10-4-2019

Breaking The Exclusionary Boundary Between User Experience And Access: Steps Toward Making UX Inclusive Of Users With Disabilities

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ABSTRACT

This research paper points out that we as Designers have failed to come up with a model of UX that would proximate a satisfying user experience for users with disabilities. It underscores the gaps in designer knowledge about disabled bodies. The research paper also draws the attention of the designer community to the limited understanding we presently possess of the disabled people's notions of, and expectations from, satisfying user experiences. It proposes a multi-step process for shifting the focus of design activity from a "medical model of accessibility design" that retrofits normative designs to the needs of users with disabilities to developing an "accessible user experience model (AUX)" of design that counts these users as design collaborators, possessors of special knowledge about disabled bodies, and untapped sources of innovative designs that might offer additional design features for all users.

CCS CONCEPTS

• Human-centered computing → Accessibility design and evaluation methods;

KEYWORDS

Accessible UX (AUX); accessible design; disabled co-designers; haptic technology; medical model of accessibility design; participatory design; retrofitting accessibility;

1 INTRODUCTION

This research paper highlights a crucial aspect of UX—a natively co-conceptualized version of accessibility for users with disabilities—that ought to become a popular discussion among UX researchers and designers. It features a difficult relationship between designers and users by focusing on the differing experience and conception of embodied needs in digital products held by the two groups. Beginning with a brief analysis of designer activity in the area of disability and accessibility, it articulates how UX Designers have failed to come up with a model of UX that would proximate a satisfying user experience for users with disabilities. It underscores the gaps in designer knowledge about users with disabilities--the knowledge possessed by disabled bodies that are beyond the ken of the nondisabled ways of knowing. Thus, the Designers are missing opportunities to learn from these users' specialized knowledge acquired from the affordances of additional senses disabled users employ on a regular basis to compensate for the inequities of ableist technology designs [35] and the specific techniques developed by these users to augment their physical and sensory capabilities through technology. As a note on terminology, this paper makes alternating use of "users with disabilities" and "disabled users" and both of these labels are prevalent in disabilities studies literature at this time. The former is also legally sanctioned under The Americans with Disabilities Act (ADA) of 1990 [28].

1.1 Gaping Holes in Designer Knowledge about Disabled Bodies

Designers and researchers in the user-centered design (UCD) field have emphasized that we need to first learn about our users to design for them. We need to know who they are, how they interact with their environments, what sort of complex activity networks they are a part of, and what their specific task needs and interests are. We are also responsible for discovering "how, when, where, and why they do what they do" [67]. Traditional user testing methods can provide us with contextual clues about our users but before getting to this step, we need to learn the aforementioned background information about them. UCD as a field and movement is intrinsically interdisciplinary. "UCD is about situated, dynamic, contextualized design focused on the users' needs and wants. It builds into its approach the theoretical

concepts of other user-concerned fields (e.g., cognitive sciences, ergonomics) because it wants to create the fullest picture of the user experience as possible. The movement to address the complexity of ubiquitous computing and replace limited applicability of traditional usability testing with a user experience (UX) methodology is the last influential force at work during this period" [67]. Despite its stress on interdisciplinarity and its desire to design the fullest user experience, it ends up creating user experiences for those who are nondisabled and are a part of the industrialized economies of the global north. Just as the market does not include disabled users when it projects demand and consumer interests, the designers and developers of the web products for the world wide web market also overlook these consumers.

While disabled consumers of technology also employ, adapt, and subvert technologies for purported and unpurported uses like other consumers, their embodied interactions with technology and the nature of these interactions' embodied temporality differ in significant ways [45]. Ignoring these differences in UX design has resulted in frustrating experiences with technology and undermine the very idea of user experience and the premises that buttress the very field of UX [22, 34]. Our community's attention to our limited understanding of the disabled people's expectations of satisfying user experiences is also important because we as designers and developers lack close professional and personal relationships with disability community and our conceptions of their bodies seldom rises above media stereotypes and sociologists' ill-conceived notions of disability based on the scientific theories of eugenics popularized by 19th-Century theorists like Galton [1]. The understanding of this specialized bodily knowledge and the disabled users' ways of thinking about technology can only be learned through close embodied interactions with this user group. Such interactions can help designers examine outmoded attitudes toward disability and disabled people, learn to overcome biases about physical and mental differences, and develop what we might label as, "accessible user experiences (AUX)" for flesh-and-blood disabled users. We might need this AUX moniker at least until we can make all user experiences inclusive for a variety of bodies. The author proposes a multi-step process for shifting the focus of design activity from what he calls—a medical model of accessibility design—a model that assigns disabled users a back seat in the design and development activity through last-minute accessibility solutions in the form of retrofits—to a participatory and social model of accessible designs where disabled users with significant experience with technology, professionals working in technology fields, and common consumers with disabilities can play an active role in defining and shaping the design of satisfying user experiences. According to Pelle Ehn, "participatory design is characterized as an approach to involve users in the design" and it "is seen as a way to meet the unattainable design challenge of fully anticipating, or envisioning, use before actual use, takes place in people's lifeworlds" [63]. Thus, this research paper asks designers to rethink the concept of designing for inclusive user

