Demonstrating Interaction: The Case of Assistive Technology

GISELA REYES-CRUZ, Mixed Reality Lab, School of Computer Science, University of Nottingham, UK
JOEL E. FISCHER, Mixed Reality Lab, School of Computer Science, University of Nottingham, UK
STUART REEVES, Mixed Reality Lab, School of Computer Science, University of Nottingham, UK

Technology 'demos' have become a staple in technology design practice, especially for showcasing prototypes or systems. However, demonstrations are also commonplace and multifaceted phenomena in everyday life, and thus have found their way into empirical research of technology use. In spite of their presence in HCI, their methodical character as a research tool has so far received little attention in our community. We analysed 102 video-recorded demonstrations performed by visually impaired people, captured in the context of a larger ethnographic study investigating their technology use. In doing so, we exhibit core features of demonstrational work and discuss the relevance of the meta-activities occurring around and within demonstrations. We reflect on their value as an approach to doing HCI research on assistive technologies, for enabling shared understanding and letting us identify opportunities for design. Lastly, we discuss their implications as a research instrument for accessibility and HCI research more broadly.

CCS Concepts: • **Human-centered computing → Empirical studies in accessibility**; **Field studies**.

Additional Key Words and Phrases: demonstration, methods, visual impairments, EMCA

ACM Reference Format:
Gisela Reyes-Cruz, Joel E. Fischer, and Stuart Reeves. 2022. Demonstrating Interaction: The Case of Assistive Technology. *ACM Trans. Comput.-Hum. Interact.* 1, 1, Article 1 (March 2022), 38 pages. https://doi.org/10.1145/3514236

1 INTRODUCTION

Demonstrations of technology have a long and storied history in HCI research and practice, from Englebart's 'Mother of All Demos' [93] through to tech demos played out on stage during product launches [4]. While this 'performative' type of demo has had a significant cultural impact in HCI, when taken as a broader phenomenon, i.e., "the act of showing someone how to do something, or how something works" [28]; such demonstrations present in HCI research practice have received far less explicit (methodological) focus. Thus, our paper centres on more 'mundane' demonstrations performed *incidentally* by research *participants*, where a participant shows and explains the use of some technology, its functionality, problems encountered, and so on.

We are not claiming that such forms of demonstration are unknown to HCI; on the contrary, they routinely feature as ways to understand technology use in home or work settings. For example, demonstrations feature within ethnographic studies, including in situ interviews and observations [12, 19, 35, 50, 94]. Beyond more typical ethnographies, we would point to contextual inquiry [9] as a likely site for demonstrations to take place, as well as 'home tours' [95], where an investigator visits participants' domestic environments and is shown objects or features of interest within it. Both are likely replete with demonstrations. 'Home tours' in particular have become a frequently-used approach to enable investigators to develop a richer understanding of the home

Authors' addresses: Gisela Reyes-Cruz, psxagre@nottingham.ac.uk, Mixed Reality Lab, School of Computer Science, University of Nottingham, Nottingham, UK; Joel E. Fischer, joel.fischer@nottingham.ac.uk, Mixed Reality Lab, School of Computer Science, University of Nottingham, Nottingham, UK; Stuart Reeves, stuart.reeves@nottingham.ac.uk, Mixed Reality Lab, School of Computer Science, University of Nottingham, Nottingham, UK.

(see [97]). As an approach 'home tours' seem most strongly predicated on the social organisation of demonstration as participants surface relevant features of their home life and its relationship to digital technologies.

However, demonstrations in empirical research can be seen as a 'means to an end': an alternative to observations of 'naturally occurring' activities, not as a focal point themselves. Often, the researchers' intent is to observe activities that participants would 'normally' carry out, sometimes prompting questions arising from the on-site observation (e.g., in contextual inquiry [10]), but in practice the phenomena captured takes the form of demonstrations. By negotiating circumstances in which demonstrations may be done by participants, researchers are seeking to generate findings both in a time-efficient manner and, often it seems, to produce more semblance of 'ecological validity' for everyday practices *in context*. The attraction is thus obvious, and has clear value for understanding technologies which come to be deeply embedded into many facets of everyday life. This might particularly be the case for specific domains, such as accessibility research investigating the everyday use of assistive technologies, and striving to document the numerous adaptations that people with disabilities have to work out in order to build access at home or work settings.

In this paper we analyse 102 video recorded demonstrations performed by visually impaired participants, mostly of their assistive technology (AT) use. These recordings were captured in the course of broader ethnographic work engaging with people with visual impairments and their uses of various technologies both in the home and the workplace, where the main emphasis was on investigating the seen-but-unnoticed or taken-for-granted capabilities and competencies of the individuals. This paper builds from our previous CHI 2020 paper entitled "Reframing Disability as Competency: Unpacking Everyday Technology Practices of People with Visual Impairments", in which we investigated the main sets of technology practices conducted by participants in their everyday lives and from a collection of examples we identified some of the participants' competencies enabling such practices [74]. Although we continue expanding the concept of competencies employed by people with visual impairments, the present paper diverts from our previous work by primarily focusing on how 'demonstrating' emerged as a key feature of participants' practices. Demonstrations in our study were not planned or requested from the outset, but emerged incidentally in our observational research. That is, we did not seek out demonstrations performed by participants on purpose; rather, demonstrational work became a product of a research approach taken i.e., in/as our ethnographic fieldwork. The phenomena we captured in our video recordings is therefore a method used *by participants themselves* to provide practical accounts of their activities and technologies—what ethnomethodology would point to as a 'members' method' [24]. Our demonstration data is thus a) significantly different from demos in HCI which are meant for showcasing a prototype or system to a public audience; and b) foregrounding demonstration practices that likely occur largely unnoticed in a range of extant approaches (e.g., aforementioned 'home tours' or other ethnographic approaches). The pervasiveness of demonstrations within our investigation coupled with the lack of HCI studies focusing on the methodical character of demonstrations, led us to further develop the present work. The aim of this paper is to exhibit and examine the practical accomplishment of this type of demonstration to better understand their import and function in the context of our assistive technology research, which in turn should add to the insights that as a community enable us to develop circumspect, reflexive research practices [80].

Our approach is ethnomethodological [36] (with elements of conversation analysis [78]). This means we use video recordings as exhibits to help articulate demonstrational work as social phenomena, conducted between an investigator and a recruited participant. We draw out fragments of our broader set of video recordings to help us 1) make sense of demonstration's social organisation within a research investigation, 2) reflect on the value of demonstration as a research approach and the ways in which they might provide detailed access to technology use and participants' activities

in various settings, 3) reveal the meta-elements around and within demonstrations and the practical and ethical implications of employing them in empirical research, and 4) assess the actual fruits of such demonstrations in terms of what design insights could be obtained through them.

Some might argue that demonstrations have a troublesome or undesirable character; certain research traditions taken up within HCI may view demonstrations as not truly 'naturalistic' events. But we take a different view: that demonstrations can be instructive for practices of qualitative research in HCI, especially when recruiting participants is challenging, for example, in accessibility research. Taken in a particular way and handled with care, demonstrations can, we think, offer relevant accounts of participants' activities and practical circumstances. To this end, we explore and reflect on the potential implications of demonstrations for HCI and accessibility research.

Lastly, we acknowledge that demonstrations at large are a complex and multifaceted phenomenon, making it a difficult enterprise to define and delimit what can be considered, or not, a demonstration. We hope this paper helps to shed light on what demonstrations are and how they are brought to bear in the context of a research investigation. In this paper, we begin to focus on the sorts of demonstration that persist as part and parcel of empirical HCI research; we leave it as future work for HCI to pick apart in detail the many *other* kinds of demonstration that are encompassed by the term.

2 RELATED WORK

There are several perspectives from the research literature to cover when talking about demonstrations. First, we review relevant HCI work that has analysed the role of technology demos and their cultural significance. Second, we provide an inspection of naturalistic observations and methodological approaches that compare, contrast or include demonstrations. Then, we give an overview of some practical applications of demonstrations in accessibility research. Lastly, we look at sociology work investigating demonstrations across various fields.

2.1 Technology demos in HCI

Technology demos—where a technological system or prototype is exhibited *in action* for an audience to experience—have a long history as significant cultural objects both in academia and industry. After all, it is through 'demoing' that researchers or developers can communicate the fruits of their work. Demos can be powerful means to communicate not only the capabilities of the technology exhibited but also to convey novel ideas or difficult-to-grasp concepts [55]. Doug Engelbart's famous 90-minute live demonstration of the NLS system in the 1970's is a proof of that. This demonstration, the first of its kind to showcase a system that integrated the computer mouse and several other core elements of modern computing, has duly been attributed the moniker 'Mother of All Demos' [48].

Many other technology demos rooted in academic work that followed or preceded Engelbart's became industry successes [67]. Naturally this was one factor influencing technology demos becoming a key element of HCI practice, nowadays being part of major conferences both in video and live formats. Some have argued that those demos are necessary for technology designers and researchers, as creativity and inspiration can spark from the *experience* of different forms of interaction and innovation by itself [47]. Some others have analysed the so-called 'demo-or-die' culture that poses public demos as a critical element for whether a projects succeeds or fails. For example, Johri [53] examined the role of demos in research and design labs for promoting innovation and found that although they are not part of formal evaluation methods they are treated as crucial elements within organisations. Technology demos are articulation work involving planning, coordination and negotiation of efforts, where crafting a narrative for performing it in front of an audience is as important as the technology itself. Elish [33] examined the ethical considerations of producing demo videos for different purposes and audiences, the different narratives used

to entice the public targeted, and the tensions between compelling and accurate storytelling in demo videos. In a similar vein, Smith [88] investigated the potential misrepresentations of use in commercial technology demonstrations, such as simulation or exaggeration of functionality, disguising undesirable events or manipulation of demonstrator credibility. Further, Bean and Rosner [5] pointed out the lack of diversity in demo videos produced for the public domain, especially in the technology industry. If the target audience, as represented in the videos, resembles the group of people who created the demo, perhaps the problems to be addressed are already well met. They suggest the need for demo videos to present a variety of propositions rather than universal and clear-cut solutions, and the possibility to co-produce them with under-represented users as a means to achieve it.

While the literature is frequently concerned with demos produced by researchers or developers for an intended audience, our interest here is that demonstrating technology, as we commonly experience it in HCI, entails much more than just showing an artifact. Taylor [93] argued that much of what happened to the sides of or behind the scenes in Engelbart's demo might have been obscured by its careful choreography. He urges us to move beyond the notion of the interface or the 'interaction' as discrete or disconnected from the interwoven set of relations happening between user and computer. In a similar vein, Smith [88] argued that the many hidden layers beneath the demo, if not acknowledged, have the potential to mask HCI issues. Smith hoped that their work examining commercial technology demos could serve as a starting point to enquire about what is actually communicated through other forms of research-based demonstrations, particularly those aimed at supporting our understanding of human activity instead of those intended for public view. In this paper, we aim to address a component of such a gap that we believe has not been tackled yet.

2.2 Demonstrations in empirical HCI research

Demonstrations have been a feature of different empirical approaches in HCI ranging from ethnographic to laboratory studies.

On the one hand, there has been a historic push towards analysing and understanding user interactions in 'real world' settings for HCI research. This has been described as a 'turn to the social', which pushed out (or in some accounts, away) from controlled, lab based environments that tended to be predominant in HCI's early days [75]. As a result, approaches and perspectives from sociology and anthropology were adopted to understand the social and contextual features of human-machine interactions. Suchman's famous thesis was empirically based on a study in which people *demonstrated* the use of a copier machine following instructions [91]. The resulting critique of cognitivist paradigms argued that the way people actually use systems (whether 'in the wild' or 'in the lab') differed from dominant user models. Drawing on an ethnomethodological approach, Suchman stressed the complexity of human action as an ongoing and situated accomplishment that contrasted with a goal-oriented and plan-literalist perspective (ibid.). This then leads us to studies of work and work practice, attempting to inform systems design [62], especially in CSCW research [11, 79]. It is important to note that such studies are not exclusive to work settings or professional activities traditionally known as 'work' (in the sense of 'labour'), and rather they refer to the effort put into the practice of interest, which could be any practice conducted in any setting [23]. Ethnographic methods have been fundamental to studies of work, in which comprehensive observations, interviews and researcher immersion are key elements. However, conducting such extensive investigations is not always practical and some have questioned the form in which this type of research has been contributing to systems design [29]. In addition, it has been argued that there is difficulty in obtaining 'naturalistic' accounts of participants' experiences when conducting ethnographic fieldwork, and tensions between field and laboratory research still remain for some.

