A Scoping Review of Human–Computer Interaction Research on the Accessibility of Data Visualizations

New Technologies, Procedures, and Designs

Corpus of all 280 papers

accessvizcorpus.pages.dev



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ASSETS 2026

Full paper in the proceedings

Motivation



Accessibility of visualizations matters

They help people interpret insights about **health**, **education**, **science**, **finance**, **news**, and broader personal, community, and societal issues

↳ But they **often exclude** people with disabilities

Blind

the visual modality is central to most visualizations

Low vision

varying levels of vision shape distinct needs

IDD

dense graphical representations are hard to process

Cognitive disabilities

abstract graphics are hard to process

DeafBlind

often depend on tactile communication systems

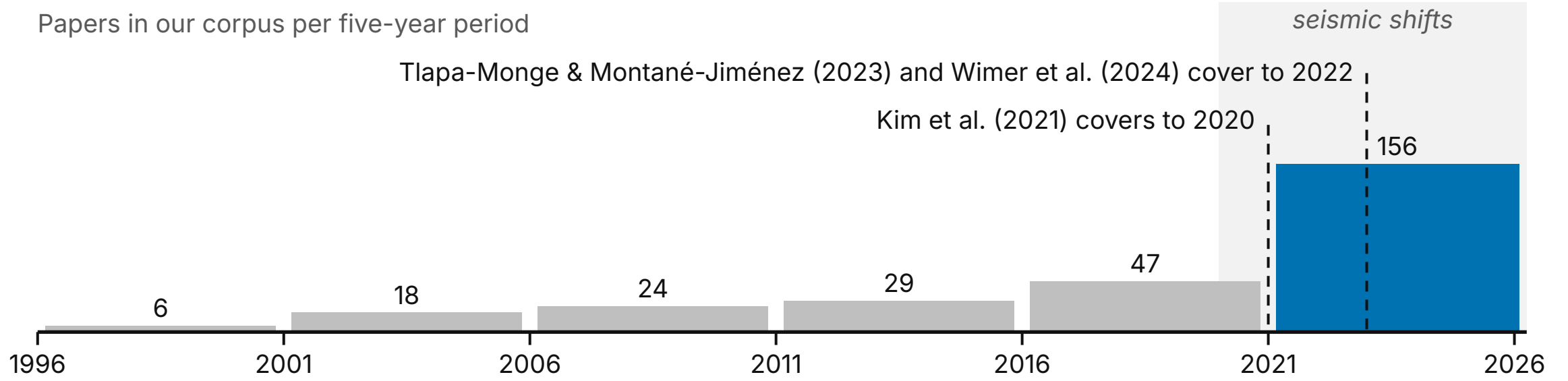
Color vision deficiencies

designs relying only on hue fail

Situational impairments

small screens or low light, for anyone

Why now | a timeline of the field



COVID-19

a major test of accessibility in public-facing visualizations

Artificial intelligence

drastically lowered the barrier to building accessibility software

Greater awareness

of accessible technologies and inclusive design methods

↳ **Good time to take stock.** Prior reviews cover only 27.9% of our corpus.

Method

1



Search

ACM DL, IEEE Xplore, Eurographics, Springer Nature Link, Taylor & Francis

2



Expand

keyword search (170) plus citations and references (455)

