Performing Qualitative Data Analysis as a Blind Researcher: Challenges, Workarounds and Design Recommendations

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ABSTRACT

Over the last 2 decades, the way in which disabled body minds are regarded in research has evolved considerably. From an understanding that disability research involves research or enquiry on or of disabled people, there is now a shift in thinking that regards disability research as research done by and with disabled people as well, thus challenging traditional researcher-participant relationships. This has lead to a larger number of people with disabilities aspiring to enter academia. However, several barriers to full inclusion of people with disabilities still remain. This paper talks about one such barrier, that is, the lack of accessibility in software packages used for qualitative data analysis. Through the author's experiences in hunting for accessible ways to perform qualitative data analysis, the paper reviews existing software packages, discusses possible workarounds, and considers the feature requirements for an accessible qualitative data analysis tool.

CCS CONCEPTS

• **Human-centered computing** → *Human computer interaction (HCI)*; **Accessibility**.

KEYWORDS

Accessibility, Qualitative Data Analysis, Human Centered Design

1 INTRODUCTION

The WHO estimates suggest that the total global number of people with disabilities has already surpassed one billion. About 15 percent of the world's population lives with some form of disability, of whom 2-4 percent experience significant difficulties in functioning. A majority of these, around 80 percent, live in the global South. Population ageing, rapid spread of chronic disabilities and a betterment in the methodologies used to measure disability have all given rise to a considerable increase in disability prevalence around the world [18]. Of the 285 million people in the world who are visually impaired, 90 percent are in developing countries. While 39 million people are blind, 246 million have severe or moderate visual impairments [15].

Over the last 2 decades, the way in which disabled body minds are regarded in research has evolved considerably. From an understanding that disability research involves research or enquiry on or of disabled people, there is now a shift in thinking that regards disability research as research done by and with disabled people as well, thus challenging traditional researcher-participant relationships [13]. This has been a significant paradigm shift. From regarding people with disabilities as passive subjects to be researched on, research methodology has evolved to a point where it recognises people with disabilities as people with agency and Choice, capable not only of being research subjects, but also of being the ones to tell their own stories. Consequently, the number of people with disabilities who regard academia as a possible inclusive space, and research as a tool to create genuine positive societal changes, has increased. There has been an increasing interest in participatory and co-design methodologies, first-person accounts of disability, autoethnographies, etc [1, 3, 8, 9, 11, 19] Advocates of participatory research emphasise the right of all people to be actively involved as researchers in matters relevant to their own lives and communities [17]. The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD), supports this principle, articulating that people with disabilities have the right to participate in all levels of society [16], which clearly includes disability research.

Several studies in recent years talk about the need for integrating disabled scholars into disability studies research, and give concrete ideas about different ways of doing so. Disabled researchers have pointed out some barriers to there full and complete participation in academia, such as ableism in the form of denial of accommodations, the burden of always having to educate the academic community around them, axis work always being considered the responsibility of individual disabled people, infrastructural accessibilities etc [1, 2, 4–6, 10–12, 14].

This paper focuses on one such barrier holding disabled people, particularly blind and visually impaired people, back from full participation in academia: the inaccessibility of software used for qualitative data analysis. By reccounting and analysing my own experiences of trying to find a tool to analyse the qualitative data I collect as an early career research scholar, I highlight the need for greater accessibility in this area, discuss some alternative methods that can be used to perform qualitative data analysis, and provide design recommendations and feature requirements for an accessible qualitative data analysis package.

2 EXPERIMENTING WITH EXISTING SOLUTIONS

Some of the popular existing software packages that enable researchers to collect, clean, and analyse the qualitative data they collect includeAtlas.Ti, MaxQDA, Nvivo and RQDA, among others. However, all of them have significant accessibility issues. Some of them have interfaces that are completely silent when accessed with a screen reader, some have no accessible ways for adding or viewing codes, and yet others have completely visual ways of displaying codes and code categories.

Realizing that no ready-made solution exists to fullfill my needs, I turned to word processors and other mainstream software packages which had already proven to be accessible, such as Microsoft Word, Adobe Reader, and Microsoft Excel. Some of these tools were moderately helpful for performing qualitative data analysis, but some were completely unusable.