Yet, as Rooksby [76] pointed out (by reminding us that Suchman's work used examples of a laboratory study), such dilemmas should not preclude the analysis of practical and social action, regardless of the setting where they are conducted, as human practice can be observed anywhere.

On the other hand, the implementation of alternative methods has sought to address the cost, intrusiveness and impracticality of extensive ethnographic studies of real-world activities, for example self-report diaries [87], cultural probes [39], think-aloud protocols and cognitive walk-throughs [45, 101], contextual inquiry [10], and tours, habitually conducted at home or workplaces [18, 50, 106]. Some of these approaches certainly incorporate demonstrations, although they may depart from each other in purpose and execution. For example, in think-aloud protocols and cognitive walk-throughs, which have become a standard method in usability testing, participants are prompted to verbalise their ongoing thoughts and actions as they follow a set of pre-defined tasks. In contextual inquiry, which was originally defined as the first part of Contextual Design [9], on-site one-on-one interviews are conducted to gain a better understanding of user needs, desires and their approach to their work activities. In a contextual interview, the purpose is to observe the users in-situ while participants carry out work of interest, from time to time interrupting them to discuss what they are doing, thus certainly turning on moments of 'demonstration' by participants. So it is not that demonstrations are 'unknown' to HCI but rather that in the aforementioned examples they are simply part and parcel of the approach, while the specific *work of demonstrating* has received little methodical attention from our community.

Demonstrations as we consider them in this paper differ slightly in that they emerged as a key method employed *by participants* simply to make something observable or available to the investigator, and not as part of a pre-specified requirement of verbalising every action. It seems likely that home tours could be positioned as an approach more aligned with this notion of demonstrations, as participants give an overview of a setting, the artifacts in it, and the common activities taking place in such an environment for the benefit of the investigator. However, tours are strictly tied to a setting (e.g the home or the workplace), whilst demonstrations can be both related to and independent from it. Home tours are a well established method in HCI employed for capturing data, but any demonstrations performed in the course of them have not been examined as a focal point of interest.

To this end, demonstrations are rarely situated as part of the methodological toolset of HCI research. One example of this can be found in Lazar et al.'s "Research Methods in HCI" book [61], in which the authors described demonstrations as a method within case studies for showing how a new tool was successfully used. They state that these demonstrations can be used in conjunction with exploration, explanation and description, but overall are shorter and less in-depth than descriptions. The fact that demonstrations have not been examined in further detail to understand their methodological character is a gap we address in this work. It is worth highlighting that we do not seek to position demonstrations as a new or alternative method in its own right, nor do we seek to systematically compare demonstrations to other observational methods. Instead, we examine demonstrations due to their frequent occurrence as *part and parcel* of various established methods in HCI to understand the challenges and opportunities they bring to the field.

2.3 Demonstrations in accessibility research

Past work in HCI has examined sociomaterial practices of people with visual impairments through a mix of methods. Whenever possible, some have conducted a number of their interviews at participants' homes, which consequently allowed them to collect photographical evidence of the various assistive technologies and adaptations employed by participants (e.g., [57, 86]). Others have moved to investigate naturally occurring activities in situ, such as shopping practices [109]

or travelling experiences of Paralympic athletes [96], which inherently have involved direct observations. Nevertheless, the time and effort required to conduct such types of studies has been acknowledged [109].

Among the thread of research looking at what are often labelled as 'real world' interactions, we note that some studies have observed participants demonstrating activities or objects of daily living as part of other data collection methods such as interviews and/or observations [2, 7, 14, 103]. For example, Bennett et al. [7] conducted interviews at participants' own spaces as part of their formative work collecting stories of design work or adaptations done by people with disabilities, in which they could often demonstrate its use. Branham and Kane [14] also interviewed participants at home, who conducted tours showcasing housewares and demonstration of some activities. However, demonstrations in these examples are mentioned as a desired complement, yet not drawn out for focused attention.

Notably, Lazar et al.'s chapter on case studies [61], where there is a brief form of examination of demonstrations as a methodological tool, used mostly examples of AT investigations to illustrate case studies' nature and best research practices. This might be the case due to the difficulty of recruiting large samples of participants with disabilities and the need for studies in this field to focus in detail on the greatly varied AT uses and users. Studies where demonstrations have featured in accessibility research include Albusays et al.'s [2] observations of blind programmers demonstrating their coding practices, by sharing screen and audio through video call software. They noted that explicitly asking participants for demonstrations of positive experiences helped to obtain breadth in the data corpus, which could otherwise have focused on the negative ones. Anthony et al. [3] analysed YouTube videos of people with mobility impairments using (and sometimes demonstrating) mobile touchscreens and found a broad set of interactions styles, use cases, and some homemade adaptations employed by them. The diversity of this dataset highlights YouTube videos as a rich source of data of interactions in the wild. The authors reflected on the challenges of this approach such as resolving uncertainty with little context. Reyes-Cruz et al. [74] observed visually impaired participants demonstrating everyday practices involving various technologies. They further reflected that although demonstrations are not naturalistic, they allowed for participant's accounts that could pass unnoticed otherwise. Lastly, Shinohara and Tenenberg's case study [84, 85] in which a blind person demonstrated and discussed software and non-software artefacts of her daily life, sharing past use instances and feelings about them. Notwithstanding these examples, demonstration-driven or demonstration explicit acknowledgement in empirical accessibility research is rather rare.

Finally, we also see work featuring demonstrations as part of larger iterative co-design processes with mixed-abilities groups [65, 66]. Demonstrations in these examples have been used in the design sessions for showing the technical capabilities of the resources available, performed by researchers to participants. Researchers found this step useful at initial stages of co-design, so that participants could familiarise themselves with the technology and a common vocabulary could be established between stakeholders.

Building on this strand of work, our study provides a detailed investigation of demonstrations performed by people with visual impairments. Its focus on this phenomenon can, we feel, contribute to a better understanding of the opportunities and limitations of using demonstrations to investigate accessibility topics, and moreover explore what AT design insights can be drawn out from them.

2.4 The sociology of demonstrations

But what are demonstrations? As we have surveyed different sorts of demonstrations appearing in HCI work, we feel the sociology of demonstration could prove a useful place to turn to for this under-examined phenomenon in our community.

While our primary focus on understanding demonstration work is oriented by ethnomethodological research's interests in such practices, here we start with some initial remarks from symbolic interactionism. Specifically, we note that Goffman's dramaturgy [37, p. 66] discusses demonstrations as exhibitions or "performances of a tasklike activity out of its usual functional context in order to allow someone who is not the performer to obtain a close picture of the doing of the activity". He further emphasises that they are usually conducted by proficient performers and that they can be done for learning or evidential purposes. Perhaps because of their cultural significance, technology or software demos have been a source of inquiry from a sociological perspective. For example, Smith's work employed Goffman's theatrical frame to examine commercial-based demos [88]. Although it is acknowledged that many types of demos are treated as heterogeneous events in this work, some core remarks are worth repeating here: 1) demonstrations are social interactions, as there is always a demonstrator and an audience or observer; 2) demonstrations can be highly implicit and often leave space for open interpretations; and 3) demonstrations may require an extreme form of inductive reasoning, if the events showed are carefully pre-selected and limited. Rosental [77] departs from Goffman's frame and examines what is beyond the persuasion or proof-like nature in demonstrations, showing that different types of public demonstrations can have many roles depending on the context they unfold in—for example, by pointing out the impact of the audience reaction on the future of the artifact demonstrated. Lastly, Both [13] remarks on the pervasiveness of video demos in self-driving cars research labs, highlighting the effort and devotion dedicated to carefully crafting a choreography and narrative for them.

Perhaps because of interest in instructions and instructional work, ethnomethodology and conversation analysis literature has investigated demonstrations fairly extensively, particularly for educational uses, for example, in sports coaching [34, 73], healthcare training [46, 52] and dancing classes [58]. Other research is concerned with demonstrations for instructional purposes, i.e., not necessarily for learning a skill but for knowing how to conduct, and then going on to conduct, specific one-off tasks. For example, Due et al. [32] examined a case of a civil servant giving video mediated instructions that had to be demonstrated and decomposed in a way that could be mimicked by the observer in a remote setting. The various investigations mentioned above focused their attention on the embodied features employed by the instructors, highly intertwined with verbalised accounts and the use of different resources, in order to produce visible actions that could be followed by the instructees. Streeck [90, p. 170-171] suggests the term 'disclosure' for referring to such actions whose very point is to make public, transparent or intelligible to a less informed spectator features of objects and settings. Lastly, Hindmarsh et al. [46] also discussed the realism of simulation practices and argues for passing authenticity concerns in favour of paying close attention to how the participants actually organise those simulations and how the notion of the activity being a simulation is drawn into the interaction between participants.

These examples provide evidence of how ethnomethodology and conversation analysis are fruitful for investigating demonstrations in-depth. In a similar vein to how some of these studies have drawn on learning outcomes for improving coaching, teaching or instructional practices, we believe that examining in detail participants' demonstrations can be constructive for reflecting on HCI research practices, and in the future perhaps for providing guidelines [70] or building tools to support their use in design work [20, 21]. This paper makes a contribution to this line of research by examining the bodily, verbal, and resource work involved in demonstrating, specifically in the case where demonstrators are persons with visual impairments. Our work departs from understanding demonstrations in sports, healthcare or art domains, and investigates them from a systems design perspective, particularly concerning assistive or accessible technologies.

3 STUDY APPROACH

The present work is based on a subset of data we collected for an ethnomethodologically-informed ethnographic study that investigated everyday technology use of people with visual impairments, with a focal emphasis on uncovering the seen-but-unnoticed and taken-for-granted abilities or competencies employed in using those technologies [74]. Over the years, ethnomethodology and related approaches such as conversation analysis [78] and interaction analysis [54] have featured as part of HCI's attempts to understand people's use of technologies (e.g., [16, 27, 63, 69, 71]). Their attention to interactional detail as the constructive 'work' of human practices with technology has led to a (often troubled) connection to systems design [30, 64]. Here, however, we feel ethnomethodology (EM) may in particular provide critical conceptual development for HCI in various ways: in enhancing its understandings of demonstrations as practical accomplishments, and in drawing attention to the value and significance of sometimes overlooked 'mundane' practices that visually impaired people enact. Ethnomethodology's interest is in explicating those practices by locating (and describing) the various methods used by members of a setting (i.e., 'members' methods' as mentioned previously), their competence and their common-sense reasoning [36]. Thus, when we refer to demonstrations as a 'method' in our data collection and analysis, we mean an ethno-method, a participant method, or 'members' method', *not* a research method. Our approach to data collection was ethnographic, oriented towards locating these methods: thus demonstrations 'fell out' as phenomena of interest in our study.

Crucially, EM emphasises the reflexivity of those members' methods—as simultaneously 'doings' and 'showings'. It also asks investigators to see research engagements themselves as sets of routine practices. It is this aspect of EM which calls for us to understand what makes demonstrations recognisably demonstrations in the research site as we find them. This fundamental tenet of interactional reflexivity in and of EM investigations led us to focus on demonstrations and demonstrational work as we found our data was replete with them, unremarked-upon, and repeatedly and motivatedly performed by participants in their co-constructive work in building 'research data'.

Hence, our aim in this paper is to unpack the interactional achievement of demonstration—of demonstrations as actions ('doings') and as analyses of situations—so as to draw out insights for the benefit of qualitative researchers in HCI employing demonstrations in their empirical research, whether intentional or not, to shed light on what demonstrations in this context are, and to elucidate its relationship to visual impairment and assistive technologies.