3



Screen

280 papers met our HCI and accessibility criteria

4



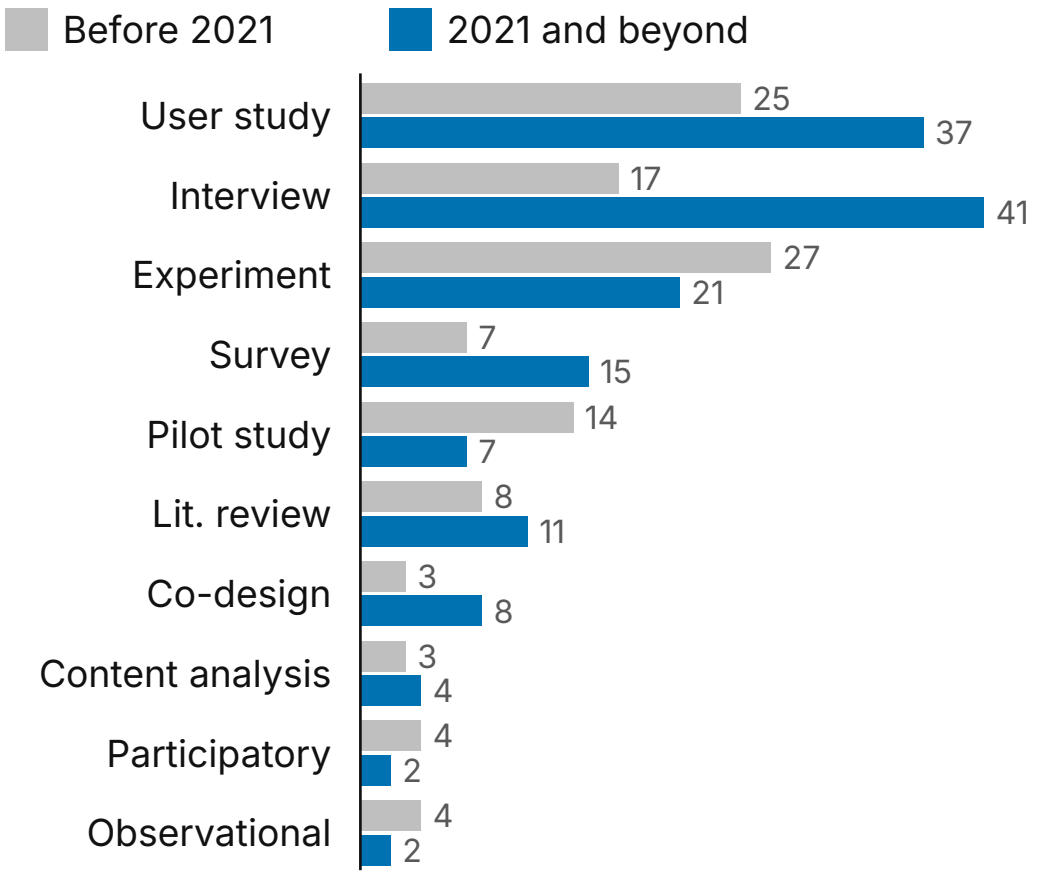
Code and read

contributions, communities, methods, visualizations, modalities, and AI, before vs. after 2021

↳ **Limitations:** did not search disability-focused journals or fields such as health, education, and psychology, and did not code for theoretical frameworks and models of disability

Highlighted Findings | the corpus

Methods used, before vs. after 2021



Venues

ASSETS (53) and **CHI** (46) lead. TVCG grew from 2 papers to 13 after 2021.

Users

74% center blind and low-vision readers. Several other communities appear **only from 2021**.

Methods

User studies, **interviews**, and **experiments** dominate. Only 2 longitudinal studies.

Visualizations

Common chart types in 71% of papers. Only 10 address **scientific visualization**.

Highlighted Findings | design and participation

Design approach

From **majority retrofitting** to **born-accessible** design (Lazar 2023)

Retrofitting remains common, e.g., an engineering curriculum retrofitted for one BLV student (Punyabukkana & Suchato 2025). More work now builds access in through *authoring* (Zong et al. 2024), *auditing* (Elavsky et al. 2022), and *training* (Sharif 2024).

Personalization

Universal design falls short of universal access (Wimer et al. 2024)

Personalization enhanced comprehension (Kim et al. 2023). *Softerware* gives end users agency to customize and adapt visualizations to their needs (Elavsky et al. 2026).

Participation

From **“being like”** to **“being with”** (Angerbauer & Sedlmair 2022)

Participatory and co-design studies rose from 7 before 2021 to 10 after, with more attention to equity, compensation, and lived experience. They remain rare.

Highlighted Findings | context of use

Education

From mostly **tactile graphics** to a **broader range of modalities**

Early tactile work faced durability and formatting challenges. Recent work adds mobile audio-tactile systems, wearables, sonification for remote learning (Ohshiro et al. 2021), low-cost tools, and teaching accessible design (Bares & Wirfs-Brock 2023).

Professional use

Surfaced **almost exclusively in 2021 or later**

Studies of BLV professionals (Chundury et al. 2024), academic articles (Menzies et al. 2022), and computational notebooks (Potluri et al. 2023) found toolchain gaps that influenced career paths and blocked access to peers' work (Cherukuru et al. 2022).

Public information

COVID-19 was the first major test for **public-facing visualizations**

The BLV community was particularly under-served (Holloway et al. 2020; Siu et al. 2021). Only 14% of top COVID-19 visualizations were very accessible to screen-reader users (Fan et al. 2023).

Highlighted Findings | communities

Blind and low vision

More perception studies, but only **2** target **low vision**

Designs are often geared toward blind people (Kim et al. 2023; Wang et al. 2024)

Color vision deficiency

Also studied before 2021 in our corpus

Color-safe and personalized mappings (Angerbauer et al. 2022)

Since 2021

IDD

Everyday data encounters and **cognitively accessible** design

Perceptual strategies and what makes visualizations (in)accessible (Wu et al. 2021–2024)

Language disabilities

Barriers to engaging with data visualization

How people with language disabilities experience visualizations (Wood et al. 2026)

ADHD

Effects on **perception and comprehension** of charts

Which chart designs suit people with ADHD (Tran et al. 2024; Ankrah et al. 2023)