The first software tool I tried to use for data analysis was Microsoft Word. I saved each interview transcript as a separate Word file, and then tried to use the "Comments" feature of word to add each Code in. However, there were several problems with this method: I had no way of easily moving from one assigned code to another; highlighting text snippets was of no use because highlights are not detected by a screen reader; exporting my codes and snippets to a new document for analysis could be done only manually;double checking the codes I have assigned to a particular snippet became difficult as typical screen leader behaviour while dealing with comments is to only announce "has comment" and an extra keystroke needs to be performed to read the comment itself.. Thus, I determined that using Microsoft Word as a qualitative data analysis tool was not feasible, due to the nature of both the screen reader and the software tool itself

Using Adobe Reader was equally unsuccessful. Although the highlights feature on this software program is actually accessible via the screen reader, the behaviour of the "comments" feature with a screen reader was similar in many ways to my experiences with Microsoft Word. Once again, I could not navigate easily between the codes I assigned, nor export them to a new document for further analysis.

3 POSSIBLE WORKAROUNDS

In this section, I would like to discuss some possible workarounds that I have used in my process of qualitative data analysis., with specific emphasis on features that make these solutions ideal for my needs.

Rather than transcribe audio data such as interviews into text and then struggle to find a tool to help me analyse the text data so collected, I now prefer to trim and clean up my audio recordings a little, and analyse them using an open source audio editing tool called Audacity. My reasoning behind adopting such an unconventional method is that, as a screen reader user, I am always listening to the interview, as even the transcripts are read out to me using the screen reader. Moreover, accessible ways of coding audio qualitative Data do exist. I typically listen to the audio twice to familiarise myself with the content. I then go through the audio once more, this time at twice the normal speed, pausing multiple

times to select snippets and attach labels to the selected audio. Audacity allows unlimited labels on an audio file. I therefore add one label per Code. Once I am done, I can export my labels to a new text file. Using keyboard shortcuts, I can attach and remove labels easily, and also move from one label to the next. I then use the text file generated, to create code categories, choose likely quotations, and perform thematic analysis. Once I got past the strangeness of coding without a transcript, this method worked the best for me.

However, not all data collected during a study can be in audio format. I do occasionally come across textual Data that needs to be analysed. For this, I use several workarounds.

One such way is to use Microsoft Excel. First, I collect my text data in Microsoft word. Second, I make sure that each codeable segment, such as a sentence or a paragraph, is enclosed by blank lines. Next, I create a new blank workbook or sheet in Microsoft Excel and create my columns (which are typically ID, Data, and Notes). I then copy my data from Microsoft word, and paste into the column named data. My data is now ready for coding, with one cell per text segment. I use the ID column to assign numbers, starting with 1, for each text segment, which makes sorting and filtering easier later on while performing analysis. I then read through all of my data, cell by cell. To code a particular text segment, I create a new column to the right of my data for each Code I assign. Now, as I read, to mark a code as being present in my data, I put an 'X' in its column.'. As and when new codes occur to me, I create new columns for them to the right of the data column. I can also have primary and secondary themes/codes for my data. I can indicate primary and secondary themes by using X for a primary code and Z for a secondary code. I then use the "sort by" and "filter by" options to view the different segments according to The codes assigned to them. This negates the need to export coded data for further analysis. This method is also not without drawbacks. When I have a large amount of data to Code, and consequently have a large number of codes as well, it becomes a little difficult to keep track of all these different codes, as each code has a column of its own. In such a case, I end up with so many columns that navigating through the spreadsheet becomes difficult. One way of handling extremely Virti or text heavy data is too create a new sheet for each interview transcript, or field notes segment.

One other method I have used is to code data using Markdown. Markdown is a lightweight markup language that can be used to add formatting elements to plain text text documents. Created by John Gruber in 2004, Markdown is now one of the world's most popular markup languages [7]. As opposed to selecting text and applying formatting through menus and tool bars, markdown uses text based ways of indicating formatting. Mark down, as a text-based system, offer certain advantages to people who are blind and visually impaired. Since Markdown uses markdown syntax, typically consisting of special characters such as *, #, and @ to indicate formatting elements such as bold, italics, underline, headings, etc, formatting elements become uniquely accessible to people who are blind and visually impaired. Using markdown, screen reader users can go through documents and understand the way they are formatted, without using special keystrokes to check the formatting of any given text. While using word processors, formatting elements such as font, size, bold, italics, etc are typically not automatically

announced by a screen reader, and have to be accessed using a keystroke.

It is the ability to add in-line footnotes To mark down text documents that is of particular significance in the context of analysing qualitative data. Using this feature, I add my codes to my qualitative data as in-line footnotes. Each snippet is enclosed in to mark them as bold, before attaching a footnote. As I re-read through this document, I can read through the formatting using my screen reader, and understand the codes I have assigned to each segment. This is particularly helpful while dealing with a large amount of data, as it negates the need to cycle through a large number of columns in excel. However, there is no easy way of exporting text snippets, or the codes attached to them, to a new file. This has to be done manually, as opposed to the sorting and filtering options in Excel that make it easier to process coded data.

