Accessibility Needs for User-Generated Digital Content for People with Sensory Disabilities

Christian Pemberton
cpember2@depaul.edu
School of Computing
DePaul University
Chicago, IL, USA

Jessica Polk-Williams
jpolk9@depaul.edu
School of Computing
DePaul University
Chicago, IL, USA

Oliver Alonzo
oliver.alonzo@depaul.edu
School of Computing
DePaul University
Chicago, IL, USA

Abstract

User-generated content is increasingly abundant online, but it is most often not made accessible for people with sensory disabilities. Current research has explored remedial approaches using AI to make inaccessible content accessible. However, automatic processes are typically decoupled from the content's author and may introduce errors or misinterpretations of the authors' intention. In this literature review, we examine multiple angles of abled and disabled user-generated content use, to ascertain critical accessibility breakdowns, for which proactive AI solutions are most needed. Topics explored include common tools of user generated content, motivations of use, accessibility violations, online disinhibition, identity formation, and technological innovation. In addition, we explore two angles of content creation, from both abled and sensory disabled perspectives.

CCS Concepts

• **Do Not Use This Code → Generate the Correct Terms for Your Paper**; *Generate the Correct Terms for Your Paper*; Generate the Correct Terms for Your Paper; Generate the Correct Terms for Your Paper.

Keywords

HCI, AI, User Generated Digital Content, Deaf and Hard of Hearing, Blind & Low Vision, Content Creators

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1 Introduction

Web and social media users are generating increasing amounts of content every day. However, both the content and the content creation process are not always accessible to people with sensory disabilities such as people who are Deaf or Hard-of-hearing (DHH) or people who are blind or have low vision (BLV). For example, videos may not provide closed captioning for people who are DHH, or images may not include alt-text, which the World Wide Web Consortium's (W3c) Web Content Accessibility Guidelines (WCAG) recommend to ensure access for everyone.

A growing body of human-computer interaction, computing accessibility and AI research has explored the use of AI to retroactively fix inaccessible content through the use of AI-based tools. However, the quality and impact of these technologies still remain limited [4, 30].

This literature review examines how sensory disabled users do not have access to the same privileges, gratifications and experiences as abled persons, whilst interacting with user-generated content (UGC). We explore topics such as tools and motivations of UGC use in contrast to the inaccessible experiences of sensory disabled users and content creators. We then review research to help future works determine liability regarding accessible design for content creation, as prior studies indicate the need for nuanced solutions. Lastly, we conclude with a discussion of retrospective accessible AI solutions in development, that approach inclusion from a user centric lens.

2 Common Tools and Motivations for UGC

To begin, this section will define UGC, and identify common types and tools associated with it. Next we will list reasons for use, including connection, sense of community, information gain, entertainment, online disinhibition, identity formation and the bond between social media influencers and users.

2.1 Classifications, Types and Tools of User Generated Content

UGC refers to digital content created by unpaid contributors, to communicate both privately, between at least two persons, or publically. It involves the use of technological devices, such as cell phones, or online social media. Common UGC classifications include social media sites (SMS), blogs, forums, media sharing platforms, and question and answer platforms. SMS usually specialize in one to two types of user generated content, for example Tik Tok is video centric, whereas Instagram is primarily photocentric, and Twitter is multimedia centric, in which users tend to primarily post text, video and images [21, 39, 50].

Common types of UGC include images, long form videos, short form videos, texting, emails, direct messaging, and emojis. Whereas videos are straightforward communication, texting is nuanced, and has become more than basic syntax, overtime it has morphed into rich and expansive language, infused with different cultures and

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societal trends. Likewise, emoticons and emojis are also composed of pertinent societal definitions, based on generational culture and trends. These pictorial representations extend texting and allow users to supplement context and syntax; they may, for example, alter the meaning of text entirely, or emphasize a statement [12, 21][6].

Lastly, common UGC tools or items that allow users to create and interact with online content include QWERTY keyboard, a Latin layout of the English alphabet, and Voice Activated Personal Assistants (VAPAs), such as Siri or Alexa [11, 18].