experience by proposing a six-step agenda in design process while employing participatory research methodologies [6, 25] with disabled users. This approach will result in breaking down the boundary between designers and disabled users and between the concepts of user experience and accessibility and make the relationship more ethical [24, 26].

2 LITERATURE REVIEW

Designers, particularly working in the academic spaces, have made attempts to provide access to disabled users. The stress has been on making websites accessible, including design and testing of evaluation standards [2, 3, 56] to suggesting strategies for adding accessibility into the design process early on [4, 5] and usable accessibility [7, 11, 22]. Researchers have proposed various alternative approaches to design for considering those users' accessibility needs who are often excluded by the market economy—Social Model of Design Practice [30], Universal Design [31, 32, 48, 49, 50, 51, 52], and "virtue ethics" in design activity [33]. Many other proposed approaches offer stopgap solutions that verge on condescension and do not go farther than providing legal fixes for inaccessible web content [38]. Unfortunately, these approaches remain designer-centered because they often have minimal input from the users with disabilities, overly depend on the designers' benevolence, or inflate accessible designs, as in the Universal Design approaches, too thin in an effort while generalizing the user needs from disparate disability groups.

Further on, discussions of accessibility in practice is often relegated to an exercise in compliance to standards [5], or takes the form of last minute retrofitting of make-shift access when an automated test on the web pages by a tool like WAVE flags errors that can be fixed at this late stage and do not require structural changes in the website design [8]. Many of these cobbled together solutions appear on websites only after customers with disabilities complain.

2.1 Issues with the Trajectory of Current Research Approaches

While researchers have discussed the concept of usable accessibility for an effective user experience [7, 11], this paper clarifies that blind users, in fact, draw nothing from most of the websites that could be labeled as, "user experience", because the maximum access they provide is "technical readability" of non-image textual content for screen readers. In practical terms, it means that this user group can extract textual information along with some information from the descriptive labels for images without any contextual information about the complex relationships among the fragments of content. Additionally, the web designers from early on began to employ diverse elements—layout, colors, fonts, spatial relationships, positioning within the page. Links to other pages, etc.—which visually communicate the basic semantics, or the meaning of the communication, not included in the textual content. None of these were accessible to blind users and became even more inaccessible after the

introduction of HTML5 and web pages now include pictures, tables, diagrams, and the ubiquitous graphics which require interpretation based on visual perception. The Web Content Accessibility Guidelines (WCAG 2.0) and its refresh prepared by the World Wide Web Consortium (W3C) focus on the accessibility of content presentation details and overlook the presentation strategies employed by web designers to communicate the relational meaning of these details [7]. In shop talk shared at conferences and symposia by web designers and screen reader manufacturers' representatives, each group blames the other for not doing their job properly. However, web designers do not always realize that screen readers themselves are a retrofit technology developed to patch up the accessibility gap left by the exclusionary design of web pages through a visual user interface alone. The early decisions about interface choices excluded web access for all of those users who depend on other senses than vision. Their introduction of aural content similarly excluded deaf users and struggle for captioning of this content goes on. It might also be relevant to emphasize that captions are not the only solution for providing access to sound for deaf users and the research in this area is slow in reaching the market. Nevertheless, some of the proposed solutions are exciting because they aim at refining the haphazard techniques of captioning online videos. Some of these emerging enhancements are also a welcome addition to the one-dimensional experience of multimedia web content through captions available at this time since they employ the multisensory affordances of haptic technologies [36, 37, 44]. The introduction of ARIA roles—another web design technique for communicating additional information is a retrofit and it was at one point expected to fill some of these visual gaps for blind users but designers and developers even don't seem to have an agreement on when and where to employ ARIA roles. The outcome is a haphazard use of ARIA techniques with users left further confused about the benefit of this addition.