3.1 Data collection and participants

In summary, we draw from a subset of our ethnographic data: 4.5 hours of video material that contains 102 instances of demonstrations from 10 participants (7 participants observed at their homes and the rest at a charity office) and supporting fieldnotes and audio material. As aforementioned, collecting data depicting these demonstrations was not our initial intention, but their importance emerged organically during our fieldwork. Later, we noticed the social significance of demonstration work in getting the research encounters 'done', which in turn inspired the present work. In this section we describe the study context in which such demonstrations were captured.

The ethnographic study conducted was approved by the University of Nottingham School of Computer Science's Ethics Committee. All data was collected after fully informed consent of the participants was gained. 11 participants with a varying range of visual impairments were recruited by establishing a relationship with My Sight, a local charity that provides support to people who are blind or are experiencing sight loss. The first author trained as a volunteer and sighted guide, learning about different visual conditions and engaging in practical exercises for guiding blind people. Subsequent researcher immersion in the setting and individual participant recruitment

took place. It is worth recalling that the original interest of the study was to better understand how the range of technologies our participants possessed were being employed in their everyday lives. Thus interviews and observations at their homes and the charity office were conducted (see [74] for detailed description of the broader ethnographic study). Out of the 11 participants recruited for one-on-one sessions, only one was not video recorded showing their technology use due to participant-researcher availability, thus reducing our sample in this paper to 10 participants. Three of them were observed at the reception desk of the charity office where they regularly volunteer. Table 1 contains the details of all the participants whose data was analysed for the work presented in this paper, including a pseudonym, gender, age, visual condition, and the method through which demonstrations were collected.

Table 1. Participants details and data collection methods.

Pseudonym	**G**	**Age**	**Visual Condition**	**Data Collection**
James	M	28	Partially sighted (Glaucoma)	Observational session at the charity office
Nick	M	50	Blind	Observational session at home
Ben	M	93	Partially sighted (Cataracts)	In conjunction with interview at home
Alice	W	28	Blind	Observational sessions at home and at the reception desk
Liam	M	55	Partially sighted	Observational session at the reception desk
Paul	M	67	Partially sighted	In conjunction with interview at home
Tim	M	40	Blind	In conjunction with interview at the reception desk
Sarah	W	80	Partially sighted (Retinitis Pigmentosa)	In conjunction with interview at home
Gayle	W	70	Partially sighted	In conjunction with interview at home
Tina	W	35	Partially sighted (Retinitis Pigmentosa)	In conjunction with interview at home

Participants consented to be audio and/or video recorded and throughout the study the researcher made sure participants knew when recordings were started and stopped. They gave permission to use such research data for understanding their everyday experiences and technology use within them. In conversation analysis, assembling, reusing and re-purposing catalogues of various phenomena allows for close examination of data from different lenses of interest. Thus, participants gave permission to reuse their data for future research and learning, including related investigations, data sessions and presentations, as long as it was anonymised (i.e., removing personal identifiable data, blurring faces, distorting voices) and destroyed after 7 years, in accordance with University guidelines.

The demonstrations captured in our data arguably emerged because our original study was purposefully exploratory. Participants were not explicitly asked to perform pre-defined tasks or follow a specific structure. Instead, the investigator (specifically the first author) tended to enquire, as is natural in the course of ethnographic work, how participants performed some activity of

interest (elicited with utterances such as "can you show me?" or "how do you do X?"). On other occasions participants provided descriptions and explanations without immediate solicitation (as they were knowingly participating in fieldwork and as such adopted a particular stance towards the researcher [17]). These forms of elicitation somewhat differ from other approaches to data collection (described in section 2.2), in that participants were not asked to verbalise their ongoing actions (i.e., cognitive walk-through, think-aloud), they were not asked to focus solely on home or work settings (i.e., tours), and they were not observed on-site while prompting contextual questions and discussions (i.e., contextual inquiry). Rather, they were asked to use and show the subject of interest, leaving them to provide their own words and actions to fulfill this purpose.

Through reviewing and classifying our demonstrational data set, we observed that demonstrations took place either as part of a dedicated observational session or within interviews (see column Data Collection in Table 1):

- *Observational sessions:* A meeting was arranged with some participants either at home or at the reception desk of the charity office. These sessions were solely for showing the use of devices and software, the performance of related activities or the accessibility arrangements at the specific setting. These sessions were mostly comprised of sequences of demonstrations, i.e., participants demonstrating each item, one after another.
- *In conjunction with interview:* For other participants, demonstrations formed constituent parts of an interview, all except one taking place at participants' homes (the other at the reception desk of the charity office). Whenever possible, the researcher asked them to show the subject of interest based on their answers, and when finished, the interview continued. However, demonstrations also unfolded in sequence in these instances; for example, when talking about a specific app, participants showed more than one use or modality and/or used the opportunity to demonstrate a related technology or activity.

3.2 Data analysis

Ongoing engagement with the charity and participants informed something akin to an 'iterative' analysis, repeatedly returning to the data collected repeatedly to better understand fieldwork experiences (of the first author), as is common with ethnomethodological studies [24]. 'Data' in EM studies is used to exhibit phenomena of social order, not to act as empirical proofs of this. As we mentioned earlier, demonstrations emerged as a central and pervasive phenomenon in fieldwork, which is why we turned to our video recordings as they helped provide reminders of such instances of this phenomenon. A complete review yielded a total of 102 recognisable demonstrations within our video data. Each participant conducted a varying number of demonstrations, ranging between 1 and 20 (mean = 10.2, SD = 8.65). We provide a broad picture of this data corpus in Table 2. Demonstrations have been grouped thematically by type of subject demonstrated, including the number of instances per category, and some examples have been provided to illustrate them. Note that we do not want to make quantitative claims on the basis of 'counting instances' but rather assist the reader in gathering a sense of the range and nature of the phenomenon.

The first author organised, pre-selected and transcribed a range of video fragments depicting demonstrations in action each of which exhibited variations from other instances. This process was part of creating an inventory of the demonstrations in our data, first consisting of identifying demonstration instances and noting down the object and/or activity demonstrated (see column Examples in Table 2) and timestamps for easing access to the material during the analysis. Then, through initial data passes (i.e., watching the whole data corpus while making notes of potential interesting observations) a range of fragments were pre-selected on the basis of being substantial but self-contained instances; that is, demonstrations could be recognised having a clear beginning and

Table 2. Content of demonstrational data corpus

Demonstration subject	Freq.	Examples
Non-digital tasks or tools	19	Personal customisations for the home: Velcro stations, indoor cane, stickers or labels on appliances.
Digital tools interacting with physical settings	25	Image recognition mobile apps: text detection, light detection, face recognition, product recognition.
Digital tasks or tools	58	Mobile phone and laptop use: screen readers, accessibility features, general purpose apps, voice assistants.
TOTAL	102	

end, whilst displaying rich interaction material of participants with the devices, the environment and the researcher. For example: instances of gesture or command performance in using screen readers, of embodied interaction while explaining the use of camera apps, and of relevant exchanges between participant-researcher. Guided by conventions of video analysis in qualitative research which recommend the use of only a few fragments of short duration for data sessions [44], seven video fragments were selected as candidates. These candidates included demonstrations of: a Velcro station, an OCR app for reading text, an OCR app for light detection, a workplace task, typing on a laptop using a screen reader, navigating elements on a mobile phone and text messaging using the screen reader. These fragments were roughly transcribed to support the data sessions.

As a team of authors we then held a number of data sessions in which the video-fragments and transcripts were viewed repeatedly. Doing so forced us to focus on just how demonstrations were being produced in the context of the research encounter (as an aid to post-hoc reflection by the first author on her encounters during these). Particularly relevant fragments exhibiting noteworthy instances [22] were selected for more detailed orthographic transcription and further analysis. The fragments we chose happened to 'represent' each category and were substantial self-contained demonstrations but short in duration (i.e., no longer than 2 minutes).

We have selected four fragments that exhibit a range of assistive or accessible technologies as exemplars of the demonstrational work of participants across the subjects identified: one non-digital tool, one digital tool that interacts with physical elements and two different digital devices, as these were more prevalent in our encounters with participants. In the tradition of EM and conversation analysis, we use these four fragments to illustrate similar or very particular instances observed across the corpus (e.g., [16, 63]). They are used to exhibit the composition and social organisation of demonstrations. We present them in the format that best communicated the specific demonstration in question, by combining linear thoroughly detailed transcripts (including utterances, silences, overlapping talk or actions) [44] and comic strips (focused on body movements, visual occurrences, overlapping talk or actions) [60]. The transcript notation follows the conventions of conversation analysis[1]. Participants' names are fictional.

For readers more familiar with ethnomethodological and conversation analytical approaches, the use of a selected number of data fragments to exhibit and analyse interaction is a common occurrence. We lean on prior undertakings that have addressed this practice from a methodological perspective

[1]Brief pauses are represented by (.), some indicate exact times in seconds (0.5). Embodied interactions or other events that are not talk are represented between ((double parenthesis)). Other characters indicate how the talk was delivered, >fast<, °quiet° or elonga::ted. Square brackets and indentation indicate overlapping talk or actions. Blank spaces between single paragraphs indicate inaudible talk. Text between (single parenthesis) indicate unclear but estimated talk. Besides talk and actions by participants and investigator (INVE), the transcripts include talk and sounds by screen readers (VO, JAWS) and Siri (SI).

(e.g., see [25]), explicating that even the most mundane activity in everyday life encompasses social order i.e., it comprises a sequence of steps or characteristics shared in a culture. For Sacks [78], this seen-but-unnoticed or taken-for-granted order produces a 'machinery of interaction' from which some form of generalisation can be drawn out regardless of criteria such as number of observations or sample size. Crabtree et al. [25, p. 8] remark that "A single case of the machinery of interaction at work on any particular occasion is generalisable because it is a *shared cultural resource* for arranging the everyday affairs it elaborates". For the present work, this means that although demonstrations are of course not conducted in the same way each time, there exists a 'shared cultural resource' for organising the activity, and it is this 'machinery of interaction' that we are interested in disclosing. We leave to future work to further engage in more specific investigations or comparisons regarding demonstrations (e.g., do visually impaired people demonstrate differently to sighted people?, what are the differences between demonstrations and other observational methods?), as herein we initially attempt to exhibit a preliminary sketch of the interactional work of demonstrating.

4 DOING DEMONSTRATIONS

We begin our exhibit of demonstrational work by exploring an example of demonstration with and around primarily non-digital features such as leveraging objects' physicality with little bearing on their digital interactional features. Then, we analyse a mixed scenario where digital tools are used to extract information from the physical setting (i.e., optical character recognition of a sheet of paper). Lastly, we examine two demonstrations of more conventional accessible technologies which prioritise digital elements (magnification feature on desktop PC and screen reader on laptop).

4.1 Demonstrating a non-digital tool at home

Our first fragment involves Nick, who is a 50-year-old blind participant living on his own. He is an experienced iPhone user, being highly familiar with VoiceOver, Siri and apps for blind people such as Seeing AI. Like many visually impaired people, Nick has spent time customising or configuring his objects and home setting so as to better support himself, for example adding stickers or labels to home appliances for locating and identifying buttons or settings. In this fragment Nick exhibits a more unusual instance of such customisation work. The specific example Nick brings us to is a Velcro station that he has created by using a Velcro patch glued to one side of the fridge in his kitchen, where he attaches his mobile phone which has the other side of the Velcro glued to the phone case. This Velcro station enables him to place his mobile phone in a readily accessible place. Here we join Nick's demonstration session, with Nick sitting next to his kitchen fridge. His phone is attached to the Velcro station, leading to the station becoming the central topic of his demonstration.

1 NI: hi I'm Nick em I am visually impaired (well) er I'm severely sighted

2 NI: ┌ now as you can see I've got my mobile phone which is in a protective case
3 NI: └ ((reaches fridge surface)) (feels his way to the phone and holds it))

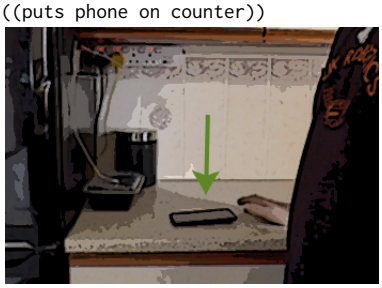
4 NI: that's attached to the fridge
5 NI: ┌ and one I use is a Velcro patch on the back of my phone
6 NI: └ ((takes phone from fridge)) ((shows Velcro patch))

Frag. 1a. Showing a Velcro station at home

Firstly, Nick gives a brief introduction as an opening to this demonstration. Not only does he remark that he is visually impaired but he emphasises he is severely sight impaired (i.e., an official term for blind individuals used by the UK's health service). In doing this he is building a framing for what he is about to show to the investigator. He starts by highlighting the location and composition of his mobile phone ("in a protective case that's attached to the fridge"), and he does that while reaching out to it. In line 3, he makes use of his spatial awareness as he reaches out to the fridge surface, roughly below the mobile phone, and then he slides his hand up, exploring the surface for locating it. He further proceeds to show and point out the patch on the back of the phone, making it clear how the pieces fit together (i.e., patch on the case attaches to the Velcro on the fridge).

