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The impact of the COVID-19 pandemic on human-computer interaction empirical research

Blind review

Blind review

The purpose of this paper is to assess the effects that the COVID-19 pandemic caused in the Human-Computer Interaction (HCI) research field. Specifically, we aim to investigate how the HCI empirical research methodology has changed due to the restrictions caused by COVID-19. For this reason, we analyzed all the papers published in the 2021 edition of The ACM Conference on Human Factors in Computing Systems (CHI 2021), which is generally considered the premier international conference for the field of HCI. Thanks to the analysis of the CHI papers, we identified four main effects of the COVID-19 pandemic on HCI research: influence on participants; influence on apparatus; influence on experiment procedure; other influences. These effects are described in detail and broken down into additional subcategories. Moreover, papers on pandemic-related topics were also identified. The analysis found that 23% of the papers reported some influence of the pandemic, the most common being a change in the procedures researchers used to interact with participants in their studies, in most cases using remote communication technologies.

Categories and subject descriptors: HCI research in the COVID-19 era

Keywords: COVID-19 pandemic; Human-computer interaction; HCI; Empirical research

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1. INTRODUCTION

The COVID-19 pandemic has had tremendous effects on everyday life; from changing the behavioral traits of human beings to modifying the nature of communications. "Research" has not been an exception and the impacts of the present outbreak in the field of scientific research are also undeniable. Although there are some benefits such as accessibility and convenience in these modifications, some studies reported limitations or difficulties in the research journey (Mukhtar et al., 2020). For instance, following the COVID-19 outbreak in 2019, there were numerous lock-downs all over the world. Hence, the researchers did not get a chance to carry out their activity of collecting data or sampling in-person and the mentioned activity transitioned to online methods. In this respect, the researchers should contemplate innovative online routes (Bambha and Casasola, 2021). However, some concerns regarding security, accessibility to technology, and cost-effectiveness of online methodologies compared to face-to-face methods, may be taken into account (Mumtaz et al., 2021). Some researchers assessed the viability of using social media platforms for participant recruitment for an online survey; the aspects including the time spent and the number of accomplished surveys were evaluated (Green et al., 2021). The success and failure rates of different online recruitment strategies (e.g. Listservs, Facebook groups, personal networks) should also be considered a crucial factor to better utilize these strategies in the future (Vu et al., 2021). Before the COVID-19 outbreak, online technologies had already been commonly employed in Human-computer interaction (HCI)-related surveys (Müller and Sedley, 2015). For instance, online surveys were previously used in investigating misinterpretation related to stickers in messaging services (Cha et al., 2018), assessing cognitive models in the practice and

training of HCI (Austin and Abdelnour-Nocera, 2013), determining the acceptance rate of advanced driver assistance systems for older adults (Braun et al., 2019), assessing the employment of near-field communication (NFC) (Geven et al., 2007), exploring user's choice in recommender techniques (Burbach et al., 2018), and many other HCI-related studies. In some studies, online sampling was proved to be a suitable technique and could be considered an acceptable alternative to traditional ones which guaranteed generalizability (Chorianopoulos and Lekakos, 2007). However, the success rates in online recruitment procedures were not always satisfactory and had some obstacles (Pretorius et al., 2018).

Since, to the best of our knowledge, no comprehensive assessment of the effects of COVID-19 on HCI research has been conducted yet, this paper elaborates on the influences of this pandemic on the studies related to this field. Our analysis was conducted by analyzing the proceedings of The ACM Conference on Human Factors in Computing Systems (CHI 2021), which is the premier international conference in the field. All of the published papers were analyzed and systematically classified according to the areas of the methodology affected by the pandemic. We also performed a comparison to a sample of the papers published at the previous edition of the conference.

The paper is organized as follows: Section 2 describes the methods we used to analyze the influences of the COVID-19 pandemic on HCI research; Section 3 presents the results of our research, followed by a discussion in Section 4. Lastly, Section 5 concludes the paper with an overview on future work.

2. METHODS

CHI conference, which was held online for the first time in May 2021, is considered a distinguished convention in the HCI field. This annual conference welcomes a myriad of state-of-the-art studies about interactive systems internationally (CHI, 2021). We primarily aimed to discuss the influences the COVID-19 pandemic have had on the studies of the HCI field.

2.1. Inclusion and exclusion criteria

All 746 papers included in the CHI 2021 proceedings were preliminarily analyzed. Firstly, papers' abstracts and full texts were automatically checked to select only those that contained at least one of these strings: "covid", "pandemic", and "corona" (so that either the informal "corona" or the formal "coronavirus" could match). In this way, we selected 263 papers (and so excluded 483).