2.2 Where do Users with Disabilities Stand in Regard to UX?

The growth of the UX field has moved the web design field toward a more user-centered space for conceptualization and creation of experiences. The designer-centered concepts of use [59] has given way to an integrative view of the relationship between design and its users [10, 57] and the boundary of use has itself been expanded to include the whole user experience as designers have questioned the narrow definition of use tied to user interface. However, when we pay attention to our disabled users, we do so often toward the end of the design process at the stage of testing our final products, not the prototypes [58]. Any modifications made at this late stage takes the form of a retrofit since ground-level access requires consideration at the conceptual stages of web design [8]. The result is a modified UX design conceptualized from the perspective of nondisabled users and the retrofitted access serves more as a prosthesis than as an accessible design feature of an original product. It is important to mention that the communication between designers and disabled

user communities has been minimal and each knows very little about the other's thinking.

3 MAKING UX INCLUSIVE OF DISABLED USERS

This research paper proposes that the user experience concept itself requires rethinking with participatory input of disabled users of all levels so that the artificial boundary between the user experience design for the disabled and the nondisabled becomes porous. The resulting permeability, with the users of diverse abilities participatorily defining the characteristics, structure, and boundaries of user experience, can take us to novel ideational spaces where the richness of multisensory web spaces can be realized. We know so little about how disabled users experience the contemporary multimodal web and we know even less about how users with diverse disabilities employ the affordances of their senses. Since the visual sensory glut of the recent few centuries of art and design have marginalized other senses [40] and our formal and informal learning networks teach so little about the affordances of our other senses, we badly need education in this transgressive space for novel designs [23]. Realizing this goal would require a basic shift in our design thinking and attitudes toward disability where 1) we acknowledge that we have not shown a serious interest in our disabled users and our attitudes toward disability are no different from those of the person on the street; 2) resultingly, our knowledge of disability is at best cursory and our familiarity with disabled users web experiences is skin deep; 3) that we accept that disabled people are as diverse as all other individuals and they possess the knowledge and skills to express what their user needs are and how they experience technologies; 4) that we acquire basic disability education to understand and learn about how people in each disability group orient themselves in space and time to accommodate their bodily differences and varied contexts of use [62]; 5) that we recognize disabled users as the owners of privileged knowledge; and 6) accept them as our ideational partners in the design enterprise.

3.1 Examining our Attitudes toward Disability

The Disability Studies field has produced a body of empirical and theoretical research that analyzes the ableist attitudes professionals in general direct toward people with disabilities [15]. The design field can gain important insights into the biases of its current thinking about disability and disabled people by integrating this knowledge into its research literature. In their paper, "Accessibility versus Usability", Chandrashekhar & Anderson note that "whether accessibility guidelines also encompass the usability needs of users with disabilities are being debated" [11]. More than a decade later, the W3C 's Web Content Accessibility Guidelines have gone through a major revision in Version 2.0 and 2.1 and the question of whether accessibility for the users with disabilities also includes usability still hangs in the air. If web design practice could be relied on for an answer, it tilts more in the direction of "no" because the reports on accessibility of websites for users with disabilities do

circulate off and on, but literature on the usability of websites for this population cannot even be described as being in an emerging state.