2.2 Connection and Community

Building a sense of community is a key influential factor that motivates people to engage in digital communication. Users enjoy moments in which they can create and participate in digital touch points–moments of intimacy in technological settings, with members of their first and secondary social groups [33, 35]. Correspondingly, digital touchpoints foster a sense of belonging within cyber groups, which then continues to feed a desire to communicate via technology. Lomanowska et. al argue that digital intimacy, despite the lack of another's presence, is comparatively similar to physical intimacy. Depending on a user's environment and social access, the digital intimacy and sense of belonging received in cyber spaces may be of greater interpersonal value to them than what they experience in their real life [26, 48].

2.3 Information, Entertainment and Common Gratifications of User Generated Content

Gratification theory suggests that individuals select media that meets their needs and leads to gratification. Whiting et al. identify a strong relation between gratifications and social media use, which may predict recurrent use. Information seeking, also known as communication utility, does not depend as much on social interaction, but relates to a desire to learn in cyber spaces and engage in self-education for both professional and non professional pursuits, mostly for the sake of curiosity consumption [48]. Entertainment is a type of engagement in which users derive fun and enjoyment from cyber communications–be it consumed. Other less notable gratifications of user generated content include relaxation and surveillance of internal and external social groups [20, 35, 48].

2.4 Online Disinhibition

Another gratification of UGC creation and use is online disinhibition—this refers to behaviors people do more freely, disinhibited online as compared to in person. Online disinhibition can be benign or toxic. The former leads to healthy explorations of identity. The latter, however, may lead to the opposite, freeing individuals to explore disturbing acts of violence and crime, including racism, ableism, and sexism, without the consequences they would encounter in physical settings. Four relevant factors are typically outlined as relating to disinhibition, which include invisibility, solipsistic introjection, dissociative imagination, and minimization of authority. Though similar, **invisibility** refers to the lack of physical presence in digital settings and how users don't have to worry about certain factors such as their own appearance, sound, or other people's emotional reactions. Moreover, **solipsistic introjection** happens when users personify online content creators to fulfill intrapersonal imaginations. Similarly, **dissociative imagination** occurs when people use online spaces to explore their imagination, and in doing so separate their online identities from their real life. Lastly, the final contributor is known as **minimization of authority** which posits that writing skills are the only digital determination of one's status in society [42].

2.5 Identity Formation & the relationship between Users & Social Media Influncers

Hoffman et. al expands Lomanowska's et. al theory regarding digital intimacy, explaining that through benign disinhibition, group-based solipsistic introjection of social media influencers, can foster online communities, which in turn cultivates one's individual sense of identity. Moreover, research suggests that such parasocial bonds can also lead to the construction of ethnic identity amongst cyber social groups [16].

3 DHH AND BLV Accessibility Violations And Associated Effects

In contrast to the previous section, in this section, we detail currently inaccessible SMSs and UGC types and tools. Then we will discuss unavailable assistive technologies that do not exist, despite need. Next we transition into how online ableism further limits these communities. Then we delve into the privileges of benign disinhibition that sensory disabled users are not able to experience due to said inaccessibility. Lastly, we report the ways in which these limitations may stunt online identity formation; a process pertinent to intrapersonal development [7].

3.1 Inaccessible User Generated Content for Sensory Disabled Users and Content Creators

Alt-text is an assistive technology for BLV users which is used to verbally describe visual elements in digital media, making it accessible for a screen reader user. Alt-text is in fact mandated as part of the Web Content Accessibility Guidelines (WCAG) for web accessibility. However, several social media and direct messaging platforms still lack widespread alt-text support. Research has observed that while platforms such as X (formerly Twitter) are popular among BLV users, low amounts of tweets containing images include alt-text, and even when alt text is included, they tend to include errors. Several important UI elements also lack support altogether such as personal profiles or geo-location [14]. Furthermore, researchers argue that alt-text may not be sufficient when sharing rich images that convey complex verbal concepts. These phenomena have also been observed outside of social media, including in academic research papers [32].