We then read and annotated for any possible COVID-19 pandemic effect all the 263 papers, and further excluded 92 papers whose research topic was not about or inspired by the COVID-19 pandemic, or that did not mention any effects of the pandemic on their research, and so 171 papers were selected for assessment. Examples of such exclusions include, for example, the presence of the words "corona" or "pandemic" in contexts other than COVID-19 or only in the references; or generic mentions of the pandemic situation in the paper introduction.

2.2. Analysis

When we annotated the papers for the effects of the COVID-19 pandemic, we wrote free text notes in a table containing one row for each paper, and one column for each of five columns we identified after reading the first few papers, four about the effects of the COVID-19 pandemic on HCI research (influence on experiment procedure, influence on participants, influence on apparatus, other influences), and one about whether the paper dealt with a topic related to the pandemic. We also noted, for each study involving participants, the type of study (user study, interview, survey, ...) and the number of participants.

After this step, we analyzed all of these notes and identified additional subcategories for influences on procedures (remote/blended experiments; experiments with anti-COVID precautions; pause or difficulty in research), participants (change in the recruitment; change in participants' reactions, activities, emotion), and pandemic-related topics (health/medicine; education; entertainment; psychology; communication; privacy/security).

Finally, we assigned each paper to one or more of the aforementioned categories/subcategories.

2.3. Comparison with CHI 2020

We also decided to compare papers from CHI 2021 with those from CHI 2020 (a conference whose submissions were not affected by the pandemic).

To this end, we selected a random sample of 100 papers from each conference (in the case of CHI 2021, the sample was drawn without taking into account the previous annotation about the COVID-19 pandemic). We then manually annotated each paper with the number of participants and the type of study that involved them (user study, interview, survey, ...).

3. RESULTS

The number of papers assigned to each category after the analysis is shown in Table 1. As mentioned above some papers were assigned to more than one category, so the

Table 1. Paper categories

Category	Number of papers
Influence on experiment procedure	126
Influence on participants	38
Influence on apparatus	20
Other influences	8
Related to/inspired by COVID-19	27
Total (papers appearing in multiple categories counted only once)	171
Excluded papers	*483+92=575*

sum does not add up to 171. In the next sections we will discuss each category/subcategory in detail. Section 3.5 will report about the number of participants.

3.1. COVID-19 influence on experiment procedure

The pandemic affected the procedure of the experiment of 126 papers. In the context of this category, by "experiment" we mean any study that needs interaction with participants (user studies, surveys, interviews, ...).

3.1.1. ***Remote or blended experiments***

One hundred papers were affected. There were some papers in which the methodologies, in part or whole, were under the influence of the COVID-19 pandemic. For instance, the researchers needed to change the procedure from face-to-face to online (Jain et al., 2021; Roffarello and Russis, 2021; Hwang and Won, 2021; Huang et al., 2021; Wu et al., 2021) or blended (Li et al., 2021) strategies. "Zoom" teleconferencing software program was overly used as an alternative to in-person communications. In one case, the researchers aimed to teach the basics of computational thinking to children. In the testing phase, they had to utilize Zoom for sharing the screen and online control (Dietz et al., 2021). In another research, virtual workshops about the online well-being of social media users were held through Zoom (Charmaraman and Delcourt, 2021). Zhang et al., utilized Zoom or WeChat for research sessions to analyze Voicemoji (a web application for emoji entry through voice for blind people) and the sessions were recorded; due to COVID-19 restrictions, the interviews were also totally online (Zhang et al., 2021a).

Apparently, there are some reasonable rationals that the researchers mostly chose "Zoom" over other platforms; for instance, one reason may be the fact that this platform nicely operates in mobile app version and desktop version (Wang et al., 2021a) and the sessions can be audio-recorded (Sparrow et al., 2021). For online interviews, the use of other platforms such as Telegram or WhatsApp has also been introduced. (Pendse et al., 2021).

3.1.2. ***Experiments with anti-COVID precautions***

Eighteen papers in this category reported that the experiment was carried out with special anti-COVID precautions. In particular, the researchers considered social distancing and disinfecting the settings (Prange et al., 2021; Kocur et al., 2021). In addition to sanitation, they also checked the participants' body temperature (that it did not exceed 37 °C), examined ventilation, and asked them to wear masks during the study (Miyatake et al., 2021; Chang et al., 2021; Zuckerman et al., 2021). There were some other extra precautions that the researchers considered during the period of this pandemic; they assessed the general health of the participants and ask whether or not they had been in touch with infected individuals in the last 14 days (Fujita et al., 2021).

Furthermore, some devices were not used in some studies because of the COVID-19 pandemic; for example, headphones that could facilitate the spread of infection were not used (Bala et al., 2021). Also, due to the need to sanitize each device, questionnaires (if needed) were on paper to reduce sanitization time (Makela et al., 2021).