We have frequently shifted our terminology from usability, user-center design, and more recently, to user experience but our attitudes toward disabled users have been those of neglect verging on professional condescension, lukewarm sympathy among those who do care, and of highfalutin benevolence among those who want to wear the mantle of leadership in the discipline—social justice, disability justice, and so on. Interestingly enough, we seldom use these terms for ourselves, or our nondisabled users—"Social justice for the ones with all the user choices"? We fail to acknowledge the essential facts that the accessible design work in general, and interaction design work in particular, offers us a leg up over our peers as we tackle messes made by other designers in an otherwise universally accessible concept of a World Wide Web that Tim Berners-Lee created. We also seldom recognize that accessible design contracts are lucrative when available and offer opportunities to develop new skills, implement novel design ideas, and expand the ken of our design expertise. Our attitudes are ableist when we design: "If I can do it with my eyes closed, any blind person can do it", or "Having to press three keys at a time is no problem for human hands; I do it all the time". The same designer would balk at using a device without a mouse. We can also exhibit unveiled contempt toward disabled users of our designs by refusing to even engage in a direct conversation with them: "Canvas is a web-based learning management system; I don't see why a blind person would have any problem using it", or "We work with your university's technical support all the time and they have told us that Canvas works fine with screen readers". Another instance of such contempt is utter silence at our professional conferences after a disabled presenter critiques our work. Most often the questions go to the nondisabled panelists about matters that do not critique ableist designs. A third version of this attitude is when we are selective about addressing the needs of certain disability groups and ignore others because either their numbers are small, or they do not have the backing of a power group. The learning management system mentioned earlier in this paper would address the needs of disabled students but would act ignorance about any issues confronted by disabled faculty. This attitude is both opportunistic and contemptuous. It undermines the very existence of the small numbers of blind faculty in this country and constantly raises new barriers before them by rolling out version after version of poorly conceptualized, designed, and implemented features in its LMS design on the instructor end. This opportunism is exhibited in the eagerness to introduce LMS features that do not serve disabled users while presenting its sponsor as a progressive organization with novel ideas—of course, novel ideas that serve only a select population that wants the newest trend. In the meantime, the web design field treats compliance with WCAG 2.0 as its ultimate goal and disabled users' dissatisfaction with the results of this compliance is more or less ignored. In a study of the website browsing by blind users, Power et al. found that only half of the accessibility problems faced by the participants fell under the guidelines covered by WCAG 2.0 [16]. The websites that had employed the techniques dictated by these guidelines alone had 8.4% of these problems. It appears that the creators of WCAG 2.0 probably did not have the empirical evidence of the type of problems that this study participants faced at the time of developing their guidelines, or their research with blind users was not expansive enough to include additional guidelines to cover these problems [17]. Further, the drawbacks of one set of guidelines, or methodology, can get magnified when another organization adopts it for convenience, or for the sake of uniformity, without considering the problems it transports to the new venue. The adoption of WCAG 2.0 standards by the United States to update the outdated Section 508 guidelines is an example of such a transfer of problems [43].

3.2 Building a Knowledge Base

Researchers have discussed the role of expert users in web design [53, 54, 55]. A disciplinary knowledge base about disabled user experiences is possible only after we engage with disabled users as co-designers and co-creators on a regular basis, conduct well-designed empirical studies of our collaborative work, and evaluate the relative strengths and weaknesses of our first-hand experiences of embodied difference. Accessibility is not the product of designed objects alone, it requires interaction between designers and users for negotiating social relations so that a space is created for mediating the explication of design elements among designers, expert users, and the holders of embodied experiences. Disabled participant co-designers and researchers can be quite influential in reshaping the ideas designers hold about the possible approaches to solve specific accessibility problems. They can further affect the direction of problem-solving by sharing their own problem-solving strategies based on their lived experiences. Last, they can propose solutions of their own which are often rooted in their daily practice of problem-solving since disabled users confront such problems as a matter of routine while fording the gaps present in every ableist physical and cyber environment. Users with sensory disabilities also are adept at provisioning answers to their daily problems employing multisensory tools and objects which tend to be absent from most designers' toolkit because designers rarely step out of visuo-audio modalities in their own lives. We need to realize that we have not even begun to consider all the multisensory affordances available at the moment, and particularly in the field of haptics, many more developments are possible to build accessible designs and environments.

3.3 Recognizing the Autonomy and Diversity of Disabled Users

We must give the same agency to disabled users that we offer to nondisabled ones and give them chances to determine and express their design choices beyond the user interface. While participatory design approaches have been applied in various forms, they lack the rigor and centrality of participants in design process that originated in the Scandinavian researchers

redesigning work systems on the factory floor with workers. For instance the three phases of contextual design beginning with immersion in the life of some individual users through field visits inflates the process to the picture of the whole market, bases its ideational stages on this data without the embodied participation of these users, and tests these concepts only when they are concretized as product prototypes and user interfaces [18]. The design and structure of Swedish video interpreting service's infrastructure is a telling positive example of how deaf user experts shape that country's video interpreting service through their participation but also how their expertise is placed higher than that of the technology designers. The deaf community's relationship with video interpreting technology is perceived in that design process. Because of the central place of deaf experts in the formulation of the Swedish video service policy and the choices of technology assemblages, the videophone service moves sign languages to the center of technology innovation and positions their users as a reference standard for all digital video communication [46]. Thus, the deaf consumers in Sweden are both expert designers of these videophone services and the users of their own innovation.