He then simulates an undesirable scenario (lines 7-11).

7 NI: so what happens is
8 NI: ((puts phone on counter))



9 NI: ┌ if I put (0.8) my phone o:n the:re (0.9) if I:: come awa:y (0.7) I'm at (0.3)
10 VO: └ one notification (.) fro:m (0.5) twenty one hours ago ( )
11 NI: ┌ risk of (1.4) >dropping it on the floor< (1.5) and damaging the phone
12 NI: └ ((simulates dropping the phone from kitchen counter))

Frag. 1b. Simulating dropping the phone from counter

By simulating brushing the phone off the counter accidentally, he gives a glimpse of something that becomes an issue for a person who is blind, that is, not knowing if an object is on a surface, then dropping it and damaging it. In demonstrating the Velcro station, Nick highlights its specific physical configuration, underlining the creative and practical solution he has come up with for adapting his environment to a typical problematic faced in his day to day life. In this sense it is an account of his everyday practices in and about his home.

Notably, this fragment also provides a natural example of a screen reader delivering continuous feedback in the background while the participant performed the demonstration. In line 10, Nick's phone's VoiceOver (i.e., Apple's screen reader) starts communicating aloud his pending notification while he is in the course of providing a verbal account of the undesirable scenario (lines 9 and 11). Nick carefully interweaves his talk with the output from VoiceOver, either by briefly pausing or elongating some words. In line 11, he briefly pauses before delivering his follow-up talk more rapidly ("dropping it on the floor"). This pause and fast talk coincide with VoiceOver not reading aloud anymore.

He later adds commentary to such scenario just introduced and simulated (lines 13-19).

13 NI: ┌ so: the whole idea is to put the phone out of the wa:y
14 VO: │ one notification (.) fro:m (0.5) twenty one hours ago ( )
15 NI: └ ((feels the Velcro on fridge)) ((feels the Velcro patch on phone))

16 NI: ┌ like so (2)
17 NI: └ ((attaches phone back to fridge))

17 NI: now (.) one of the things that- one of the: things that I do like to use is SIRI
18 NI: and I'll give you an example (.) HEY SIRI WHAT TIME IS IT?

Frag. 1c. Explaining and using a Velcro station at home

He remarks and makes very explicit the reason he implemented the Velcro station in the first place ("the whole idea is to put the phone out of the way"). As evident as this might be, by being a demonstrator, Nick's role is to make as visible or transparent as possible the subject of interest, and he does it through his embodied actions (i.e., taking phone off the station, showing the Velcro patch on phone –in line 6) coupled with his verbal accounts.

Once again VoiceOver has started reading aloud the pending notification that overlaps with Nick's talk (lines 13-14). Yet, this time, he did not pause or deliver his words at a different pace as in lines 9 and 11. From this, we highlight Nick's different methods to talk around or over the screen reader. Moreover, we note that the demonstration also contains elements of natural 'troubles' encountered in everyday activities, and captures Nick's improvisation around unexpected events, as VoiceOver's feedback overlapping his talk was not 'part' of the Velcro station demonstration.

He brings this demonstration to a close by putting the phone back to the place where it was at the beginning of the fragment (lines 16-15). The demonstration performed up to this point has achieved two broad purposes: allowing Nick to disclose and explicate the composition and motivation of the object, while simultaneously providing an illustration of some ways in which Nick locates (line 3), senses (line 15) and uses (line 17) the station and his phone.

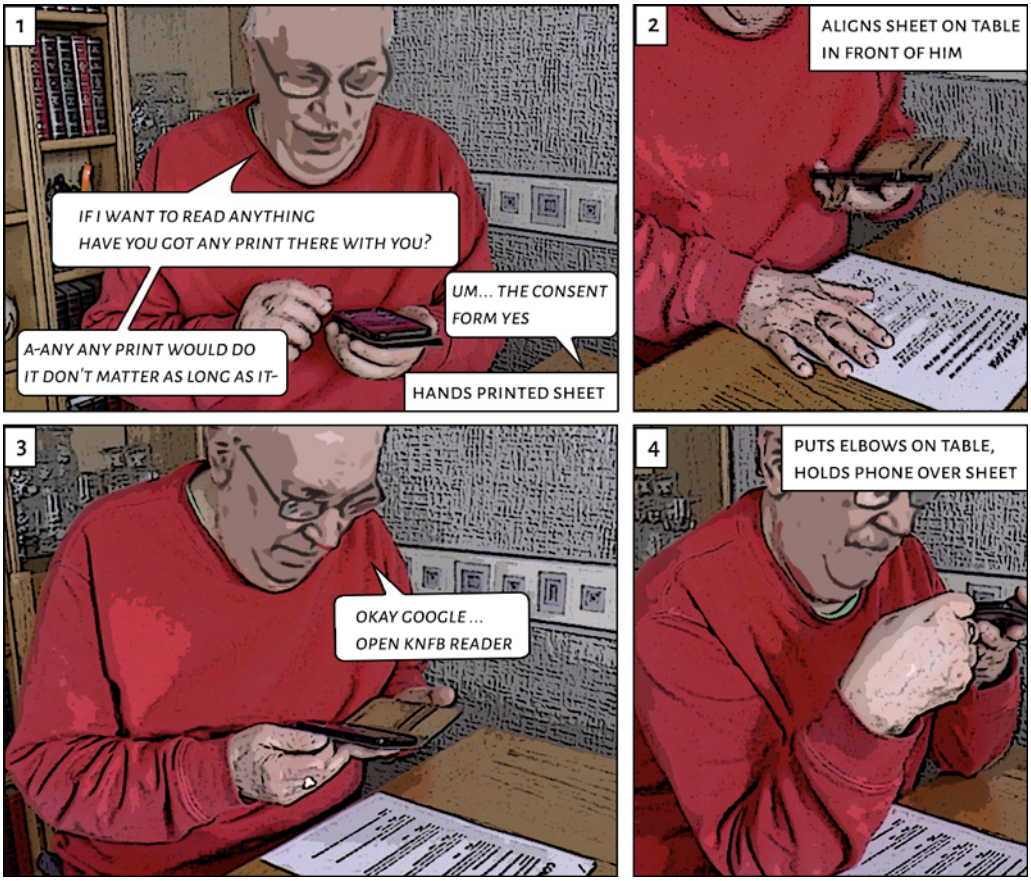
While he is attaching the phone back to the fridge, there is a brief pause (end of line 16) that serves as a transition to the next demonstration (line 18) in which Nick introduces Siri (i.e., Apple's voice assistant) that incidentally makes use of the Velcro station he just contextualised for the investigator. Further, we see again a brief introduction that contextualizes the subject about to be shown ("one of the things I do like to use is"). There is thus a noticeable sequential organization of the demonstrations exhibited in this first fragment.

Similar to this data fragment, other non-digital or purely physical tools and tasks were part of our data corpus –19 demonstrations in total. For example, a short indoor cane, stickers on shower controls, Braille labels on game cards and various types of low-tech magnifiers. However, not necessarily all demonstrations require or concern pre-existing customisations like Nick's. There are also other specific activities that could be demonstrated and that display the work involved in doing so. We next analyse one of those instances.

4.2 Demonstrating a digital tool to extract information from the physical world

We now introduce Paul, who is a partially sighted participant (67 years old) being interviewed at his home, sitting at the dining table. He has some residual vision, but not sufficient to read small print. Paul is also a tech-savvy person, using his smartphone for several everyday activities such as

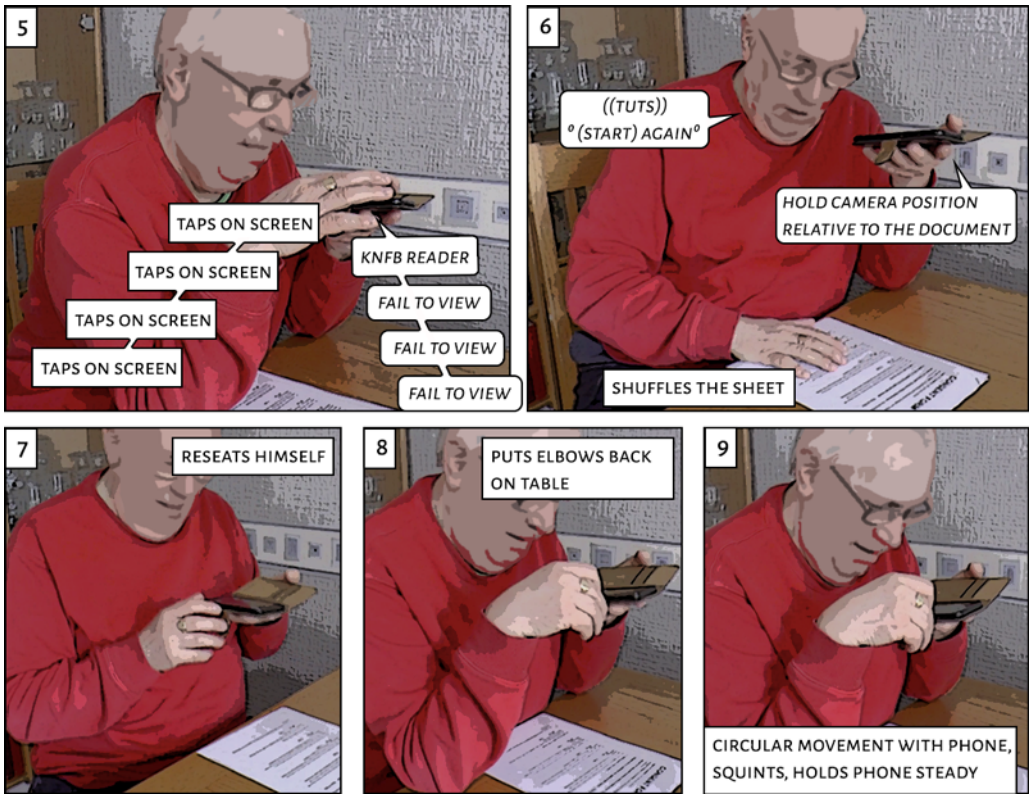
communicating with others via text messages and emails, checking information online, requesting local taxis and reading printed text using the corresponding apps. In this fragment, Paul uses an Android phone and the built-in screen reader (i.e., TalkBack) as he demonstrates some apps on his mobile phone. In the following he shows how he uses KNFB reader (an OCR –Optical Character Recognition– app) to read printed text. Prior to this, he demonstrated how he reads his emails (via Gmail).



Frag. 2a. Preparing to read a printed sheet using KNFB reader app

Paul needs to have the right resources and conditions to perform his demonstrations. Here he needs printed text to proceed with this. The investigator has at hand the consent form for the study, as would be expected for ethnographic fieldwork. Upon the investigator's hesitancy he remarks that "any print would do". For Paul, the relevance is for the production of a demonstration, so what is adequate here as material is judged on that basis. Once he has the sheet he continues creating or 'staging' the required conditions to deliver the demonstration. To do this he aligns the paper in front of him (panel 2), then placing his elbows on the table with the phone atop his hands, using a method that presumably supports him for distancing, steadying and aligning the phone over the paper (elbows on table in panel 4).

Paul's staging of the demonstration also includes opening the app through voice command, an action he must time appropriately before continuing (panels 5-9).