3.1.3. ***Pause or difficulty in research***

Fifteen papers were affected. It is obvious that any disaster would inevitably hinder the process of any procedure. Thus the COVID-19 pandemic caused this as well. Some studies were forced to be halted during this period and several others reported critical difficulties due to this outbreak. This included:

(i) not receiving required materials necessary for the study (Liu et al., 2021c);
(ii) missing the opportunity to include diverse points of view due to shutting down some settings (Guan et al., 2021);
(iii) having restrictions to access certain facilities (Schlosser et al., 2021);
(iv) not being able to observe sessions, neither in-person (as a result of the COVID-19 restrictions) nor virtually (due to some policies) (Akinsiku et al., 2021);
(v) skipping or canceling some phases of study (Cambre et al., 2021; Scheepmaker et al., 2021; Lechelt et al., 2021) or having to stop then earlier (Yoo et al., 2021);
(vi) having restricted access to necessary equipment (Liang and Guo, 2021).

The above are just some of the issues caused by the COVID-19 pandemic. In a paper about digital fabrication, the devices (e.g. the 3D printers) were placed in separate locations. Thus, each had to be staffed individually by a

different researcher and samples obviously had to travel between them; these hurdles were the result of COVID-19 concerns and considerations (Rocha et al., 2021).

3.2. COVID-19 Influence on participants

Thirty-eight articles reported pandemic effects on study participants. In some articles, the participants of the research were recruited differently from usual due to the COVID-19 pandemic. There would be restrictions in the recruitment or, in some cases, the strategy changed. Some other articles reported that there were some modifications in participants' reactions, activities, or emotions during the research projects.

3.2.1. ***Change in the recruitment strategy***

Twenty-eight papers were affected. Many researchers reported that the recruitment of participants, or a specific group of participants (e.g. elderly population), and sampling were hard to accomplish (Xin et al., 2021; Wang et al., 2021b; Xu et al., 2021a). In some studies, the researchers were forced to recruit participants through more limited means as a result of this pandemic (Hendriks et al., 2021). For instance, they had to utilize online recruitment announcements via social media (e.g. Facebook) (Charmaraman and Delcourt, 2021; Koshy et al., 2021). They were also forced to recruit a smaller number of candidates or enroll the same ones in more than one phase due to the COVID-19 regulations and limitations (Zhang et al., 2021c; Xu et al., 2021b; Buschel et al., 2021), or though it may seem strange, consider themselves -the authors- as the only participants (Courtoux et al., 2021; Chen et al., 2021a). Due to these limitations in the recruitment procedure, the samples may not be a perfect representative of the population and the generalizability of the results may be affected as well (Foong and Gerber, 2021). It is reported that this circumstance probably induced gender disparity/bias in the samples (Pfeil et al., 2021).

The pandemic situation also had positive points as it caused an increase in the number of individuals required to use online platforms. For instance, in the study conducted by Chung et al., the authors recruited individuals who had previous experience in online lectures or live streaming. A group of participants carried out remote teaching following the outbreak situation (Chung et al., 2021). In another study, web-based recruitment made it more convenient for the researchers to include extensive groups of individuals (Seberger et al., 2021).

3.2.2. ***Change in participants' reactions, activities, emotion***

Eleven papers were affected. The pandemic has had several consequences on people's emotions and feelings, and this has been reported in some HCI studies. To give an instance, in one research the authors reported that some viewpoints of the participants may be under the influence of the COVID-19 pandemic and other controversial situations (Sparrow et al., 2021), which may potentially lead to bias. In another research, there was a withdrawal from the study because the participant did not have the required condition (having habitual physical activity) to use the app in real life, due to this pandemic (Kim et al., 2021). COVID-19 also affected the most personal aspects of the individuals' lives; it was outlined in one study that this outbreak influenced their fertility intents (Figueiredo and Chen, 2021). They also reported that the participants were more stressed, anxious, and separated (Guan et al., 2021), and in some cases, have cut down on daily activity levels (Oygur et al., 2021), outdoor activities, and social communications (Kang et al., 2021a). Since there were massive closures (including libraries), participants reported some issues with concentration since they had nowhere to go but their homes (Lee et al., 2021b). Accordingly, lifestyle modification can be considered one of the most critical effects that this pandemic has had on individuals (Griggio et al., 2021).

3.3. COVID-19 Influence on apparatus

Twenty papers reported effects of the pandemic on the study apparatus. Equipment required to conduct HCI studies may also be modified, or even not used, as a result of this pandemic.

In one study, the authors had to use Virtual Reality (VR) technology for the user study phase, since it was not possible to use other means during this pandemic. In the mentioned study, the researchers constructed a virtual machine that enabled some functions (painting and printing) in 3D mode (Huang et al., 2021). Similarly, VR was utilized in another research to evaluate and test the proposed technique owing to COVID-19 considerations (Mahadevan et al., 2021).