Similar to how platforms' adoption of ALT text still fails many BLV users, the lack of proper captioning impacts DHH viewers. Captions are subtitled transcriptions for long and short form videos, and are also mandated by the WCAG for web accessibility. Yet many online applications such as Facebook, TikTok, YouTube, Instagram, and Twitter fail to comprehensively offer users captions. Popular captioning issues include timing inconsistencies, spelling errors, audiovisual mismatches, missing words, and excluding utterances and

non-speech sounds. Furthermore, in short form videos, researchers found that SMS's support an inaccessible trend, in which content creators prioritize comical and click bait subtitles over other important information necessary for comprehension [9, 31].

BLV and DHH users encounter other accessibility challenges regarding UGC tools— emojis and VAPAs. Prior research indicates that alt text for emojis lacks nuance, content, application, and description. For DHH users, researchers found familiarity with different emojis depends on one's access to cultural trends, which in other countries may differ [29, 45]. VAPAs assist BLV users and help facilitate tasks such as texting, sending emails and calling on within cellular devices. Though useful, VAPAs also fail BLV users in a variety of ways including, misinterpreting of input commands, poor feedback, quick feedback, speech recognition errors, limited voice settings and control, and answers through visual content.. Moreover, despite their desire to utilize VAPA's, the technology is entirely inaccessible for DHH users, due to voice-only input and feedback [1, 13].

Furthermore, the lack of accessibility of popular SMS makes sensory disabled users feel excluded from mainstreamed cultural trends. In turn, this relates to deep-seated feelings of isolation and depression, especially within young adults [22, 47].

3.2 Unavailable Assistive Technology for Sensory Disabled Users and Content Creators

Researchers argue that online anonymity is a hearing and sighted privilege that allows abled users to explore online spaces, disinhibited and enjoy the benefits of invisibility [7]. Current keyboards and font scripts do not allow DHH signers to communicate in ASL and do not allow BLV users to communicate with non-blind users via braille–this forces both parties to either communicate online via English QWERTY keyboards or videos. Both solutions limit sensory disabled persons access to two contributors of online disinhibition. Regarding minimization of authority, DHH and BLV users sometimes fear communication via conventional keyboards, because they fear they will be deemed unintelligent based on underdeveloped writing skills as English is not always their first nor preferred language. Secondly, videos remove anonymity, forcing these users to expose their identity, which removes the freedom of invisibility [17, 24].

Prior research explains that while facial technology has recently expanded, no current technology exists that hide one's identity, whilst keeping facial features movements, which are pertinent to the complex nuances of facial expression within ASL. In addition, BLV users report incompatible software with screen readers and challenges with complex UI paths on SMS [17, 24, 34].

3.3 Unique Accessibility Violations for Sensory Disabled Content Creators

As content creators, sensory disabled users face unique challenges that limit their ability to attract and interact with follower bases. Researchers discover that Deaf content creators, especially in other countries where English is not the primary language, experience difficulty translating multiple verbal and signed languages. These creators must connect a wide range of meaning-making systems and first translate scripts into their language, and then into their sub-set of sign language. Tang et. al. highlight that language complexities make poor content quality popular amongst DHH creators as DHH followers struggle to determine the trustworthiness of information [43, 44]. Along the same lines, BLV content creators struggle with inaccessible creation tools including incompatibility with screen readers, alignment tools, unlabeled elements, multi-layered menus, and various image sizing tools. Researchers explain that such blocks make editing and stylizing content, without external help, near impossible [52].

3.4 Online Ableism, Invisible Work Theory, Flourishing Labor, Fatigue and Wasted Time

Toxic online disinhibition, in contrast to benign disinhibition, feeds off of a social construct of fake heroism and negativity; it enables hearing and sighted persons to embrace ignorant generalizations and dismiss the opinions, efforts and experiences of DHH and BLV communities. Ableism is prevalent online as social narratives become less about promotion of disabled cultures and more about rewarding abled persons for being socially aware of inequality, even though in reality the majority are not. Online conversations about sensory disabled persons do not include these individuals and are often rooted in assumptions, based on negative stereotypes regarding low intelligence and inferiority [2, 5, 24].