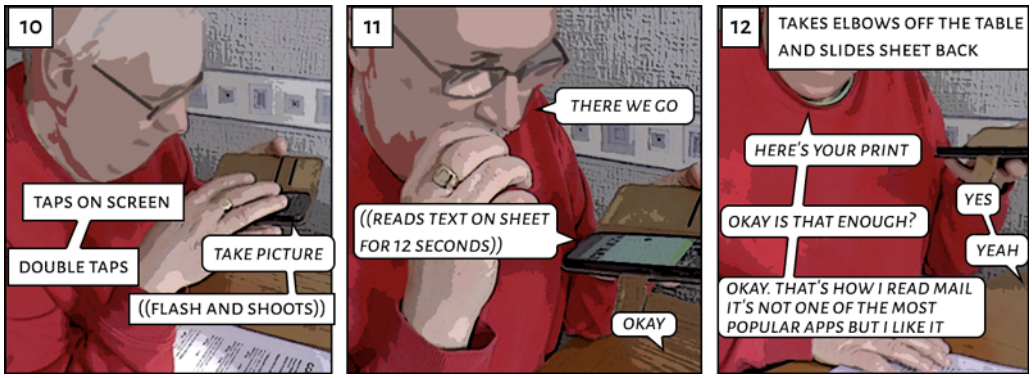


Frag. 2b. Failed attempt to use KNFB reader app

Paul taps the screen four times (panel 5) of which the last three attempts receive feedback of unsuccessful progression. He responds by first tutting and a brief formulation where topicalisation of the activity itself is made; that is, by muttering "(start) again" in panel 6 he gives a commentary of where-we-are with the demonstration, which is making the demonstration progress available to the investigator. In a sense, such a comment might not be necessary for conducting the activity, but it gets repurposed in any case for the demonstration itself.

Subsequently, in panels 6-9, he 'redoes' the whole staging from the start by taking his elbows off the table, shuffling the paper, reseating himself and getting his bodily comportment 'into the demo' again, i.e., putting elbows back on table with phone atop hands once more. Staging here also needs to work with and around Paul's particular eye condition, as he is partially sighted, but he did not demonstrate modalities in which auditory or verbal feedback give support on better aiming the camera (e.g., [98, 99]). Rather, he relies on his own embodied method as we previously described. In panel 9 he does a circular movement with the phone and what looks like squinting before attempting to take the picture again. This could be functional for him, but in any case, works to show an effortfulness involved in getting the app working.

We reach the point of this demonstration (panel 10 onwards) when the picture is taken, the text processed, and read aloud.



Frag. 2c. Reading a printed document using KNFB reader app

The brief exchange in panel 11 ("there we go", "okay") between participant and investigator are further moments of recognition that this performance of the demonstration has been successful. Twelve seconds after the document started being read, Paul starts the closure of this demonstration, breaking his bodily staging by taking his elbows off the table and handing back the paper to the investigator. In panel 12 he nevertheless confirms the closure by assessing the adequacy of the demonstration ("is that enough?") and possibly calibrating the expectations of the demonstrator and the observer.

Overall, this fragment showcases the significance of Paul's bodily work, not only of its centrality to doing the demonstration but also, in this case, of building a witnessable 'version' of the activity he is demonstrating. That is, we get to observe all the staging activities that enable him to use the OCR app to read printed text i.e., table positioning, materials to hand, ensuring alignment, correction of alignment, timing of taps, squinting, etc.

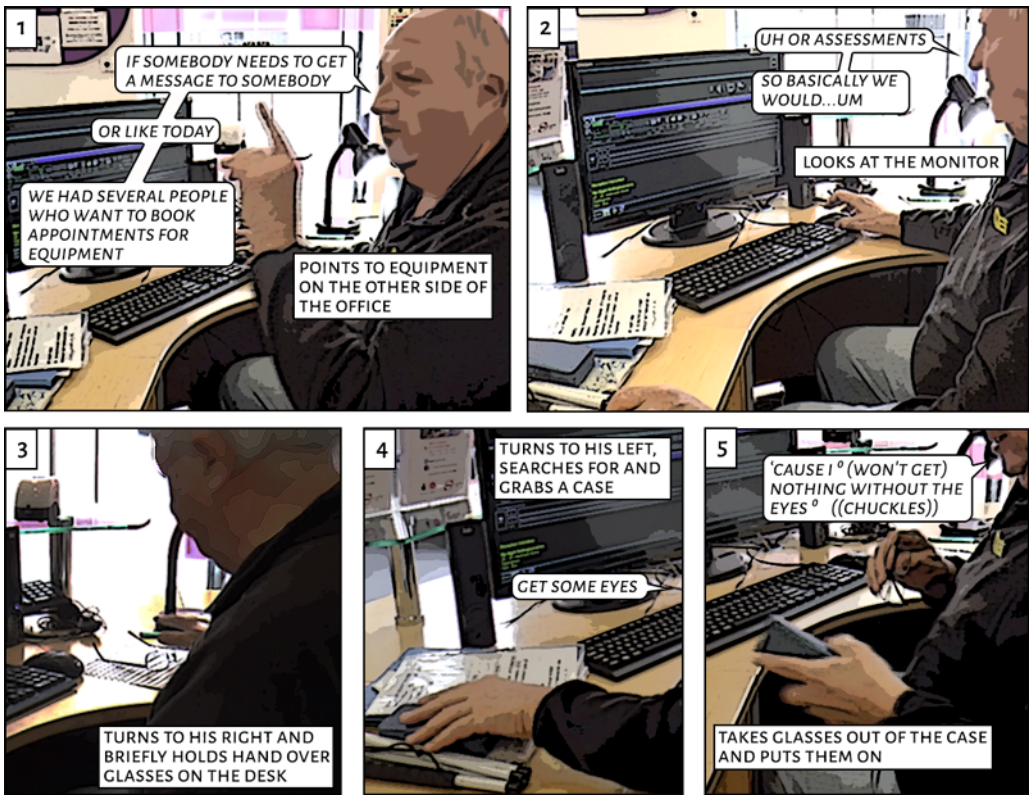
Several other instances of demonstrations in our data corpus that exhibit digital tools extracting information from the real world include the same or similar apps like the one Paul used, but for detecting light or products, and for recognising faces or different types of print. A few other demonstrations involved pairing a mobile device with an external physical device via Bluetooth, for example speakers or a wireless keyboard. In total, 25 demonstrations from this category were observed in our set.

Fragments 1 and 2 have presented exemplars of 'whole' demonstrations, where participants introduced the subject, added context of use, staged the demonstration in place if needed, and delivered the activity intended. However, we also found moments in which participants produced partial demonstrations, where for a variety of reasons some steps could not be performed. The following fragment illustrates this.

4.3 Demonstrating a workplace task using a digital device

For this fragment we introduce Liam, a 55-year-old partially sighted participant. He reported feeling slightly less confident about technology, but learning through the charity and other service users the features and apps that can support him best given his visual condition. He performed a series of demonstrations at the charity office where he carries out work as a receptionist. Before the fragment, Liam described the tasks he normally conducts at this workplace, for example dealing with calls requesting information or appointments, giving information to visitors, directing them through the visitor registration and sorting out the room, office or person they are looking for. He is sitting at the reception, in front of a desktop PC, and various other office and personal tools

laying on the desk. The monitor displays an email application, open and ready to use for composing a new email. The monitor also shows the particular configurations Liam needs for operating the PC, being partially sighted: screen colours are inverted (i.e., the screen background is black) and a magnification feature is turned on (i.e., the top half of the screen shows a magnified view of the elements at the bottom half of the screen). The investigator prompted him to demonstrate some of the tasks described ("is there something you can show me?"). He responds by recounting the activities, gesturing or pointing at the objects on the desk (e.g., the landline phone, notetaking paper). Liam then starts to demonstrate what he does when people phone the reception, resulting in him often composing an email to deal with the call.

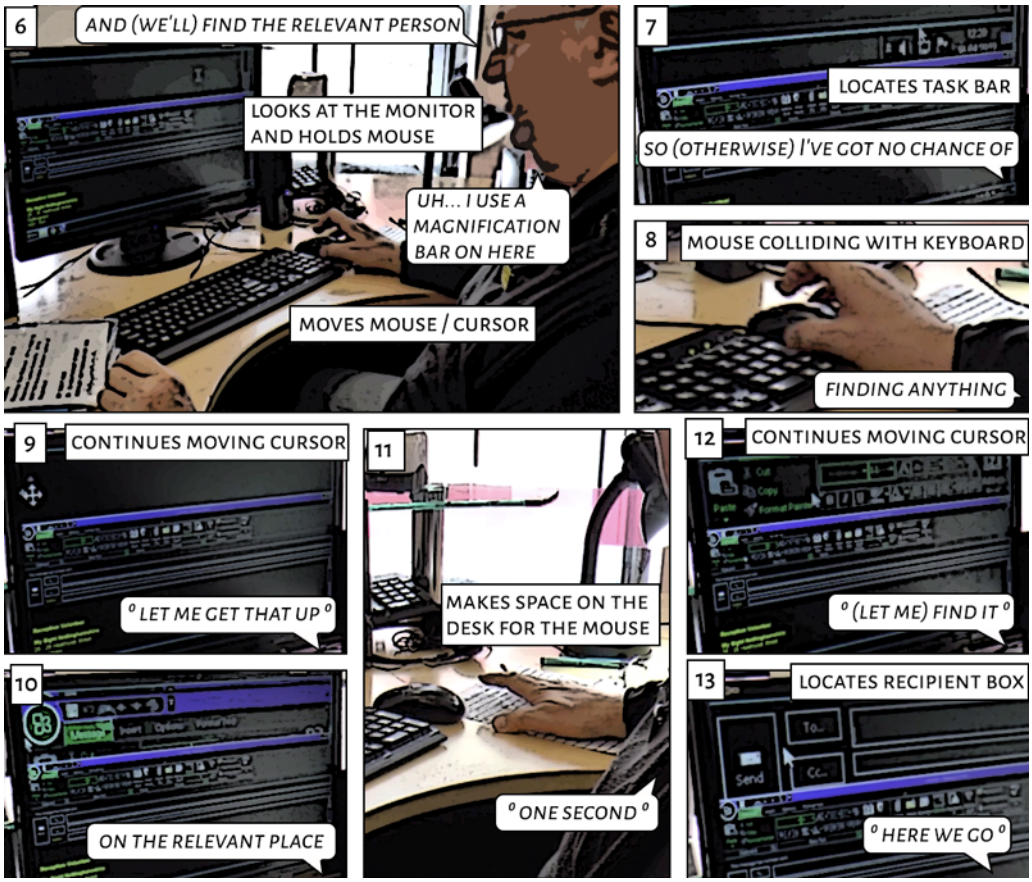


Frag. 3a. Explaining receptionist task and getting ready to show it

Liam starts by presenting a scenario that would typically occasion the activity he is about to demonstrate ("if somebody needs to…"), that is promptly tied to a real recent event ("like today… we had several people who want to…."). While he describes that people request appointments for equipment, he points to the equipment displayed at the reception, so to clarify what he means by 'equipment' for the benefit of the investigator. In panel 2, he seems to state the beginning of the demonstration ("so basically we would"), but interrupts himself after looking at the monitor. He slightly turns to his right, seemingly about to grab his pair of glasses laying on the desk. Immediately he turns to his left, and searches for something. He finds a case and pulls a second pair of glasses from it. Similarly to Paul in the previous fragment, the demonstration here reveals to us the ways in which Liam has to stage *himself* in order to perform the activity. Moreover, and differently to

Paul, Liam accounts for the interruption by clarifying what he is doing and why ("get some eyes, 'cause I (won't get) nothing without the eyes"). He did not, however, explain the reason for and the difference between the two pairs of glasses. But what is evident from this fragment, is that each pair of glasses has specific purposes for Liam, a fact that was confirmed later in the fieldwork with him.

Then, Liam picks up the demonstration where he left it (panel 6 onwards), before the *staging* interruption.

