Beyond Audio Description:

Exploring 360° Video Accessibility with Blind and Low Vision Users Through Collaborative Creation

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360° Videos

Orion Nebula - Google Arts and Culture

Accessible 360° Videos *Should* Be Immersive

- Prior work
    - **Fidyka et al.** (2021): conducted focus groups to understand preferences of AD creators and end users for 360° descriptions
    - **Fleet & Herndon** (2020): explored live AD for 360° videos and VR
    - **Chang et al.** (2022): created a 360° AD authoring system
    - **Jiang et al.** (2022): investigated how to support BLV AD creators

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- Research gap
  - Conveying **immersion and engagement** in a nonvisual way
  - Holistic accessibility through **varying types of feedback**

Research Questions

How can we make 360° videos accessible?

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- How can audio descriptions best support **accessible and immersive** 360° video viewing experiences?

- What **additional feedback** can improve accessibility and immersion for 360° videos?

- How and why should **BLV people engage in AD creation**?

Methodology

Participants

BLV AD Users	Sighted AD Creators
9	**5**

Interviews

- Individual and virtual
- Presented 360° video probes
- Brainstormed AD styles and interactions

Design Workshops

- Collaborative and in person
- Focused on one 360° video probe
- Wrote AD script prototypes with audio cues in mixed-ability groups

**Design Workshop 1
@ CSUN**
5 participants

**Design Workshop 2
@ Cornell Tech & Zoom**
4 participants

Data Analysis

	Individual	Group	Group Interaction
Who			
What			
How			How was the group dynamic and how did that shape the outcome?

Findings

Linguistic Preferences

- Changing the AD point of view
  - First-person-plural
  - Second-person
- Characters could serve as AD narrators

"The describer is in it with me, rather than sucking me out of the show."

(Aaron, BLV AD Creator)

Aural Preferences & Sound Design

- Spatialized AD
- Audio effects helped with exploration and agency
  - Sound and speech
  - Augmentative earcons and prompts

"Having the person be like, 'Hey!' … That's really helpful, just in terms of knowing which direction to face… It's not audio description, so you're still in the moment."

— Amber, blind AD narrator

As Mario, we watch Luigi, a tall thin plumber with a large mustache in a green hat, in a tub plunging a bathtub drain.

Suction cup plunging and spatialized AD

Multisensory Interactions

- Haptic / tactile feedback
  - Touch tours
  - Inspired by video games
  - Access for deafblind users
- Smell / taste were not critical

"Haptics are a great way to imply very loud sounds... being ducked or slightly sacrificed for the sake of narration."

(Stacy, Sighted AD Creator)

Including BLV AD Creators

- BLV experts contributed unique insights
  - Detailed questions about characters
  - Discussions about the inaccessibility of existing media
- AD creation is a collaborative effort

"*What is the coloring, or what is the style like, visually? ... Is it 3D? Is it claymation? Is it cartoons? Is it live action? Is it neon video gamey surreal? ... Even if we're not seeing it visually, that can give some context.*"

– Annie, blind AD creator

Discussion

Implications for Accessible Media & Future Work

- Insights can be generalized across many types of media
    - Traditional videos
    - Images
    - Video games
    - Extended reality
- Prior works have taken a utilitarian approach to media accessibility
- We recommend exploring creative methods of providing access that go **beyond audio descriptions**

BLV Involvement Can Improve Video Accessibility

- BLV AD creators often drove discourse on key points due to their **rich expertise as narrators, audio engineers, and writers**
- It is important to consider BLV users' prior cultural context
- We encourage future work to include disabled people as both creators and users of access technologies

Contributions

- Proposed **multisensory design considerations** (linguistic, aural, smell, and taste) to make 360° videos more **accessible and immersive**
- Explored the importance of **including BLV experts in creating / designing** access technologies
- Utilized a **co-design framework** featuring mixed-ability groups

Please read our paper and reach out to Lucy (lucjia@cs.cornell.edu) if you'd like to chat about immersive and responsive accessibility!
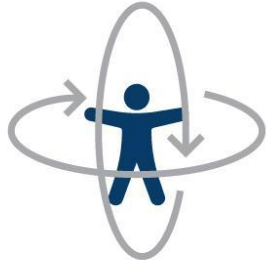
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Thank you!

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Please read our paper and reach out to Lucy (lucjia@cs.cornell.edu) if you have any questions!