modalities that have been studied to assist in image accessibility on touchscreen devices
- Very little research has been done on the automation of image-related information
- Input from target users is *very* important when designing new accessibility solutions

Study

Note: BLV = Blind/Low Vision

The authors had five questions for their review:

> RQ1. What types of images have been studied for image accessibility?
>
> RQ2. What types of image-related information has been supported for BLV people?
>
> RQ3. How has image-related information been collected?
>
> RQ4. How has image-related information been delivered?
>
> RQ5. How have BLV people been involved in the design and evaluation process?

Most of the reviewed papers focused on specific types of images. Here were the main three:

Specific Image Type	Number of Papers
Maps	10
Graphs	6

Specific Image Type	Number of Papers
Geometric Shapes	4

Conclusion

The authors came to several conclusions:

1. Image types other than maps, graphs, and geometric shapes are rarely studied
2. Only about 1/3 of the papers provide multi-modal feedback
3. The lack of an automated way to retrieve image-related information is currently an important barrier in making large-scale solutions
4. Studies should get BLV individuals involved early in the process, as their feedback is very important when making design decisions

Lessons Learned

Further Questions

Accessible Maps for the Blind: Comparing 3D Printed Models with Tactile Graphics

Citation

(Holloway, Marriott, and Butler 2018)

Brief Summary

Several studies were done on the effectiveness of Orientation and Mobility (O&M) training for people with blindness and severe vision impairment using 3D models. These studies seem to suggest that 3D models are preferred and more effective than the tactile equivalents for 2D graphics. 3D models can also be enhanced using interactive audio labels.

Main Study: Comparing Tactile Maps & 3D Prints

- 3D models were preferred

  Preferred format by map type, as revealed through use (neighborhood map) or self-reporting (park maps and station plans)

map	tactile graphic	both	3D model
neighborhood	5	2	9
park	3	0	13
station	4	1	11

References

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