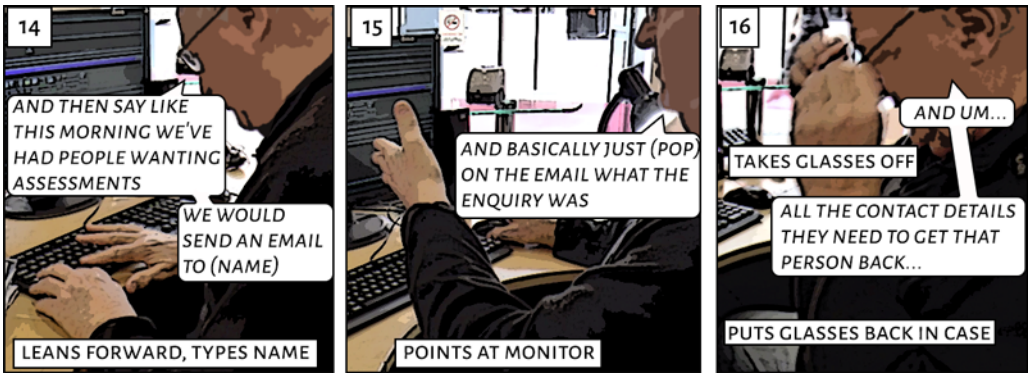


Frag. 3b. Using a PC with a magnification feature enabled

After putting his glasses on, he continues describing the first step in the task ("find the relevant person"), and then engaging with the action, by holding and moving the mouse. However, he inserts again additional commentary (panels 6-8), topicalising the accessibility feature set in the PC and explaining why it is needed ("I use a magnification bar on here… (otherwise) I've got no chance of finding anything"). These accounts that clarify the need for glasses and magnification are clearly not part of the task of composing an email, but are performed as part of the demonstration for the benefit of the onlooker. These accounts make explicitly accountable to the onlooker the required steps to move on with the task.

Further, in panels 7-12, Liam struggles to locate the recipient box for carrying out the current step in the process (i.e., find the relevant person). He first locates the task bar at the bottom and as

he tries to move the cursor up, he seems to struggle to handle the mouse, which is colliding with the keyboard. He then makes some space on the desk for addressing this issue. Interestingly, he provides a commentary, but this is different from the previous accounts about the glasses or the magnification bar. Instead, he gives a stream of utterances that help the investigator know the state of the demonstration ("let me get that up… one second… let me find it… here we go)". Again, these formulations are not essential for the task performance, but are performed for the sake of the demonstration as they index the progression through the demonstration.



Frag. 3c. Partially showing how reception messages are forwarded

Finally, after Liam locates the recipient box, he types the name of the person in charge of the request of the scenario he has given (panel 14). However, he does not continue performing the rest of the steps, instead opting to describe them. We observe he goes 'out of the demo' in panel 16, as he takes his glasses off and stores them back in the case where they were at the beginning of the fragment, thus 'un-staging' the demonstration. By this he concluded the demo. Notably, Liam did not perform an evaluation check for stopping the demonstration or deeming it successful, as Paul did in the previous fragment.

In our data corpus, 58 demonstrations primarily involved showing digital tools, such as in Liam's fragment. Other demonstrations consisted of different mobile phone or laptop uses, such as specific gestures or commands to control screen readers, text-to-speech features, a variety of general-purpose apps or websites (e.g., text messaging, e-mail, online shopping, etc.), and use of voice assistants. So far, fragments 1, 2 and 3 have presented examples of relatively straightforward demonstrations, where depending on familiarity with the subject displayed, some of the participants' actions and accounts could seem obvious or self-explanatory. Nevertheless, by applying similar features to more complex scenarios and activities, demonstrations in these cases could help to create better understanding for the observers. In the following fragment, we address one of those cases.

4.4 Demonstrating complex actions using a digital device

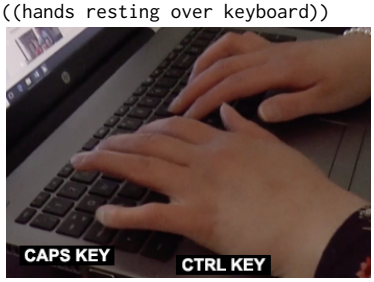
Alice is a 28-year-old blind participant. In the session conducted with her, she demonstrated her use of her laptop, among other devices such as her mobile phone, an audio-labeller and an electronic Braille note taker. Alice is also an experienced technology user, making use of several devices, features and apps that enable her to conduct everyday tasks, such as communicating with others via text message and email, doing college work, and labelling, locating, and identifying personal items. Furthermore, she is quite proficient at performing gestures on the mobile phone and a set of

commands on the laptop. In this fragment, she was not asked to perform anything in particular, but rather show her regular practices with the laptop. At the beginning she explained that she mostly uses the laptop for her college work which involves Microsoft Word and Excel apps. But before she engaged in specific demonstrations, she took advantage of two occasions—while waiting for a system response—to explain how she is able to use the keyboard. First, while the laptop was loading after turning it on, she brought the first author's attention to the small ridges on keys F and J. Later, after typing her login password, when waiting for the system to load, she highlighted a set of stickers on specific keys such as number 5, Home, Enter and arrow keys. The ridges are originally part of the keyboard whereas the stickers are a personalisation of hers, analogous with that of Nick's kitchen fridge. Brief accounts of the configuration and use of the keyboard enabled Alice and the investigator to establish a basic shared understanding of the sense of the landmarks used to locate and press specific keys.

The following fragment is an extract of her demonstration involving a Word document and a variety of keyboard commands to read the text through the laptop screen reader (JAWS for Windows). It is important to note that such particular command practices were not completely visible to the investigator, nor are they identifiable in the video recording, as Alice's hands cover parts of the keyboard. Moreover, JAWS is set to a very fast speaking speed and similarly to fragment 1 on some occasions becomes disruptive.

Before the fragment begins, Alice explained which keys she presses to perform certain actions: "if I want to read a text I usually go down arrow [...] if I misheard or can't remember what I read I go up arrow [...] if I want to go top of the page I press control and home [...] if I want to go end of the page I press control and end". The fragment here starts with the cursor positioned at the beginning of the document.

```
1  ALICE:  so if I want to know what document is this so I press er::
2  ALICE:  ((hands resting over keyboard))
```




```
3  ALICE:  ((presses caps lock key)) um ºone secondº ((holds down caps + (  ) keys))
4  JAWS:   ((reads)) (0.5)
5  ALICE:  ((stops JAWS by pressing control key)) so this er:: like a: (.) er:: space bar?
6  INVE:   uh huh
7  ALICE:  (no) capital key (.) caps::  (.) caps ah key isn't it? ((presses caps lock key))
8  INVE:   (yes) yes
9  ALICE:  caps key I press down (and) hold this down and then press T
10 ALICE:                          ((presses and holds down caps key)) ((presses T key))
11 JAWS:   ((reads document title)) (2)
12 ALICE:  ((stops JAWS)) what article this (.) so read the document's name (what's) actually mean
13 ALICE:  I mean (.) what document is it
```

Frag. 4. Demonstrating JAWS (screen reader) commands to read text on a Word document

Throughout Alice announces the next actions she will perform. The way she does this is to introduce them as scenarios in which they would be invoked in a regular situation, e.g., "if I want to

know what document is this" in line 1. Such a format "if I want to know [X]" serves as a preparation for the imminent demonstration. Further, we note in this fragment a form of rehearsal of some actions by the participant. Similarly to Paul and Liam in the previous fragments, in line 3, Alice provides a formulation of the state of the demo by murmuring "one second" while performing the command. By doing so, she carries out a kind of 'rehearsal' to check whether the key combination actually does the expected action (i.e., describing what document this is).

In lines 5-7, we see Alice seemingly struggle to name one of the keys involved in the command she just rehearsed. In this, there is self-repair and also a question to the investigator in order to obtain the correct name of the key (line 7). The name of the key is relevant as part of her ongoing interaction with the investigator and what it means to participate in the fieldwork (to attempt to render ones' practices visible): not knowing the key name surfaces a kind of friction between the phenomenology of the participant and the phenomenology of the demonstrational work. Rendering the key's name is important for the demonstration but not the action that the demonstration is demonstrating (i.e., performing the command). Resources have to be mapped by the participant from their circumstances to those of the investigator. The basic work of achieving intersubjectivity is thus made available—laid bare—by the demonstration itself as a phenomenon.

Similar to previous fragments, we get to see the actual demonstration (line 9) after some staging took place. Thereafter in line 12, there is a post-demonstration explanation of what the command just did, and a segue into the next demonstration. This template employed by Alice was observed throughout her keyboard command demonstrations in a sequential form, that is, first announcing the action, then performing, and at last summing up. Then again used in that order for demonstrating the next command.

Throughout this fragment we also observe non-highlighted actions in between the commands that are, by contrast, explicitly introduced and demonstrated. For example, pressing the control key to stop the screen reader in lines 5 and 12. The continuous action to stop the screen reader was highly present in all demonstrations on the laptop, as it allowed Alice to provide her verbal accounts without major disturbance, in contrast to Nick's demonstration in fragment 1. Notably, this is also an exemplar of a frequent and routine action of hers, one that is unremarkable to her or taken-for-granted as she did not explain or topicalise it, as Liam did in fragment 3.

This fragment is a very short extract of a chain of demonstrations that could be very difficult to follow for non-familiar audiences. It is in this type of complex scenario—not completely visible to the camera nor the observer—that a systematic breakdown of steps taken are useful for comprehension. The demonstration creates these opportunities for highly skilled individuals like Alice to slow down and require them to produce shared understanding.

5 DISCUSSION

Demonstrations have been a common element of HCI research for studying people's activities, tools and environments, but not much attention has been paid to their methodical character. By analysing four different instances of demonstration performed by people with visual impairments, we revealed key features that encompass the work of demonstrating which we summarise next. Following this, we'll discuss design opportunities arising from our analysis, and finally, the significance and implications of demonstrations as part of the methodological toolset for accessibility research and for HCI more broadly.

5.1 Demonstration features

If we want to understand the potential value of demonstrations then we need to be able to identify their features—i.e., what constitutes them *in and as* demonstrations in the first place.

Firstly, our detailed analysis adds to past work asserting that demonstrations entail more than merely showing technology functionality [88]; they delineate the different embodied and verbal resources employed by demonstrators for **showing**, **using** and **simulating** tasks or artifacts within a demonstration, for **checking upon** the onlooker for signs of comprehension and validation of the demonstration itself, and **providing accounts** to make their actions recognisable for other people. The various embodied interactional resources are central to produce and recognise these instances as demonstrations. For example, we can pinpoint moments where participants, aware of their role as demonstrators, directed their actions or objects towards the camera or the investigator. Conversely, there were moments where they had to fully engage with the action, or get 'into the demo', in order to move on with it, even if that meant making the activity demonstrated less clear for the observer. While the first fragment draws attention to assistive physical customisations of the home, the other three fragments emphasise the bodily, coordination and haptic work required for performing the activity (e.g., framing a shot, performing keyboard commands). Moreover, in between the interwoven modalities of using and showing, some demonstrations also comprised simulating a scenario or context of use; for example, Nick simulating dropping the mobile phone from the counter in fragment 1 as justification of his personal customisation at home. All the embodied actions are of course inextricably intertwined with participants' ongoing talk which is employed variously to explain, contextualise, draw attention, validate or open and close the demonstration itself. Our data illustrates some of these different uses of verbal accounts within the demonstrations:

- Accounts of steps within the activity or object being demonstrated (e.g., "the idea is to put the phone out of the way, like so" in fragment 1).
- Accounts of the state of the demo itself (e.g., "one second" in fragment 4).
- Accounts of steps merely described but not performed (e.g., "and basically just (pop) on the email what the enquiry was" in fragment 3).
- Accounts of additional information (e.g., "it's not one of the most popular apps but I like it" in fragment 2).

Further, we want to bring our attention to the **staging** process; that is, all the meta-activities preceding the actual demonstration, or *the use in action*. Again, the entanglement of embodied and conversational resources are a key feature throughout staging, leading to and providing the building blocks of the demonstration itself. This was especially the case for fragment 2, where Paul engages in a series of actions to obtain the required printed material to be read. The fragment lets us examine how required conditions to scan the paper are practically, physically achieved, by aligning, steadying and framing the phone. In fragment 3, Liam engages in a series of actions that do not necessarily encompass the task of composing a workplace email. He moves 'into' and 'out of' the demo as he gets his glasses and puts them on, and then traces those steps back after he deemed his demonstration complete. In fragment 4, Alice builds up the demonstration by announcing it and quickly verifying the keys before explicitly performing their use. In our data, most of these meta-activities occurring before the demonstration were key to understand participants' experiences with technologies and their use in context, despite the brevity of our fragments. Some of these meta-activities also took the form of practical troubles emerging within and around the demonstration (e.g., failing to scan a document, struggling to move the cursor), and the inclusion of extra steps within the demonstration to explicate related information (e.g., topicalising the need for glasses and a magnification tool). Thus, all the meta-activities preceding or intertwined with the demonstration, gave us relevant information about the person, the activity and artifact in question, and furthermore, about other elements unfolding to the sides or behind the demo, as others before us have pointed out [88, 93].