As discussed earlier in section 3.1.2, devices such as headphones were not used in an attempt to curb the virus transmission (Bala et al., 2021). Other studies, on the other hand, asked the participants to use their own headsets (Chang et al., 2021), their machines/devices (Zhang et al., 2021c), their computers (Schaadhardt et al., 2021; Kadner et al., 2021; Thompson et al., 2021), or their own VR devices (Yu et al., 2021) during the experiment. Additionally, some researchers established participants' houses as a study setting and brought the devices there. Subsequently, the instruments used by participants would be disinfected to pass on to the next user (Liu et al., 2021b). In an article about smart messaging, the researchers were supposed to exhibit prototypes in the deployment plan. However, due to COVID-19 concerns,

they had to share educative videos with the users (Raju et al., 2021).

3.4. Other influences

Eight papers reported other pandemic effects. In some cases, the pandemic has influenced research findings in unquantifiable ways. For example, some authors state, in studies regarding homesickness (Kelly et al., 2021) and online meetings between grandparents and grandchildren (Fuchsberger et al., 2021), that the pandemic situation may have influenced their results, or may have allowed participants to notice the potential of their work (Alorwu et al., 2021). In other cases, the situation influenced the conduct of interviews, in which talking about the pandemic or how it might have affected the study became inevitable (Hughes and Roy, 2021; Kjærup et al., 2021; Liu et al., 2021a). Finally, in some cases, the authors used topics regarding pandemic COVID-19 among the possible applications of their research with their study participants (Kang et al., 2021b; Gilad et al., 2021).

3.5. Number of participants

For each of the 171 papers, we also recorded the number of participants recruited by the authors (in experiments, surveys, interviews, etc.). This resulted in 160 papers involving an average of 154.0 (s.d. 675.3) participants (11 papers had no participants). If we exclude surveys, we had 149 papers with an average of 52.1 (s.d. 203.9) participants. If we also exclude interviews, we had 107 papers with an average of 61.4 (s.d. 239.4) participants.

We compared the number of participants from CHI 2021, with those from CHI 2020, a conference whose submissions were not affected by the pandemic (submissions expired in 2019), by analyzing a random sample of 100 papers from each conference, as stated in Section 2.

The results of this analysis are shown in Table 2. As we can see, the pandemic does not seem to have led to a decrease in the number of participants or studies employing them, which actually seem to have increased. The increase in the number of interviews may even suggest that the spread of video conferencing has actually favored this type of activity.

3.6. How did COVID-19 inspire the HCI research field?

Our initial aim was to assess the articles that were inevitably under the influence of the COVID-19 pandemic, in any of the above reported aspects. Nonetheless, another theme of research aroused during the screening process: articles that were inspired by the COVID-19 pandemic situation. In other words, there has been some HCI research specifically conducted somehow as a result of this pandemic, and that has made use of HCI to address COVID-19 concerns. We identified 27 such papers and in this section, we are going to briefly mention the ideas behind this type of publication. There are six subcategories to which articles have been assigned: health/medicine, education, entertainment, psychology, communication, privacy/security.

3.6.1. ***Health/medicine***

The researchers utilized HCI means to develop medical systems or introduce clinical ideas in an effort to assist in the present pandemic. For instance, an online symptom checker was created to help in the self-diagnosis of this disease (Tsai et al., 2021). Distributed manufacturing of stopgap of COVID-19 personal protective equipment (PPE) (Lakshmi et al., 2021), technology use among youngsters and its impact on their health (Pitt et al., 2021), technology-led contact tracing (Lu et al., 2021), and the utilization of wearable devices in designing a warning system for predicting the COVID-19 hotspots (Diethei et al., 2021) are a number of new concepts in this category.

3.6.2. ***Education***

In this category, the authors explored the educational potential of HCI in this pandemic. They proposed platform designs for online home-schooling (Cumbo et al., 2021), as well as introducing design guidelines for distance learning (live streaming in higher education) (Chen et al., 2021b); in this respect, there was also a research on more specific online educational content (e.g. online digital fabrication courses) (Benabdallah et al., 2021). Assessment of viral data visualization in social media and the following conflicts in groups with non-identical notions about masks (Lee et al., 2021a) is another intriguing aspect that was reviewed.

3.6.3. ***Entertainment***

Some research studies considered and evaluated entertainment in the period of this pandemic. Kleinman et al., studied game utilization to deal with COVID-19 (Kleinman et al., 2021). Other authors specifically evaluate online tabletop games (e.g. board games and card games) (Yuan et al., 2021). There was also research on folk clubs that were transformed into online forms during this pandemic; they were held in the two formats of video conferencing and offline show (Benford et al., 2021).