Analysing and coding videos and images are even more challenging as a blind researcher, as these dataformats are generally rather inaccessible to people who are visually disabled. I generally refrain from using video as a method of documentation. Rather than recording videos when I am in the field, I tend to textually record my observations. I prefer to make transcripts of conversations and record textual and audio field notes.

However, in certain situations, collecting data in the form of videos and images is unavoidable. Projects that involve data collected from social media platforms, for instance, require me to engage with data in the form of Screenshots, pictures, and videos. In such situations, I must incorporate a preliminary step into my process of data analysis: a step where I convert my pictures and videos into descriptions of what happens in them. I can analyse this extra data in the same way that I would analyse any other piece of textual data.

What is evident from this analysis of possible workarounds to performing qualitative data analysis using unconventional methods is that, at this point in time, a one size fits all solution to analysing qualitative data in a screen reader accessible way does not exist. Every method I have outlined above is usable only in specific situations or with specific kinds of data. Moreover, typically, a research project does involve dealing with multiple types of data such as field notes, interview recordings, pictures, etc, making it necessary to use more than one method in analysing this data. It is in the complexities like these that blind and visually impaired researchers end up spending more than the usual amount of time to produce work that is comparable in every way, including methodological rigour, to that produced by sighted researchers.

4 DESIGN RECOMMENDATIONS FOR AN ACCESSIBLE QUALITATIVE DATA ANALYSIS PACKAGE

It is evident from the methods and problems I have outlined in the previous section that developing a tool that enables Blind and visually impaired researchers to accessibly analyse qualitative data is a necessity. In this section I therefore in numerate the feature requirements for an accessible qualitative data analysis tool, from my experiences of using different tools and workarounds to analyse different kinds of data.

Firstly, the tool should have an easy way of Assigning a particular code to a certain text snippet. To reduce the number of steps necessary to select text and then go through menus to find the necessary options, there must be a keyboard shortcut for this feature. There must, of course, also be a way of identifying a particular text snippet as coded or not coded.

Second, information such as whether a particular snippet has been coded or not, and what code has been assigned to a particular snippet should be announced by a screen reader as the user goes through the document, without any additional keystroke. This will go a long way in having accessible ways of re-reading and re-coding documents. These attributes must also be visually indicated, for the use of researchers who have low vision, or sighted collaborators.

Third, the tool must have an easy way to move from one assigned code to another. Screen reader behaviour such as the ability to navigate by headings using a keystroke, can be taken as an example. Just as a user can move through headings by pressing the 'H' key repeatedly on the web page, the tool should ideally allow for navigation to the next and previous codes in the document using a keystroke. This could possibly be control+c or something similar.

Next, the tool should also have the ability to deal with and process multiple types of data such as audio, video, text, and images. This is especially important since research projects typically do require the researcher to collect multiple types of data in the form of field notes, interviews, photographs etc. Therefore a researcher who is blind and visually impaired must have the ability to input all these different types of data into the analysis tool, and analyse them using this tool as well.

Finally, the tool should also have a way to perform further analysis on this data. This can possibly be facilitated in two ways. The first is to have an "analysis mode" or something similar which displays quotes one after the other with each assigned text segment displayed below. This mode can also include a feature to collapse multiple codes into one category or theme. This will facilitate easier thematic analysis. The option to create sub-themes or sub categories would also be welcome. This information can perhaps be displayed using a treeview control, which a screen reader typically understands well. An alternative way of doing this is to provide the ability to export codes and text snippets assigned to them into a spreadsheet-based data format such as XLS orCSV for further analysis.

5 CONCLUSION

It is evident that new and accessible ways of doing qualitative research and analysing qualitative data are necessary for the Blind and visually impaired researcher community. As more and more blind researchers stepped into academia it becomes necessary not only to avoid social and societal ableism, but also create a safe and technologically accessible place within academia.

This is important not just for the sake of accessibility, but also to promote more research about disability by the disabled community themselves. If more and more researchers are to participate in research on an equal footing, and if more research using co-design and participatory design as methodologies must be conducted, it is necessary to strip away the inaccessibilities in the platforms and processes used for conducting research. Creating and finding

accessible ways of performing qualitative research is but one step forward in this direction.

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