Furthermore, researchers determined that though both abled and sensory disabled parties use the internet to gather information and connect with friends and family, sensory disabled users did not seek to meet strangers and develop online relationships. In addition, this team also found that sensory disabled users primarily use the web to seek independence and agency and do not experience other gratifications in the same manner as abled persons [2].

Sensory disabled content creators also face brutal discrimination online. Researchers found that many disabled creators feel that Youtube's algorithm is discriminatory, exclusively promoting videos and streams featuring abled persons. When creators choose to identify as disabled in video posts, they notice significant differences regarding viewership and demonetization frequency [10, 38]. Saunders suggests a "cry baby" effect: a phenomenon in which marginalized communities, such as those who are DHH and BLV, are viewed by the majority as crybabies when they express the means or situationships of their oppression. This display of toxic online disinhibition quickly translates to violatel acts of cyberbullying [40].

Ableist environments, unavailable assistive technologies and accessibility violations deter sensory disabled users from online platforms. To regain some semblance of participation in online activities and cultural trends, these users often rely on **invisible work**, (also known **infrastructure work),** which **is** additional work disabled persons must do to make inaccessible platforms accessible. [8, 28] However, researchers find that invisible work takes time and causes surplus fatigue. Moreover **flourishing labor** relates to how people conceptualize themselves on social media and connect to each other, forging online communities. Benign disinhibition, a key factor of identity exploration and discovery, is an able-bodied privilege. Ultimately, lack of accessibility then limits the extent to which members of these communities can experience

and enjoy disinhibitions, which then limits the extent to which they can use technology to explore their identities. [7, 33] Therefore, sensory disabled creators willingly bear the burden of flourishing labor and choose to create safe spaces online, as they fear their communities will continue to be overlooked. [27, 44]

4 Determining Responsibility of Accessible User-Generated Content

Though the topic is up for debate, most sensory-disabled users feel the responsibility for accessible UGC should belong to content creators. However, in this section, we examine the complex implications of responsibility between content creators and platform hosts, considering content creation's monetary pressures and the lack of sufficient resources for both parties.

4.1 Content Creation is a Monetary Business

Most social media platforms have established economic value by manipulating and lowering entry barriers to content distribution and publication, which favors the platform over the creators. While not all content creators are financially motivated, most are, and their primary goal is to earn profit. Being a professional content creator involves trying to make a living by constantly creating content across different platforms, prioritizing visibility and profitability.

Although monetization schemes can empower and benefit creators, they also highlight the reliance on the platform hosting their content. Some content creators abide by YouTube's monetization contract, which includes policies on community guidelines, terms of services, advertising, and monetary tactics through the YouTube Partner Program (YPP).

The exact revenue share and its calculation between YouTube and creation are often not transparent. Platforms like YouTube and Facebook enforce policies that influence creators' brand objectives and tactics to improve commercial viability, yet these strategies frequently do not promote accessibility. Despite monetization schemes and the appearance of partnerships, most social media platforms maintain control over creators' content by acting as "legislators, judges, and enforcers," reinforcing the ambiguity between creator empowerment and platform dependence.

Some creators feel that media platform algorithms force them to pay for visibility; interviews with Instagram fashion and lifestyle content creators revealed that creators sense a need to track metrics and analytics to better understand content performance that will increase their chances of being pushed through the algorithm and develop tactics to "beat" the algorithm. This process is described as playing the "visibility game." Others felt pressured to produce content regularly because they feared being "punished" or suppressed by the algorithm. Creators often personify the algorithm's behavior, highlighting how it prioritizes content based on audience engagement and creators' regency.[19]

This algorithmic influence can lead to a power imbalance between platform hosts and creators, limiting creators' content because of coerced compliance and requiring them to prioritize alignment with the algorithm's preferences to preserve and enhance their visibility and profitability, leaving a gap in inclusive content expectations by not explicitly addressing accessibility requirements. [23]

4.2 Insufficient Training, education, and resources

Developing accessible video content, specifically audio description (AD) or closed captioning (CC), is "a labor-intensive process that requires video authors to manually identify inaccessible segments by watching the video frame-by-frame." This task can be incredibly challenging for non-professional describers and captioners, who lack sufficient training and tools to identify video accessibility issues efficiently. Research has found that the absence of convenient systems and platform support are substantial reasons for not providing AD and CC.