3.6.4. ***Psychology***

The field of HCI can assist in addressing psychological issues in disasters, particularly in this pandemic. The assessment of individuals' disclosure of anxiety in social

Table 2. Number of participants: comparison between CHI 2020 and CHI 2021

Considered papers	Any with participants		Excluding surveys		Excluding interviews		Excluding surveys and interviews	
CHI edition	**2020**	**2021**	**2020**	**2021**	**2020**	**2021**	**2020**	**2021**
N. papers / 100	87	89	80	84	73	66	68	61
Participants (AVG)	60,7	104,8	41,3	60,4	65,2	104,1	41,7	47,9
Participants (S.D.)	100,7	240,6	47,5	162	108,3	223,2	49,5	76,3

media and the role of platform capabilities in doing so is an example of this notion (Zhang et al., 2021b). In another study, the researchers evaluated YouTube as a tool for dealing with loneliness in the COVID-19 pandemic situation; in this respect, some movements (#StayHome, #WithMe) were reviewed (Niu et al., 2021).

3.6.5. ***Communication***

In the category of communication, the researchers tend to assess how people communicate during the pandemic. Some authors, for instance, developed a system that mediates physical communications such as handshaking or hand-holding during the time of social distancing (Zhang et al., 2021e). Similarly, there was research about online handshaking in the idol culture of Japan which is another example of computer-mediated communication (Yakura, 2021). There are also some ideas about remote attendance to funerals in Japan; the researchers established telepresence systems via Zoom in an attempt to give the relatives an online presence at the event (Uriu et al., 2021). In addition to this type of communication (human-to-human), there is also a subset of this idea that relates to communicating information to the public through visualization methods in the context of COVID-19. The researchers evaluated several visualizations considering this pandemic (Zhang et al., 2021d). The researchers also considered risk assessments and challenges of the public to obtain COVID-related information from truthful sources (Pine et al., 2021), or how e-commerce platforms are amplifying vaccine misinformation (Juneja and Mitra, 2021). How remote collaborations affect artists' performances was also investigated (Branch et al., 2021).

3.6.6. ***Privacy/security***

Privacy and security (of information) can be seen as crucial concerns in the HCI field, especially when dealing with dire situations such as pandemics. Issues in contact tracing apps can be taken into account as privacy and autonomy concerns for individuals (Seberger and Patil, 2021). User acceptance of COVID-19 apps is another matter that the researchers bear in mind to address the apprehensions about security, privacy, and societal consequences when using these apps (Utz et al., 2021). As intimate partner violence would become more severe in this pandemic (being in lockdown with the abuser), researchers tried to design safe and secure HCI-based services to assist people at risk of this violence; secure systems would obviously be beneficial for both sides, the abused and the consultant (Tseng et al., 2021).

4. DISCUSSION

As was easily predictable, the pandemic has significantly influenced research in the area of HCI, because both it typically needs interaction with people and it can offer solutions to some of the problems posed by the pandemic. In the 2022 edition of CHI, 171 out of 746 papers (23%) reported some influence of the COVID-19 pandemic. This is certainly a significant number, also considering that the deadline for submissions was September 17, 2020, so a lot of research may well have been completed before the first lockdowns (in March 2020 in most of the world, except China).

One of the heaviest effects of the pandemic was the change in the procedures used in user-studies to work with participants, with the majority of papers reporting procedure changes, with procedures conducted remotely instead of in person. This allowed the researchers to continue their studies, with relatively few papers reporting that they had difficulty performing their studies. CHI 2021 had fewer submissions than the previous two editions (but still higher than the even earlier ones), interrupting a very long growing trend, as shown in Figure 1. This could be an indication that authors who encountered difficulties because of the pandemic gave up submitting their work. In contrast, the slightly higher acceptance rate suggests that the pandemic did not lead to a reduction in the quality of the actual submissions or that the program committees relaxed the very strict constraints that CHI conference usually adopts in order to have a high selectivity on the quality of the published works.

In the published papers, there does not appear to have been a decrease in the number of participants or studies

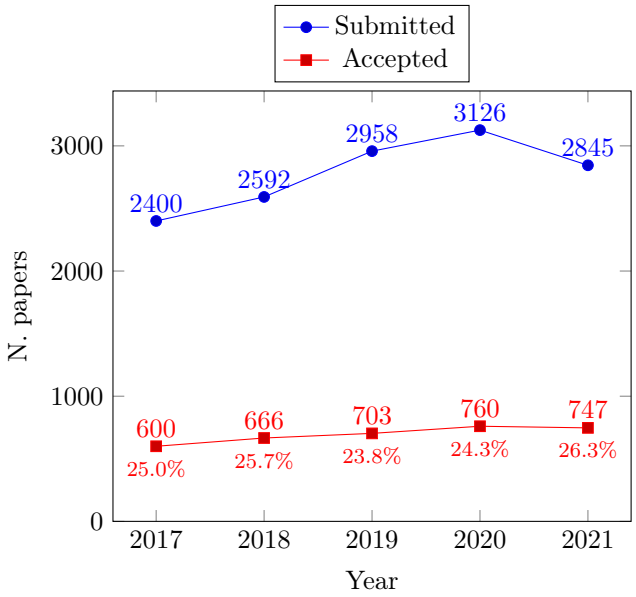

Figure 1. CHI conference submitted and accepted papers (percentage values report acceptance rates) (ACM SIGCHI, 2021).

employing them, and indeed the increase in interviews may have been aided by the spread of videoconferencing.

