PARTICIPATORY DESIGN OF AN ALTERNATIVE SOLUTION TO SUPPORT EQUALITY FOR DEAF COMMUNITIES: THE OUTLINE OF A LATIN AMERICAN RESEARCH

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ABSTRACT
We present work focused on supporting independent living and equal participation of people who are Deaf and sign language users. In this context, we aim to identify cultural variations in user experience during the participatory design life-cycle of a system for automatic translation to and from sign language. This paper presents the outline of our research project conducted in Latin America, starting in México and to be continued in Brazil.

KEYWORDS. People who are Deaf, User experience, Cultural aspects, Assistive technology.

INTRODUCTION
UN DESA (2019) is a report that discusses problems and recommendations related to the "Sustainable Development Goals by, for and with Persons with Disabilities" based on data, policies and programmes gathered and compiled from an international cooperation effort. According to this report, "the main barriers to inclusion entail discrimination and stigma on the grounds of disability; lack of accessibility to physical and virtual environments; lack of access to assistive technology, essential services and rehabilitation; and lack of support for independent living that are critical for the full and equal participation of persons with disabilities as agents of change and beneficiaries of development" (p. 1).

Complementarily, from Article 30 of CRPD (2006), “Persons with disabilities shall be entitled, on an equal basis with others, to recognition and support of their specific cultural and linguistic identity, including sign languages and deaf culture”.
We are particularly interested in supporting independente and interdependent living for Deaf persons who are sign language users. For Bennett, Brady and Branham (2018), “The definition of the term interdependence implies a relationship between people and things [assistive technology, AT] and focuses our attention on what goes on within their interactions [...] in a particular moment in time”; which means that not only AT can play an important role in people’s life towards a more autonomous living, but community and close people around also are contributes to adopt technology and have a positive user experience. In this sense, we aim to identify cultural variations in user experience during the participatory design life-cycle of an automatic translation to and from sign language system, taking into account people, context, activities and technology. Our innovative research approach is to compare information and to share knowledge, initially, between researchers from Brazil and México. We are replicating the same investigation in both countries by the same researchers, collecting and analyzing qualitative data on the differences and similarities of users’ individual and collective experiences, regardless of the (sign, spoken/written) language used. With that goal in mind, the questions we wish to answer by the end of this research are: Do people who are Deaf and who are sign language users have the same basic needs in the user experience design of an automatic translation to and from sign language system, regardless of their country of residence? Is it possible to create a prototype using the Wizard of Oz technique including Deaf Community participants as codesigners? Is the prototype generated through the Wizard of Oz technique amenable to understanding by the Deaf Community?
The theoretical basis aligned with our project are publications of researchers who work with technology for People who are Deaf for many years and are mandatory references to be consulted, such as, Starner, Pentland and Weaver (1998), Huenerfauth and Hanson (2009), Cavender, Bigham and Ladner (2009), Mankoff, Hayes and Kasnitz (2010), Ladner (2015), Hanson, Cavender and Trewin (2015), among others.

RESEARCH PROJECT PLAN

In order to achieve our goal, we are conducting activities under the concepts of User experience (Rogers, Sharp and Preece, 2013), Participatory design (Muller and Kuhn (1993); Bødker, Ehn, Sjögren and Sundblad (2000); Baranauskas et al (2013); Ladner (2015)) and the Human Activity and Assistive Technology (HAAT) model (Cook and Polgar, 2008), in which we structured the research project into four phases. In Phase 1, we carried out two exploratory literature reviews (Prietch et al. (2019a); Prietch et al. (2019b)) on automatic sign language translation (ASLR) and discussed ideas to implement a Latin America-wide research project on this topic (Prietch et al., 2019c). In Phase 2, we started two activities: We are conducting a systematic review of user studies on the design of automatic translation to and from sign language systems. In contrast with our exploratory reviews, this more focused review is helping us understand both sides of communication, in which sign language users (signers) and written/spoken language users (non-signers) may communicate using their preferred language to interact with each other. In parallel with the first activity in this phase, we have been participating in activities in the local Deaf Community agenda, such as, taking

local sign language lessons, attending lectures and workshops given by signers, observing deaf students' classes in a special school, and engaging in social events with the Deaf Community. Next, in Phase 3, we conducted twelve interviews with people who are deaf, sign language interpreters, hearing parents of deaf children, and hearing teachers of deaf students. These interviews were designed to learn about demographic data, types of communication, technologies used: for learning purposes, for information access and to interact through sign language, and to understand cultural aspects. In Phase 4, we have also planned two parallel activities. The first one consists of the participatory design life-cycle, in which elicitation of technology requirements, ideation, prototype development and evaluation are taking place during twelve workshops - two meetings per month, during six months - with stakeholders. The second activity of this phase consists of searching sign language video databases to be used in future translation system development and evaluation with partners.

FINAL CONSIDERATIONS

To situate the status of this work, we currently are at an early stage of the research project, analyzing data collected in Phase 2 and in Phase 3, and starting activities of Phase 4, according to the plan described in the previous section.

The main challenges and obstacles we have found are language related. Since each country has its own spoken and sign languages, we have to adapt our research instruments and to discuss with sign language interpreters the best ways to apply research techniques.