Secondly, demonstrations are social interactions [88]. Although this is somewhat obvious the implications are not. They are about making something visible, transparent or explicit to an observer, investigator, or co-present other(s). Nevertheless, even in simpler scenarios such as fragment 1, 2 and 3, this extra work of explicating and performing provided relevant information about the object or activity being demonstrated. The nature of demonstrations is such that demonstrators are sensitised to the need to clarify commonplace assumptions. Moreover, demonstrations can give insights from very complex situations, such as the one in fragment 4, that could be unintelligible if it were not for Alice's interwoven accounts of her actions. Arguably the overriding purpose of demonstrations is to create the **intersubjective shared understanding** of the subject being displayed. Demonstrations are not merely a display of a series of actions, but they are interspersed with talk that checks upon, confirms, and works to generate mutual understanding of the demonstrated activity between the demo-er and demo-ee. Participants' self-awareness of their role within the research is illustrated by Paul in fragment 2, checking with the investigator whether his demonstration was successful for the purposes of the investigation. It is *in and through* the continual—interactional—production of verbal, physical, digital, and embodied actions that this intersubjectivity is achieved, and thus, the demonstration can be seen to serve its purpose.

Third, like all social interaction, demonstrations are constituted in and as recognisable and repeating sequences of action (i.e., the 'machinery of interaction' [78]). Demonstrations can look to **follow a 'template'** that may make them appear almost scripted, even when demonstrators had not prepared or choreographed their actions in advance, as is common with public technology demos [53]. Demonstrations are thus underpinned by unspoken but shared-in-common expectations about 'how a demo is done' and 'what a demo looks like' as a recognisable social object. Our work expands Lazar et al.'s suggested pattern that, for them, descriptive demonstrational case studies broadly follow [61]. Their stated pattern consists of a participant introduction and context of use (e.g., fragment 1), how they used the system (e.g., fragment 4), problems faced (e.g., fragment 2), strengths of the system (e.g., fragment 3) and opinions (e.g., fragment 2). However, our detailed analysis provided a closer look into some of these broad steps. For example, in fragment 4, this 'template' involved Alice conducting her command demonstrations in recognisable phases i.e., announcing, performing, and summing up. Moreover, on some occasions she had to quickly rehearse before moving on to the 'official' performance. Notably, these actions were brought to bear specifically because of the demonstration, so these do not only concern how she uses the system, but also how she explicates her use of it. Although we can observe that other participants performed their actions *while* explaining, instead of announcing in preparation, it is worth remarking that all the fragments included a scenario statement that set the demonstration in motion or helped to contextualise it (e.g., "*if* I want to read anything").

5.2 Design opportunities

Demonstrations involve attempts by participants to surface the embodied nature of their everyday interactions 'in the world'. They are not phenomenologically 'the same' as those everyday actions but instead they *evoke* them. In this way they have the potential to surface *some* of what it means to live with a visual impairment, and to make this available (recognisable) to others, furnished with all the possible challenges and required skilfulness in their accomplishment. Demonstrations surface the importance of the adaptations done by visually impaired people to configure both their situation and environments in which assistive technologies are used. We build on previous work articulating the particular competencies that people with visual impairments use in their everyday lives [74], which are often seen-but-unnoticed or taken-for-granted. Herein we locate and highlight the situated competencies that the participants exhibited through demonstrating. We then provide exemplary design areas in which future design work could be done to support the demonstrated

competencies. Table 3 summarises the activities and competencies demonstrated and unpacked in this paper, as well as potential design areas they relate to.

Table 3. Design insights obtained from analysis of demonstrational work

Demonstration	Activities (Competencies)	Design Areas/Opportunities
Customisation at home	-Reaching fridge, locating device, showing it to the investigator (tactile, spatial)	-Indoor navigation and orientation towards others (e.g., [40, 41])
	-Simulating use case scenario dropping the phone (spatial, adaptation)	-Safety mechanisms for mobile devices or other objects (e.g., [43])
	-Talking over and around screen reader in the background (verbal, auditory, social)	-Use of pauses and slow and fast talk around screen readers
OCR app for reading printed document	-Framing, steadying and aligning document for scanning (bodily camera work)	-Supporting camera focus and alignment (e.g., [51, 98, 99])
	-Redoing steps after failed attempt (bodily camera work)	-Use of embodied methods for taking pictures
Task at reception desk	-Arrangement of tools in a workspace (spatial, configuration, tactile)	-Accessibility arrangements in work settings (e.g., [2, 15])
	-Selecting and using tools for specific purposes (configuration, visual)	-Configuration and use of tools by people with low vision (e.g., [92])
	-Moving cursor and finding elements on screen (spatial, visual)	-Magnification tool research
Screen reader commands on laptop	-Starting at a resting position and performing commands (tactile, spatial)	-Tactile references in non-visual activities (e.g., [72])
	-Naming keys for the investigator's benefit (social, intersubjective)	-Mixed-visual abilities settings (e.g., [65, 66])
	-Stopping screen reader in order to talk (auditory, tactile, social)	-Use of stop-shortcut with audio output in social settings

Past work has turned to gather evidence and reflections of the adjustments or adaptations that people with disabilities implement for creating more accessible home and work settings that fit their individual and social needs, pointing out their invisibility and unrecognised characteristics [7, 15, 57]. As showcased by Nick in fragment 1, demonstrations can give complementary insights of such configurations that might only be prompted by this type of performance and that could be overlooked if we *only* ask for verbal accounts perhaps via interview. For example, the undesirable case scenario brought up by Nick when demonstrating his Velcro station showed a very specific concern that involved the particular setting in which the demonstration took place; that is, he showed what it meant to leave the phone on the counter right next to the Velcro station and in doing so exhibited the possibility of dropping and damaging his phone. Perhaps another evident reason for his adjustment is to easily locate his phone, but for the account given in his demonstration, this is incidental. Through this example Nick also demonstrates how he moves around and locates objects

at his home, which could be valuable for technological research on indoor navigation. Likewise, fragment 3 gave us a glimpse of Liam's workplace and the necessary arrangements for the tasks he conducts at his desk station. We are shown his personal configuration of tools, both physical (i.e., landline phone, paper, two pairs of glasses, PC) and digital (i.e., magnification feature on the PC). Asking Liam to demonstrate something *in use*, we moved beyond 'touring' the workstation or going through the tools. In doing so, we obtained a deeper understanding of what tools are essential for the activity demonstrated and how some tools have specific purposes (e.g., a second pair of glasses for using the PC).

There are also insights for research on the embodied interactions of people with disabilities. In this paper, a simple and conventional example of bodily work has been illustrated by Liam, who demonstrated how he operates a mouse and a magnified screen while having residual vision. A more specific example of bodily work has been displayed by Paul when demonstrating the OCR app on his phone, which involved framing the camera over the paper through a series of actions (elbows on table, aligning the paper, crafting his posture, positioning the phone, squinting, etc). Although there is significant work on designing assistive technologies that support visually impaired people to aim and align their mobile phone to take pictures (for different purposes, including reading documents by themselves or others) [51, 98, 99], we note a major emphasis on design and evaluation of technological prototypes or existing solutions and their different modalities [26, 68]. Photographs taken by visually impaired individuals are often of poor quality or not usable for the intended purpose (e.g., computer vision systems or crowdsourcing services), and thus the practice still entails crucial challenges [42]. Future work in this area could benefit from systematically employing demonstrations by visually impaired participants in various situations or settings and thus, designing for supporting and enhancing the embodied methods people use for e.g., taking pictures.

Lastly, we have presented cases in which the pervasiveness and sometimes disruption of screen readers' output is evident. In Nick's demonstration we have seen how he improvises and crafts his talk and performance around VoiceOver. In this example, timing and sequencing are key elements to carry on talking while the assistive technology continues communicating his pending notification. By contrast, Alice's demonstration highlights a routine action—pressing a control key—to continuously stop JAWS, so to clearly provide her aligned (verbal) accounts of the ongoing demonstration without interruption by the subject of it. These fragments showcase short demonstrations, which have allowed us to examine and understand these two types of interactions to deal with a screen reader in the background. Future work on interdependent practices [6] could further explore the use of screen readers in social situations through demonstrations, as they are intrinsically a social occurrence (i.e., needing at least two parties).

5.3 Further implications for accessibility research

We think better conceptualisation of demonstrations can help deepen thinking in **accessibility research approaches** such as autoethnography [49] or biographical prototypes [7]—approaches that have sought to recognise and elevate the experiences of people with disabilities through descriptions and reflections of personal experiences and collecting design counter stories (i.e., stories of personal adaptations or adjustments that tend to be ignored by traditional design). For our investigations of AT, demonstrations provided an opportunity to capture how people chose to show and explain their activities and artefacts, as it was mainly **participants (as demonstrators) who led the narrative** of the encounter. In our case, participants were not asked to craft, learn and rehearse a particular choreography or narrative in advance for demonstrating, as is common in technology demos performed by developers or designers. But participants knew the general purpose of the research and, in and through their demonstrational work, they displayed their

expectations of what the researcher might be interested in. This co-orientation to the research encounter—as an achievement of intersubjectivity—is what helps drive the demonstration and make it productive as a research encounter.

Through the close examination of naturally emerging demonstrations performed by participants (i.e., a members' method), we want to propose the eliciting of demonstrations as a practical method (i.e., a research method) that can support some people with disabilities in **representing themselves in the research process**, if treated with care and taking limitations into consideration. Williams and Gilbert have pointed out that "the researcher has a duty to return voice to whomever it has been withheld from" [105, p. 127]. In this vein, and particularly relevant to the field of accessibility, video recordings of people with visual impairments demonstrating how they perform different activities in their everyday lives (e.g., using various technological devices) have been increasingly gaining attention on social media platforms [59, 107]. **Rather than dismissing or invalidating the performative** element in these demonstrations (see comment in next section about the naturalistic/un-naturalistic dichotomy), or those emerging in the course of research activities, we should aim to fully engage with them, listening to users and what they have to say about the systems, especially when they have been systematically excluded from traditional design processes—and our work shows what can be uncovered in doing so. Future work could examine some of that online video material, as it has been analysed sparingly and in less detail (e.g., [3, 81–83]). Making use of existing data sources or doing remote video demonstrations are viable alternatives to doing observational research in times of Covid-19 in which social distancing precludes us from doing face-to-face research. However, future efforts should also devise alternatives for clarifying assumptions, misinterpretations or resolving uncertainty when there is little context in such videos [3], as well as grappling with the ethical implications of using data available on the internet or reusing video data for further research purposes for which the material was not originally intended. For example, Seo and Jung [82] provide an example of how to start handling such ethical considerations. They contacted the creators of the online videos used in the research and interviewed some of them to complement their video content analysis.

Drawing on recent work in HCI that builds on critical disability studies, framing access as an ongoing accomplishment requiring continuous negotiations and adjustments, we suggest demonstrations as an approach to investigate some of these mundane attunements [8]. Our analysis has revealed how participants **repaired their troublesome or uncertain interactions**, by creating specific configurations (bodily, object customisations) that fit their needs, and by conducting routine methods such as resetting their actions after failed attempts, or repeatedly verifying their actions to make sure they are correct. This work aligns with—and provides tangible examples of—a perspective that considers accessibility as something more complex than a binary outcome i.e., accessible or not, but an ongoing undertaking—or to use more ethnomethodological language, an accomplishment [36]. Underpinning this observation, we note that ethnomethodological and conversation analytic research has shown how **embodiment—being in-the-world—is a key feature of the accomplishment of access** for visually impaired people, for example in blind navigation using white canes or guide dogs [31], in sighted guided navigation co-constituting common spaces [100], and in examination of artworks by visually impaired people and their sighted companions at a museum [102]. Future work examining the various embodied interactional resources employed by visually impaired people in and through using digital devices can deepen understanding of people's activities and broaden opportunities for design intervention.