A number of researchers directed their research to topics related to the COVID-19 pandemic. Although the number of such papers in absolute numbers is small, it seems relevant given the short time between the onset of the pandemic and submissions to CHI 2021. Therefore, we expect over time a significant number of papers on such topics.

5. CONCLUDING REMARKS

In this paper, we sought to assess the effects that the COVID-19 pandemic caused in the research field of Human-Computer Interaction (HCI), and especially how HCI empirical research methodology changed due to the restrictions caused by COVID-19. To this end, we did an analysis of CHI 2021 papers, through which we could find that 23% of the papers reported some influence of the pandemic, and identified four main effects of pandemic COVID-19 on HCI research (influence on participants; influence on apparatus; influence on experiment procedure; other influences) and papers on pandemic-related topics. The most common influence involved the procedures used to interact with study participants, with a heavy use of remote communication technologies.

Future work will involve analyzing papers from the 2022 edition of CHI to see if there have been any changes caused by the pandemic, compared to the previous edition analyzed here. It will also be useful to continue this study after the pandemic has ended, to see if/how much of the changes caused by the pandemic have stuck, after being "discovered" by researchers/people, for example, in the case of remote communication technologies.

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REFERENCES

ACM SIGCHI (2021). Past CHI Conferences. https://sigchi.org/conferences/conference-history/chi/.

Akinsiku, A., Avellino, I., Graham, Y., and Mentis, H. M. (2021). It's not just the movement: Experiential information needed for stroke telerehabilitation. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Alorwu, A., Kheirinejad, S., van Berkel, N., Kinnula, M., Ferreira, D., Visuri, A., and Hosio, S. (2021). Assessing mydata scenarios: Ethics, concerns, and the promise. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, CHI '21, New York, NY, USA. Association for Computing Machinery.

Austin, A. and Abdelnour-Nocera, J. (2013). Cognitive styles in hci education and practice. *Paper presented at the Proceedings of the 27th International BCS Human Computer Interaction Conference, London, UK*, 27.

Bala, P., Oakley, I., Nisi, V., and Nunes, N. J. (2021). Dynamic field of view restriction in 360° video: Aligning optical flow and visual slam to mitigate vims. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Bambha, V. P. and Casasola, M. (2021). From lab to zoom: Adapting training study methodologies to remote conditions. *Front Psychol;*, 12(69472):8.

Benabdallah, G., Bourgault, S., Peek, N., and Jacobs, J. (2021). Remote learners, home makers: How digital fabrication was taught online during a pandemic. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Benford, S., Mansfield, P., and Spence, J. (2021). Producing liveness: The trials of moving folk clubs online during the global pandemic. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Branch, B., Efstratiou, C., Mirowski, P., Mathewson, K. W., and Allain, P. (2021). Tele-immersive improv: Effects of immersive visualisations on rehearsing and performing theatre online. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, CHI '21, New York, NY, USA. Association for Computing Machinery.

Braun, H., G"artner, M., Tr"osterer, S., Akkermans, L. E. M., Seinen, M., Meschtscherjakov, A., and Tscheligi, M. (2019). Advanced driver assistance systems for aging drivers: Insights on 65+ drivers' acceptance of and intention to use adas. In *Paper presented at the Proceedings of the 11th International Conference on Automotive User Interfaces and Interactive Vehicular Applications. Utrecht, Netherlands.*

Burbach, L., Nakayama, J., Plettenberg, N., Ziefle, M., and Valdez, A. C. (2018). User preferences in recommendation algorithms: the influence of user diversity, trust, and product category on privacy perceptions in recommender algorithms. In *Paper presented at the Proceedings of the 12th ACM Conference on Recommender Systems*, Vancouver, British Columbia, Canada.

Buschel, W., Lehmann, A., and Dachselt, R. (2021). Miria: A mixed reality toolkit for the in-situ visualization and analysis of spatio-temporal interaction data. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Cambre, J., Williams, A. C., Razi, A., Bicking, I., Wallin, A., Tsai, J. Y., Kulkarni, C., and Kaye, J., A. (2021). Firefox voice: An open and

extensible voice assistant built upon the web. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Cha, Y., Kim, J., Park, S., Yi, M. Y., and Lee, U. (2018). Complex and ambiguous: Understanding sticker misinterpretations in instant messaging. In *Proc. ACM Hum.-Comput.Interact.*

Chang, M., Huh, M. S., and Kim, J. (2021). Rubyslippers: Supporting content-based voice navigation for how-to videos. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Charmaraman, L. and Delcourt, C. G. (2021). Prototyping for social wellbeing with early social media users: Belonging, experimentation, and self-care. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Chen, Y., Yang, Z., Abbou, R., Lopes, P., Zhao, B. Y., and Zheng, H. (2021a). User authentication via electrical muscle stimulation. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Chen, Z., Cao, H., Deng, Y., Gao, X., Piao, J., Xu, F., Zhang, Y., and Li, Y. (2021b). Learning from home: A mixed-methods analysis of live streaming based remote education experience in chinese colleges during the covid-19 pandemic. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

CHI (2021). CHI conference on human factors in computing systems. Online Virtual Conference (originally Yokohama, Japan) https://chi2021.acm.org/.