Current tools identify "gaps in speech" to suggest where descriptions might be needed, which is an inadequate method for numerous genres that do not have significant speech pauses and rely on other forms of digital media, such as images. [25, 49]Interviews with authors with various backgrounds and levels of expertise found challenges in understanding what information belonged in an images' caption versus alt text, how to describe dense visual information, and how to handle complex figures with multiple elements. Even experienced authors struggled with knowing what information to include when writing alt-text and how to structure descriptions for complex figures, and most authors lacked the tools, knowledge, and support to compose "high-quality" alt-text for their research communities. Also, written communication workflows and tools often incentivized composing alt-text at the last minute, leading to potential errors and inconsistencies. These findings show the need for better education, tools, and support systems to assist creators with producing more accessible content across various platforms. [25, 49]

5 Retrospective AI Technological Innovation

Current solutions to technological inaccessibility for sensory disabled users are mostly made prospectively––consisting of amendments to previously existing devices and user interfaces. This section details retrospective design solutions to inaccessibility; and reflect upon innovative developments that are iterative in their pursuit to achieve user centricity.

5.1 New Technologies for Deaf and Hard of Hearing

Researchers highlight that inaccessibility arises when technological solutions do not allow for DHH users to communicate with hearing users. Therefore one goal of retrospective developments is to make automatic sign language recognition systems. [3] Current AI solutions consist of hand gesture recognition, sign language recognition, facial expression disambiguation, emotional recognition within sign language, and throat language interpretation systems. These systems aim to bridge the gap in communication, by allowing DHH users to sign to hearing persons via video or virtual conversation. [51] However, more research is required regarding user anonymity; no video technological solutions exist. For textual communication, researchers are investigating the usefulness of fingerspelling keyboards, as some participants find excessive spelling tedious. [15] In regard to non-communicative tasks, researchers ideate assisted subtitling prototypes to address the lack of caption-training amongst

content creators. Through unique features such as speech recognition and text to voice synchronization, researchers aim to simplify the caption creation process and in doing so incentivize creators. [3]

5.2 New Technologies for Blind and Low Vision

Similarly researchers has explored AI solutions such as haptic braille keyboards, one-handed braille keyboards, and personalized AI-assistants to help BLV users navigate productivity applications and communicate with sighted people via braille. They acknowledge the incomprehensive nature of screen readers, and have adapted solutions to fit modern user interfaces, involving complex user paths. However, research in regard to complex user paths within SMS for BLV users, has not been academically explored. [3, 17, 36, 37, 41, 46]

6 Method

For this study we will conduct a survey based on our literature review to explore the perspectives of people with sensory disabilities on the current accessibility of UGC, their perspectives on who and how should be responsible for the content accessibility, and on new tools that may increase its accessibility. As such, our survey questionnaire contains 25 questions divided into 8 main categories: platforms and surfaces, media types, motives, accessibility violations, invisible work and responsibility, online identity formation, disabled content creation, and technological innovation.

We will conduct the survey online. We aim to recruit roughly 150 participants, who are BLV and or DHH through platforms such as Prolific or social media interest groups. To avoid scamming practices, we will not include participants who provide inconsistent responses or complete at least 75% of the survey. This procedure is to assure that respondents are not simply participating to obtain the compensation as we will compensate valid participants with a US$10 Amazon gift card.

7 Conclusion

In conclusion we compare and contrast privileges, gratifications and experiences of abled and sensory disabled users, to ascertain pertinent arenas of accessibility need. We also highlight the controversial topic of accessibility ownership, to achieve two goals 1) draw attention to the lack of know-how regarding accessible content creation and 2) highlight the power imbalance concerning creators, algorithms and SMS conglomerates. Lastly we illuminate ways in which retrospective AI can provide solutions via user centric design for sensory disabled users and UGC use. We hope to offer future research efforts, arenas of application regarding the accessible needs of sensory disabled users and content creators.

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