Building on the prior point, we sought to draw attention to the core purpose of demonstration, **achieving an intersubjective understanding** of the activity at hand. This becomes relevant in mixed abilities interactions, such as in the data fragments we presented, where the demonstrator was visually impaired, and the researcher was sighted. We think that studying demonstrations to

investigate just how intersubjectivity is achieved could provide insights for work on documenting the practices and relationships between parties with mixed abilities [14, 15, 89, 109]. Moreover, it allows the positioning of the researchers as actors in the investigations with disabled participants, helping to expose assumptions or frictions in these relations and opening up space for moving away from a 'modest witness' standpoint [104] towards one of respect and recognition of disabled experiential knowledge. Likewise, employing other forms of demonstration material (i.e., available online or remotely produced) can open up the space for examining different types of demonstrational work and social interaction beyond the participant-researcher pairing, such as the creator-audience or teacher-student relationships, exploring their difference and similitude with empirical demonstrations. Most likely, achieving intersubjectivity can be a feature present throughout different types of demonstrations, but several other features and dynamics would surely vary depending on the source material. For example, the type of power imbalance present between participant and researcher and the participant motivation of providing good data are elements specific to empirical demonstrations. Examining social interaction with other types of parties and circumstances would require us to consider questions like: who is producing the demonstrations, for what purpose and for what audience, who is consuming them, what their motivations are for doing so, and how they are being used.

Finally, in employing demonstrations, we must recognise that **disabled individuals are often objectified as a source of inspiration** for non-disabled people. In a 'supercrip' narrative that perceives disabled people as incompetent by definition, they are subject to praise when accomplishing anything, even the mundane or banal [56]. Moreover, 'inspiration porn' [108] portrays people with disabilities as special or superhuman for 'overcoming their impairment'. Both notions are recognised as harmful and dehumanising and thus ones that we must be aware of and strive to avoid perpetuating when conceptualising people's situated competencies [74]. In this way we think ethnomethodology has the potential to contribute to new understandings and approaches for AT research.

5.4 Implications for demonstrations in HCI research

Finally we turn to wider implications for HCI, discussing limitations of, ethical considerations for, and opportunities for, conducting demonstrations as a research instrument. Although technology demos have had cultural significance in Computer Science and HCI (e.g., 'the Mother of All Demos' [48]), research-based demonstrations had not been considered as a methodological object worthy of examination despite being part and parcel of empirical HCI research. We have discussed the implications and opportunities of conducting demonstrations with people with disabilities. Nevertheless, we think the insights from this work are broad and could provide significant value to research in HCI beyond assistive technology and accessibility, as also signified by demonstrations' occurrence or even pervasiveness in other methods, such as home tours, ethnographic and observational research. We first lay out some of the limitations we have encountered in the data collected applying this approach.

5.4.1 Practical limitations. Inevitably, there were cases that **could not be demonstrated** because of practicality purposes (e.g., GPS for navigation, taxi booking app), technology not working (e.g., disconnected internet/WiFi) or for privacy reasons (e.g., banking app). Alternatives had to be employed, taking the form of partial demonstrations (e.g., only showing the home page of the taxi booking app, without actually requesting the taxi) coupled with verbalised accounts or made entirely in this latter modality. However, fragment 3 has shown that even when demonstrations are partial, we are able to locate relevant elements about participants, their use of a system and the unfolding context.

5.4.2 Realism concerns. Some might argue that the participants' 'performance' for the researcher invalidate the research or portray unrealistic or exaggerated actions or opinions. Firstly, it is a fallacy to assume a dichotomy of 'naturalistic' vs 'un-naturalistic' research investigations. Secondly, we found that conducting the demonstrations in conjunction with other standard ethnographic approaches like interviews allowed us to make sense of or probe our assumptions, and gain a broader perspective of the activity and/or object demonstrated. Moreover, the multiple demonstrations performed by each person allowed us to pinpoint relevant factors about them, their activities, their tools and overall, their competencies in action. For example, Liam's demonstration of the PC in fragment 3 was followed by a series of demonstrations of other personal artifacts such as a portable electronic magnifier and a mobile phone. Altogether, these moments provide a glimpse of the pragmatics of his particular visual condition in concert with his bodily work, the artifacts he manipulates, and the required configurations for doing so (e.g., light text on dark background, glasses, large font). However, we do not wish to claim that demonstrations in their own right give us a 'complete' picture of participants' lived experience, but rather that they throw into relief a few likely very essential elements that are core to them as visually impaired individuals (i.e., the ordinary, the unremarked-upon). In this paper we move from long-standing concerns about capturing 'naturalistic' or 'authentic' phenomena [91], and have illustrated that demonstrations can actually provide relevant insights for understanding the practical mundanity of encounters with everyday technologies. By looking at demonstrational work we are **embracing 'simulations'** for what they are rather than treating them as categorically problematic as compared with idealised 'real' interactions [76]. Demonstrations as simulations let us investigate interactions' social and sequential organisation—and we take them for what they are rather than strive for realism [46] as a panacea for 'good' design. Further, we do not wish to draw an artificial connection between the place in which the technology is demonstrated (e.g., the home), and the 'naturalness' of that demonstration. Rather this judgment, which is ultimately about the veracity of the demonstration, needs to be about **situational appropriateness**. Thus, it may be appropriate to demonstrate a mobile-embedded OCR reader anywhere, while a fixed Velcro station may really only be demonstrated appropriately in that home in which it is installed.

5.4.3 Ethical considerations of meta-activities. Further ethical considerations we wish to highlight are related to the demonstrational meta-activities we identified in our analysis. These meta-activities may occur throughout the demonstration but were particularly evident in the 'staging' phase; that is, everything leading to the demo itself. On several occasions interruptions or issues took place, and although some participants built them into the demonstration (i.e., accounting for them, explaining how to solve them or why they could not solve them), others surreptitiously dealt with them to continue with the demonstration. Similarly, some 'unintentional' demonstrations occurred in the course of performing the main demonstration and were not always explicitly called upon or explained in detail. We as HCI researchers can do more to reflect on **how we account for or even acknowledge meta-activities around and within a demonstration**, and consider how and whether they implicitly inform or bias our understanding of participants. If issues come up or participants make mistakes during or even before the demonstration, are these considered part of the research? Moreover, are we being explicit about this with our participants? And if not, how we should go about making the data capture fair or more transparent? By this we do not wish to draw a line between what counts as a demonstration or not, but rather bring attention to the empirical observational practices we are already conducting. Our orientation as HCI researchers might be one of capturing as much data as possible to let us understand participants' use of systems, their behaviour and performance, but we may benefit from discussions and reflections coming from accessibility research that call for an ongoing consent process with participants, that allow

them to engage and disengage at convenience [105]. General recommendations when conducting fieldwork with blind and partially sighted participants include letting them know at all times, and give reminders, that they are being recorded. In our work we noted that some of the meta-activities in and around the demo were 'breaking' or making us pause the recordings. If a participant giving a home tour needs to engage with other interrelated activities in the course of demonstrating, are these automatically part of the data? When should we explicitly ask for participants' consent during such events? Setting up audio-visual recording devices across a setting at the beginning of a session and informing participants that data will be captured uninterruptedly might be a more straightforward and practical research custom, however, it has the potential to mask these ethical implications for both researchers and participants.

5.4.4 Ethical considerations of participant-researcher relation. Our insights resonate with Taylor's argument to pay attention to the set of relations happening behind and to the sides of the demo itself (although he referred to Engelbart's demo) [93]. By this, we also mean paying attention to the participant-researcher or demonstrator-spectator relation, as demonstrations are a form of social interaction. Throughout fieldwork, there must be a **clear shared understanding about the purpose of the demonstration**. Is the focus on the system, on the activity or on the person? Most likely we will not be able to separate the interwoven relations between the actors, but is this clear to participants? Their understanding of our research motivation could have effects on the ways they conduct their demonstrations. In our work this was illustrated by, on the one hand, outcome-driven demonstrations, and on the other, process-driven demonstrations. That is, showing that something exists and can be made to work (e.g., fragment 2) and explaining in detail the steps of the activity or technology in question (e.g., fragment 4).

5.4.5 Benefits and opportunities. In spite of such limitations and if ethical considerations are carefully acknowledged, we believe that demonstrations are **effective in providing fruitful accounts of real-world activities**, thus adding to the methodological toolset for understanding human practices regardless of the setting where it takes place [76]. The role of material artifacts in home and work life, and how social organisation of members emerges around them, has been long investigated in HCI and CSCW literature, especially via ethnographic studies. Although fieldwork undertakings are characterised by rich and comprehensive findings, they tend to be lengthy in scope and time frame, especially if they attempt to follow 'naturally occurring' activities. By contrast, demonstrations can reduce some of those application inconveniences, while, as we presented in this paper, revealing significant (versions of) mundane practices. Moreover, we point out that demonstrations can be particularly helpful to understand and **break down complex scenarios**, especially **involving skilful, proficient performers and practices**. A demonstration of a particular activity can also reveal the performer's capabilities in an intelligible manner, that is, it can surface how professionals make sense of and articulate the particular events and resources relevant to their community of practice [38]. This ties back to accessibility research, in which recognising disabled individuals as skilled or power users has become a powerful and focal stance [1, 7, 74].

6 CONCLUSION

Demonstrations implicitly play a key role in a wide range of research contexts, but their methodical character has not been examined in depth to understand their practical accomplishment nor the opportunities they bring to HCI. Despite being a constituent part of popular approaches such as 'home tours', little is known of what can actually be achieved through demonstrating. Our study has highlighted *just what* makes particular practices recognisable as demonstrations (i.e., showing, using, simulating, staging, checking upon and providing accounts to the onlooker, and

producing intersubjective shared understanding). A purpose of this is to provide an improved conceptual toolkit—benefits and caveats included—to help foreground demonstrations, so they may be identified within and delineated against other approaches such as ethnography, contextual inquiry or other types of recorded interaction. Our research thus uncovers a potential field of focused study of demonstrations in HCI.

We have shown how, in the case of assistive technology (AT) demonstrations by people with visual impairments, demonstrational work can offer specific insights into the detailed ways in which AT use is accomplished—throwing into relief visually impaired AT users' particular competencies. For example, we saw how careful bodily 'camera work' was performed in the course of using a regular OCR app. These insights then may map onto design areas and opportunities; for instance, rethinking how embodiment might be brought to bear for visually impaired users of AT camera based apps. Paying specific attention to the actions involved in staging the demonstration reveal valuable phenomena to generate these insights (and if no staging is required, inquire what this might indicate).

In closing we believe demonstrations—when tackled in a way that carefully accounts for their character as a specific sort of social encounter—also have broader value for other areas of HCI and AT research. This is because, as we have shown, demonstrations have the potential to successfully generate design insights for difficult-to-capture situations or taken-for-granted practices. Future work should do two things. Firstly, it should bring together and examine existing examples of demonstrations and the role they have played in delivering research results (e.g., see Rooksby's account of Suchman's work [76]). In other words, we feel there is a need to surface the latent achievements of demonstration within extant HCI literature in this way. Secondly, approaches that make a virtue of demonstrations as an eliciting technique can be applied to other settings; particularly, we would suggest, for domains in which more conventional observational, participatory or immersive approaches are difficult, or out of reach in some way. This is *n*ot to say that demonstrations can somehow 'replace' such investigatory methods, and neither is it to say that they are exempt from the troubles approaches like ethnography might regularly encounter. However, demonstrations do offer the potential for complementary alternatives to these.

ACKNOWLEDGMENTS

This work was supported by the Engineering and Physical Sciences Research Council [grant numbers EP/V00784X/1, EP/T022493/1]; and the National Council of Science and Technology of Mexico [award number 710041]. Thanks to the reviewers of this, and previous versions of this paper, for their time and feedback. We also thank the participants who took part in the study. Data access statement: all of the research data used to produce this publication is available in full in transcriptions in this paper.

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