Chorianopoulos, K. and Lekakos, G. (2007). Learn and play with interactive tv. 5(2). *Comput. Entertain*, 4.

Chung, J. J., Shin, H., Xia, H., Wei, L., and Kazi, R. H. (2021). Beyond show of hands: Engaging viewers via expressive and scalable visual communication in live streaming. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Courtoux, E., Appert, C., and Chapuis, O. (2021). Walltokens: Surface tangibles for vertical displays. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Cumbo, B. J., Bartindale, T., and Richardson, D. (2021). Exploring the opportunities for online learning platforms to support the emergency home school context. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Diethei, D., Niess, J., Stellmacher, C., Stefanidi, E., and Sch"oning, J. (2021). Sharing heartbeats: Motivations of citizen scientists in times of crises. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Dietz, G., Le, J. K., Tamer, N., Han, J., Gweon, H., Murnane, E. L., and Landay, J. A. (2021). Storycoder: Teaching computational thinking concepts through storytelling in a voice-guided app for children. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Figueiredo, M. C. and Chen, Y. (2021). Health data in fertility care: An ecological perspective. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Foong, E. and Gerber, E. (2021). Understanding gender differences in pricing strategies in online labor marketplaces. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Fuchsberger, V., Beuthel, J. M., Bentegeac, P., and Tscheligi, M. (2021). Grandparents and grandchildren meeting online: The role of material things in remote settings. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, CHI '21, New York, NY, USA. Association for Computing Machinery.

Fujita, K., Suzuki, A., Takashima, K., Ikematsu, K., and Kitamura, Y. (2021). Tiltchair: Manipulative posture guidance by actively inclining the seat of an office chair. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Geven, A., Strassl, P., Ferro, B., Tscheligi, M., and Schwab, H. (2007). Experiencing real-world interaction: results from a nfc user experience field trial. In *Paper presented at the Proceedings of the 9th international conference on Human computer interaction with mobile devices and services*. Singapore.

Gilad, Z., Amir, O., and Levontin, L. (2021). The effects of warmth and competence perceptions on users' choice of an ai system. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, CHI '21, New York, NY, USA. Association for Computing Machinery.

Green, H., Fernandez, R., and MacPhail, C. (2021). Social media as a platform for recruitment to a national survey during the covid-19 pandemic: Feasibility and cost analysis. *JMIR Form Res*, 5:7.

Griggio, C. F., Sato, A. J., Mackay, W. E., and Yatani, K. (2021). Mediating intimacy with dearboard: a co-customizable keyboard for everyday messaging. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Guan, C., Bouzida, A., Oncy-avila, R. M., Moharana, S., and Riek, L. D. (2021). Taking an (embodied) cue from community health: Designing dementia caregiver support technology to advance health equity. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Hendriks, S., Mare, S., Gamboa, M., and Bayta horn, M. A. (2021). Azalea: Co-experience in remote dialog through diminished reality and somaesthetic interaction design. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Huang, G., Qian, X., Wang, T., Patel, F., Sreeram, M., Cao, Y., Ramani, K., and Quinn, A. J. (2021). Adaptutar: An adaptive tutoring system for machine tasks in augmented reality. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Hughes, M. A. and Roy, D. (2021). Keeper: A synchronous online conversation environment informed by in-person facilitation practices. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, CHI '21, New York, NY, USA. Association for Computing Machinery.

Hwang, A. H. and Won, A. S. (2021). Ideabot: Investigating social facilitation in human-machine team creativity. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Jain, M., Diwakar, N., and Swaminathan, M. (2021). Smartphone usage by expert blind users. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Juneja, P. and Mitra, T. (2021). Auditing e-commerce platforms for algorithmically curated vaccine misinformation. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, CHI '21, New York, NY, USA. Association for Computing Machinery.

Kadner, F., Keller, Y., and Rothkopf, C. A. (2021). Adaptifont: Increasing individuals' reading speed with a generative font model and Bayesian optimization. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Kang, B., Kang, S., and Hwang, I. (2021a). Momentmeld: Ai-augmented mobile photographic memento towards mutually stimulatory inter-generational interaction. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Kang, D., Ho, T., Marquardt, N., Mutlu, B., and Bianchi, A. (2021b). Toonnote: Improving communication in computational notebooks using interactive data comics. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, CHI '21, New York, NY, USA. Association for Computing Machinery.