3.4 Need for Basic Disability Education

Historically speaking, disabled users have always been discriminated against by designers, with the exception of when a product has been designed by the disabled, or when it has been especially designed for them—typewriters, telephones, optical scanners, etc. come to mind from the pre-digital era. However, as these designs proliferated as consumer products, their newer versions have become less, instead of more, accessible. In the recent decade, even when accessible product features are designed for the disabled—often under legal pressure rather than the goodness of corporate hearts—designers and manufacturers are unwilling to own up to this fact because they believe that their nondisabled consumers would not buy these designs. We want to draw our readers attention to a deeper societal problem here: why are consumers not interested in buying goods that are accessible to use by disabled people? Is the consumer population above disability, or has it been miseducated to believe that goods designed for disabled users are inferior to the ones for consumers like them? Don't we as designers need to educate consumers about the advantages of inclusive designs?

As practitioners and experts, for understanding how disabled users avail the affordances of technology, we ourselves need to learn about how people in each disability group orient themselves in space and time to accommodate their bodily differences and varied contexts of use. The construction of authoritative knowledge had been in the hands of experts thus far [60] but the discussions of temporality and women's embodied experiences have challenged some of the scientifically defined chronological progression of time in relation to lived experiences in health sciences [19]. Physical disability's accounts of temporal embodiment of experiences and the knowledge derived from them is also beginning to receive attention in

medical and technological anthropology [20]. The design field can learn much about how different bodies relationally experience technology in space and time by intersectionally employing the concept of embodied temporality in UX from the perspectives of disability studies and feminist theory [39].

Participatory design as presently practiced with user experts with disabilities in what we call sites of knowledge production in academia become locales where epistemic injustice is dealt with by those who claim to be doing the just practice [66]. Interactions in these contexts more often result in a double oppression because the unjustly treated are presented as beneficiaries of the designers' work while in reality it is the designers, developers, and producers who take away the fruit of the experiential labor of the participant disabled users. This labor is further slighted when designers cherry pick from the results of such labor without providing any rationale to those whose intellectual work is being violated through a process that fragments and rejects the organically developed experiential knowledge of disabled users through selective adoption. Rarely do designers brief these participants about their processes of using the participant knowledge since these experts do not place the participants' knowledge at the same level as they place designers and developers routine work. These designers also believe that the experiential labor of the disabled participants has been duly rewarded with what industry insiders would otherwise regard paltry amounts. In the Microsoft country, these rewards can be as low as 25 dollars for two hours of labor with no compensation for the time the participant might have invested in traveling to the usability test site. Such epistemic infringements are seldom discussed in the ACM literature even though these participants should be listed as our co-authors for contributing to our field's design knowledge in our conference papers and journal articles according to the attribution rules of the organization.

3.5 Accepting Multiple Ways of Knowing as Valid Means of Inquiry into the World

We as designers must develop humility about our expertise and honor disabled users as the owners of privileged knowledge about their bodies and the peculiar strategies they have developed to maximize the outcomes of their efforts to accommodate their bodies to the ableist information, communication, and technology environments [47]. Critical disability theory researcher, Sara Ahmed, reminds us that "We learn about worlds when they do not accommodate us." It could also be added that disabled users acquire additional critical skills as they repeatedly experience pain points in designs, become observers with keen insights into the fault lines of normative thinking of designers, particularly when they don't meet the user's needs. Such users might notice the slightest hint of user marginalization in product design that might be invisible to a nondisabled user or designer [41]. Researchers have further connected participatory design and disability with the concepts of "quality of life" and "secondary gains" [64]. Hendriks,

Dreessen, and Schoffelen explain that "secondary gains occur when a person with a disability re-interprets the disturbed balance between body, mind and spirit in their life and finds an enriched meaning secondary to the condition brought on by the disability" [64]. By reinterpreting disability in these terms, users with disability not only improve the perceived quality of life but also find a meaning in their participation in the design activities that might affect their day-to-day lives on a regular basis. Oswal and Palmer discuss participatory design and diversity of point of view in terms of disability gains. They view the engagement of accessibility and disability issues in human-centered design activity as a diversity contribution [65].