Furthermore, a discussion may rise to distinguish concepts of universal design and assistive technology (AT) which, according to Story and Mueller (2011), the distinction lies on three aspects: the user, the application and the situation, where a certain type of user may perceive differently the same solution-mediated technology in a certain situation/ contexto that another person. Initially, we may propose an automatic translation to and from SL system to support communication for Deaf person who are SL users, however, one may think that if this type of system ensures hearing persons to understand what people who are Deaf want, need, question, suggest, than it could be seen as a universal design solution.

Attending HCIxB 2020 will be beneficial to our work in terms of having an opportunity to discuss our goal and research plan with peers, trying to find research interests in common, connecting with people who have similar research support to exchange experiences, and better framing our work in the context of the Sustainable Development Goals.

REFERENCES

Baranauskas, Maria Cecília Calani; Martins, Maria Cecília; Valente, José Armando. Codesign de Redes Digitais. Porto Alegre: Penso, 2013.

Bennett, Cynthia L.; Brady, Erin; Branham, Stacy M. 2018. Interdependence as a Frame for Assistive Technology Research and Design. In Proc. of the 20th Intern. ACM Conf. on Computers and Accessibility (ASSETS '18). https://doi.org/10.1145/3234695.3236348.

Bødker, S; Ehn, P; Sjögren, D; Sundblad, Y. (2000). Cooperative design perspectives on 20 years with "the Scandinavian IT Design Model". In: Proc. of the 1st Nordic Conf. on HCI (NordiCHI 2000). ACM, Stockholm, Sweden, 23/10/2000.

Cavender, Anna C.; Bigham, Jeffrey P.; Ladner, Richard E. (2009). ClassInFocus: Enabling Improved Visual Attention Strategies for Deaf and Hard of Hearing Students. ASSETS'09, October 25-28, 2009, Pittsburgh, USA. https://dl.acm.org/doi/10.1145/1639642.1639656.

Cook, Albert M.; Polgar, Jan M. Cook & Hussey's assistive technologies: Principles and practice. St. Louis, Mo: Mosby Elsevier, 2008.

CRPD. Convention on the Rights of Persons with Disabilities. Retrieved 02/10/2020 from http://bit.ly/39q4EQ8.

Hanson, Vicki L.; Cavender, Anna; Trewin, Shari. (2015). Writing about accessibility. interactions 22, 6 (October 2015), 62–65. DOI:https://doi.org/10.1145/2828432.

Huenerfauth, Matt; Hanson, Vicki L. (2009). Sign Language in the Interface: Access for Deaf Signers. In book: The Universal Access Handbook, Publisher: CRC Press, Editors: Stephanidis, Constantine, pp.1-18, Chapter 38. DOI: 10.1201/9781420064995-c38.

Ladner, Richard E. Design for user empowerment. interactions 22, 2 (February 2015), 24-29, 2015. DOI: https://doi.org/10.1145/2723869.

Mankoff, Jennifer; Hayes, Gillian R.; Kasnitz, Devva. (2010). Disability studies as a source of critical inquiry for the field of assistive technology. In Proc. of the 12th Intern. ACM Conf. on Computers and accessibility (ASSETS '10). https://doi.org/10.1145/1878803.1878807.

Muller, M. J.; Kuhn, S. (1993). Introduction to participatory design, Communications of the ACM, 36, 24-28.

Prietch, Soraia S.; Olmos, Ivan P.; Paim, Polianna dos S.; Gonzalez, Juan Manuel C.; Guerrero, Josefina G.; Resmini, R. (2019a). Discussion on Image Processing for Sign Language Recognition: An overview of the problem complexity. In: V Jornadas Iberoamericanas de IHC. Research and development of new technology. Puebla/MX: Fondo Ed. BUAP, Huelva: España: United Academic Journals, 2019. p. 112-129.

Prietch, Soraia Silva; Paim, Polianna dos Santos; Olmos-Pineda I.; Guerrero García J.; Gonzalez Calleros J.M. (2019b). The Human and the Context Components in the Design of Automatic Sign Language Recognition Systems. In: Ruiz P., Agredo-Delgado V. (eds) HCI-COLLAB 2019. Springer. https://doi.org/10.1007/978-3-030-37386-3_27.

Prietch, Soraia S.; Gonzalez, Juan Manuel C.; Sánchez, J. Alfredo; Olmos, Ivan P.; Guerrero, Josefina G. (2019c). Cultural aspects in the user experience design of an ASLR system. In Proc. of the IX Latin American Conference on Human Computer Interaction (CLIHC '19). ACM, New York, NY, USA, Article 37, 1–5. https://doi.org/10.1145/3358961.3359000.

Rogers, Yvonne; Sharp, Helen; Preece, Jennifer. Design de Interação - Além da Interação Homem-computador. 3ª ed., Porto Alegre: Bookman, 2013.

Starner, Thad; Pentland, Alex; Weaver, Joshua. (1998). Real-Time American Sign Language Recognition Using Desk and Wearable Computer Based Video. IEEE Trans. Pattern Anal. Mach. Intell. 20, 12 (December 1998), 1371–1375. DOI:https://doi.org/10.1109/34.735811.

Story, Molly F.; Mueller, James L. (2011). Universal Design of Products. In: Preiser, Wofgang; F. E.; Smith, Korydon H. Universal Design Handbook, Chapter 32.

UN DESA (2019), Disability and Development Report 2018: Realizing the Sustainable Development Goals by, for and with Persons with Disabilities, UN, New York, https://doi.org/10.18356/a0b1b1d1-en.