Towards Intersectional CUI Design Approaches for African American English Speakers with Dysfluencies

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Abstract

Conversational User Interfaces (CUI), such as voice assistants, offer great potential as a communication modality for people with disabilities. Unfortunately, the limited research that has examined the design of CUIs with regard to race or disability considers each in isolation, neglecting the lived experiences of African Americans with speech dysfluencies. This position paper first reviews literature considering race or dis/ability in CUI design. We then explore compounding inequities at this intersection for African American English speakers who stutter. Finally, we invite participants to engage in inquiry around intersectional approaches to designing equitable CUIs that honor the intersection of race and disability.

Introduction

Conversational User Interfaces (CUI), such as voice assistants, are one of the most widespread examples of voice-based interaction [8], yet they generally fail to be inclusive of marginalized intersectional facets of identities. For example, the intersection of race and disability in CUI design remains understudied, especially for African Americans with associated English ethnolects and speech dysfluencies (e.g., stuttering). Although some research has examined the design of CUIs to be inclusive of race or disability [1, 3, 9], we argue that it is also important to consider this rich intersection of identities.

In this position paper, we approach the inquiry of designing CUIs for the intersection of race and disability in three parts.

We first highlight previous research examining race and disability in CUI design. We then surface entrenched notions and amplified inequities that compound at this intersection for African American English speakers who stutter. We close by asking how our community can apply intersectional design approaches to building more equitable CUIs.

Race and CUI Design

Critical Race Theory (CRT) is a theoretical lens that examines the appearance of race and racism across dominant cultural modes of expression in America. CRT scholars attempt to understand how victims of systemic racism are affected by cultural perceptions of race and how they represent themselves to counter prejudice [12, 13].

Within Science and Technology Studies (STS), CRT has highlighted ways technologies can impact people of color and other under-represented ethnic groups, characterizing technology design as a site which can perpetuate harms stemming from systemic and social violence [5]. Ogbonnaya-Ogburu et al. further extended and adapted CRT in arguing for the importance of addressing issues of race in HCI research and practice [11].

Research has highlighted the prevalence of racial disparity in current voice-based systems. For example, an analysis of commercially available Automatic Speech Recognition (ASR) found significant racial disparities in transcribing Black voices versus white voices [9]. These racial disparities can result from a system's unfamiliarity with phonological, phonetic, or prosodic characteristics of African American Vernacular English (AAVE) due to insufficient representation of audio data from Black speakers in training data [9]. Other studies suggest voice assistants could more effectively serve the Black community by incorporating their culture, whilst addressing privacy and security concerns [7].

Accessibility and CUI Design

Disability Studies and Accessibility research both work to create a more inclusive world through rooting their research in the lived experiences of people with disabilities. In an early and important framing, Mankoff et al. prompt researchers to draw more upon the critical inquiries of Disability Studies [10]. Limited research has explored the accessibility of CUIs, often focused on potential benefits for older adults, blind and low-vision people, or people with limited motor dexterity. For people who stutter, current CUIs pose a variety of challenges [4], leaving them left out of these highly beneficial communication modalities.

Other speech research has focused on detecting dysfluencies or building dysfluency-aware recognition models. For example, Bayerl et al. leverages machine learning techniques to detect six different stuttering-related events (e.g., blocks, prolongations, sound and word repetitions) [2]. The limited research on improving robustness of voice recognition to speech dysfluencies has largely neglected people with associated English ethnolects, as existing data resources on speech dysfluencies are only representative of white, high resourced languages.

Amplified Inequities at the Intersection

It remains a challenge across inclusion and accessibility to examine the challenges and inequities that coexist at the intersection of race and disability. Given existing demonstrations of CUI shortcomings in recognizing African American Language speech, it seems safe to assume systems will have additional difficulty in executing recognition for African American Language speakers who stutter. A person's speech might be perceived as noisy data and subsequently auto-corrected, resulting in unfair or inaccurate responses. Consequences of error could also impact access to information, to services, and to completing high-risk tasks that have particularly damaging

consequences. Negative affective experiences are also likely to result, potentially exacerbating the anxiety that often accompanies stuttering. In recognizing these challenges as technological harms that can be amplified through a neutral stance on the intersection of race and disability, we aim to highlight a need to prioritize African American Language speakers who stutter in the design of accessible and inclusive CUIs. It is important to ensure that all people can benefit from the convenience and functionality of CUIs while maintaining their sense of self, safety, and well-being.

Exploring and Engaging Intersectionality

Intersectionality suggests people have unique experiences based on the combination of their identities and social categories (e.g., race, gender, sexuality, ability). In seeking to impart critical perspectives in CUIs, it is paramount to apply a multidimensional lens to these intersecting identities as they relate to how people navigate speech and language.

Erete et al. highlighted the importance of researchers developing a shared understanding of problems that are relevant to a communities, especially those from historically excluded populations. [6]. Such understanding attributes aspects of community cultural wealth including social, cultural, and linguistic capital, as grounded-truth data of cultural context. In data science, there is a growing agenda and practice to utilize 'culturally competent data' to train machine learning language models, in exhibiting behaviors and capacities in how people navigate CUIs against their identities. In HCI, intersectionality is a techno-feminist framework for community-driven technology innovation that incorporates various backgrounds and personal experiences that shape the lives and outcomes of marginalized populations into technology design. Similarly, emerging lines of work in critical computing practices affirm that turning a universal neutral gaze (the assumption that factors are innately 'just'

and 'fair') in the design of CUIs further invites design outcomes of systems that are biased, racist, and ableist.

Applying Intersectional Approaches

DisCrit (Annamma and Morrison 2018), emerged from education, as a conversation and framework regarding the intersection of race and disability. Evolving from CRT, DisCrit highlights the intersecting oppression of racism and ableism in the lives of ethnically-diverse disabled people. Highlighting how marginalization manifests against the backdrop multiple intersecting forms of identity. Participatory design approaches engage with historically marginalized or underserved communities to co-design pathways toward more desirable outcomes. These approaches include: community-based participatory research (CBPR), equity-centered community design, and design justice principles; accompanied by a variety of emerging civically engaged methods.

Workshop Participation

In participating in this workshop, we look forward to positioning intersectional design approaches as equity-oriented research and design tools that can be promising sites of interventions for designing and building CUIs within the complexities of racial and dis/ability identity. In doing so, we invite our community to explore and apply these frameworks in their own work and to further explore how intersectional approaches might better empower people such as African American English speakers with speech dysfluencies. It is our position that current compounding disparities and degraded experiences are a direct consequence of neutrality to intersectional aspects of identity such as race and dis/ability.

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