Seizure risk

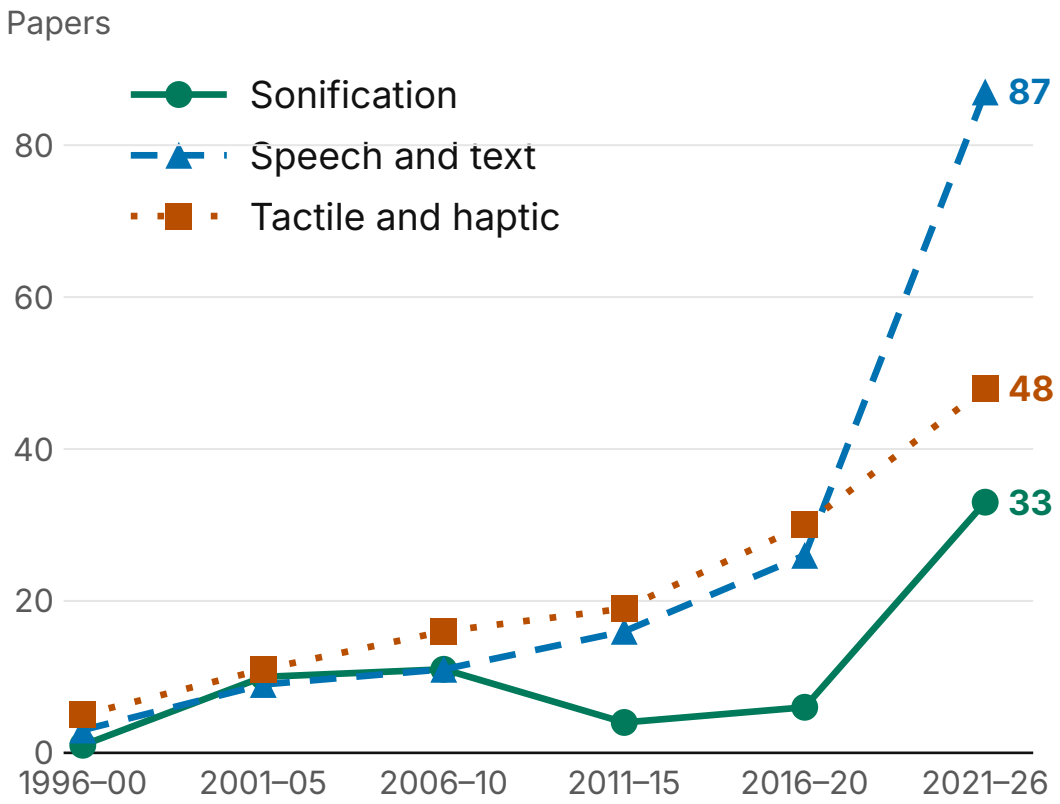
Seizure-inducing risk of **animated and interactive** visualizations

Flashing and animated content can trigger seizures (South & Borkin 2022)

↳ **Since 2021, more perceptual and behavioral studies** set baselines across user communities

Highlighted Findings | technology

Papers by interaction modality



Tactile

From translating visual encodings to more work on **perceptual baselines** and **authoring tools**

Non-speech audio

Studies of **acoustic parameters**, **spatial audio**, and **narrative** (Erie, Kim et al. 2024)

Speech and text

Rose from 52% to 60% of papers. **Alt-text quality** and richer **screen-reader** experiences

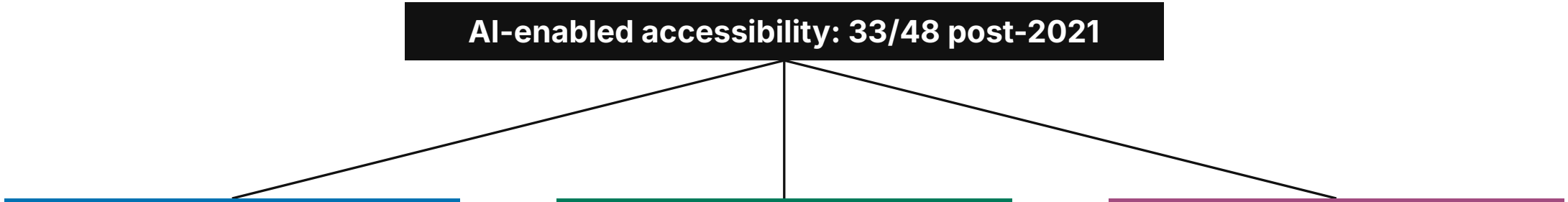
Multimodal

Most studies find it **beats single modalities**. Newer work on **mobile**, **authoring**, and **varied input**

↳ **Since 2021, more perceptual and behavioral studies** set baselines across sensory modalities

Highlighted Findings | automation and AI

Before 2021: chart classifiers, data extraction, and natural language summaries



↪ **Future challenges:** misleading alt text, bias against disabled people, and new security risks

Open Questions | users and research methods

Users How do access challenges and strategies differ across **disability types** as more heterogeneous populations are considered (e.g., blind vs. low vision)?

Users How should accessible visualization tools differ for distinct **contexts of use** or user groups?

Methods What new **evaluation frameworks** can capture accessibility outcomes that unfold beyond momentary task performance?

Equity Who bears **the labor of accessibility**: creators, platforms, or auditors?

Open Questions | modalities and technologies

Chart types	How can accessibility techniques support **complex visualizations**?
AI and automation	What is the **role of automation in accessible visualizations**, and **is it welcome**?
AI and automation	What is the **design space of interactions between user and AI** that prioritizes accessibility?
Tactile materials	What are the **limitations of material/physical properties** of tactile charts, and can they change?
Personalization	How can non-visual visualization systems **learn from a user's interaction** history to personalize and adapt?
Personalization	What **fidelity is lost or preserved** when exporting charts between modalities?

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