3.6 Offering a Seat at the Drafting Table

Disabled users, as well as, disabled people in general can be excellent ideational partners in inclusive design and development activity because, unlike nondisabled designers, their understanding of technologies, spaces, communications, and accessibility embody the experience of difference. They experience the frustrations of failure with our designs due to our inability to connect with them, see their ways of thinking, doing, and experiencing technology, and drawing on their cumulative knowledge about different bodily experiences. And yet, we as designers hardly stop to consider this group of users with the closest connections to the affordances of their body/mind as our partners in knowledge co-creation. Partnerships with disabled users have borne meaningful results. For example, based on a study of the differences between the gestures used by blind and sighted people on touch devices with ten blind and ten sighted users, Kane et al. arrived at several recommendations that challenged traditional design wisdom for mobile devices: 1) "avoid symbols used in print writing", 2) "favor edges, corners, and other landmarks", 3) "reduce demand for location accuracy", 4) "limit time-based gesture processing", and 5) "reproduce traditional spatial layouts when possible" [21]. What is insightful about this study is that it discovered embodied differences in the performance of gestures by the two groups and suggested guidelines that would recognize these differences in how designers should draw on the affordances of touch screen devices without either sacrificing ease, or retrofitting, for one or the other group.

4 THE PATH FORWARD

For designs to be meaningful for our times, our methodology needs to be intentional to reflect our socio-cultural frameworks and values that dispel myths and stereotypes about creativity inherited from the modernist discourses of the previous century [40]. Designers also have the responsibility of advancing the public understanding about the meaningfulness, impact, and ubiquity of creativity" [42], so that participatory and critical approaches gain a wider currency in design practice. We as designers and research cannot continue to perform meaningless accessibility tests with sighted testers masked as blind users with little to no experience of screen readers, braille and other tactile technologies, sign languages, and the embodied experiences of

disabled users [9]. In this regard, Frauenberger points out that "collaborative decision making in design is ruled by power structures between participants, stakeholders, and designers, which are particularly complex when people with disabilities are involved" [12]. Other researchers in the design field have also stressed the relevance of perspectives from the field of disability studies because these scholars represent the collective voices of disabled academics and activists [13]. It might be pertinent to stress that when the evolution of UX is seen through the lens of disability studies, user experience and participatory design don't appear as two isolated sets of practices because Shariat & Saucier inform us that the inclusive and accessible designs for disabled users "emerge out of very similar exigencies and should be considered together" [14]. Thus, the proposal for a UX based on inclusion of disabled participants in design activity asks for what the user experience movement, now UX, started out to achieve for all users in the 1990s but has continued to overlook almost 20 percent of its user population on its way to becoming a full-fledged profession after two decades [10, 22].

5 CONCLUSION

The boundary between designers and disabled users has been a major obstruction in realizing the possibilities of accessible design. The approach discussed above directs our field toward accessibility through participatory design in where the disabled users' lived experiences of technology and design become the foundation for the early stages of the development process. Participants, as well as, designers in this cooperative process learn about technology, use, creativity, and human bodies from being exposed to new approaches in user research as well as to specific accessible design practices emerging out of embodied experiences of disabled users. The design experiences emerging out of the concept of working with individuals with different abilities and bodies through participatory design is a step forward toward accessible user experience, or AUX, to counter the widely prevalent ableist practices in UX design.

This research paper has explored the concept of participatory design from the perspective of disability studies. It asks designers to create agentic junctures in design activity through participation of disabled creators, designers, users, and theorists as equal partners from the very beginning of the ideational phase of design. Turning the concept of social justice on its head, it moves designers toward the concept of cooperation where designers are asked to recognize that they are not givers of justice but are beneficiaries of new knowledges from the disabled participants when their work involves disabled clients. It challenges designers to become co-creators of designs that don't ask disabled users to passively accept retrofit designs and doubly marginalized adaptive technologies. Thus, the paper challenges the dominant narratives of design for disabled users and questions normative ways of knowing and doing user experience designs—designs that take into consideration only those users who are viewed as normal in the common parlance and whose needs are deemed normative [29]. It asks UX designers to overcome the unconscious avoidance of disabled people in our

practice of the profession, accept them as equal partners in the design process, and adopt cooperation instead of distance in our interactions [61].

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