Kelly, R. M., Cheng, Y., McKay, D., Wadley, G., and Buchanan, G. (2021). "it's about missing much more than the people": How students use digital technologies to alleviate homesickness. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, CHI '21, New York, NY, USA. Association for Computing Machinery.

Kim, Y., Lee, B., Srinivasan, A., and Choe, E. K. (2021). Data @ hand: Fostering visual exploration of personal data on smartphones leveraging speech and touch interaction. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Kjærup, M., Elsborg, M., Skov, M. B., and Bruun, A. (2021). Available anytime anywhere: Investigating mobile volunteer responders for out of hospital cardiac arrest. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, CHI '21, New York, NY, USA. Association for Computing Machinery.

Kleinman, E., Chojnacki, S., and El-Nasr, M. S. (2021). The gang's all here: How people used games to cope with covid19 quarantine. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Kocur, M., Habler, F., Schwind, V., Woźniak, P. W., Wolff, C., and Henze, N. (2021). Physiological and perceptual responses to athletic avatars while cycling in virtual reality. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Koshy, V., Park, J. S., Cheng, T., and Karahalios, K. (2021). "we just use what they give us": Understanding passenger user perspectives in smart homes. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Lakshmi, U., Hofmann, M. K., Mack, K. M., Hudson, S. E., Mankoff, J., and Arriaga, R. I. (2021). Medical maker response to covid-19: Distributed manufacturing infrastructure for stopgap protective equipment. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Lechelt, S., Brudy, F., Marquardt, N., and Rogers, Y. (2021). Evalme: Exploring the value of new technologies for in situ evaluation of learning experiences. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Lee, C., Yang, T., Inchoco, G., Jones, G. M., and Satyanarayan, A. (2021a). Viral visualizations: How coronavirus skeptics use orthodox data practices to promote unorthodox science online. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Lee, Y., Chung, J. J., Song, J. Y., Chang, M., and Kim, J. (2021b). Personalizing ambience and illusionary presence: How people use "study with me" videos to create effective studying environments. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Li, H., Xu, M., Wang, Y., Wei, H., and Qu, H. (2021). A visual analytics approach to facilitate the proctoring of online exams. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Liang, R. and Guo, Z. (2021). Nfcsense: Data-defined rich-id motion sensing for fluent tangible interaction using a commodity nfc reader. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Liu, F., Park, C., Tham, Y. J., Tsai, T.-Y., Dabbish, L., Kaufman, G., and Monroy-Hernández, A. (2021a). Significant otter: Understanding the role of biosignals in communication. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, CHI '21, New York, NY, USA. Association for Computing Machinery.

Liu, S., Claypool, M., Kuwahara, A., Sherman, J., and Scovell, J. J. (2021b). Lower is better? the effects of local latencies on competitive first-person shooter game players. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Liu, W., Dementyev, A., Schwarz, D., Fléty, E., Mackay, W. E., Beaudouin-Lafon, M., and Bevilacqua, F. (2021c). Sonichoop: Using interactive sonification to support aerial hoop practices. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Lu, X., Reynolds, T. L., Jo, E., Hong, H., Page, X., Chen, Y., and Epstein, D. A. (2021). Comparing perspectives around human and technology support for contact tracing. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Mahadevan, K., Sousa, M., Tang, A., and Grossman, T. (2021). "grip-that-there": An investigation of explicit and implicit task allocation techniques for human-robot collaboration. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Makela, V., Kleine, J., Hood, M., Alt, F., and Schmidt, A. (2021). Hidden interaction techniques: Concealed information acquisition and texting on smartphones and wearables. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Miyatake, M., Narumi, K., Sekiya, Y., and Kawahara, Y. (2021). Flower jelly printer: Slit injection printing for parametrically designed flower jelly. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Mukhtar, K., Javed, K., Arooj, M., and Sethi, A. (2020). Advantages, limitations and recommendations for online learning during covid-19 pandemic era. *Pak J Med Sci;*, 36:S27–S31.

Müller, H. and Sedley, A. (2015). Designing surveys for hci research. *Paper presented at the Proceedings of the 33rd Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems, Seoul, Republic of Korea.*, 33.

Mumtaz, N., Saqulain, G., and Mumtaz, N. (2021). Online academics in pakistan: Covid-19 and beyond. *Pak J Med Sci;*, 37(1):283–287.

Niu, S., Bartolome, A., Mai, C., and Ha, N. B. (2021). #stayhome #withme: How do youtubers help with covid-19 loneliness? In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Oygur, I., Su, Z., Epstein, D. A., and Chen, Y. (2021). The lived experience of child-owned wearables: Comparing children's and parents' perspectives on activity tracking. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Pendse, S. R., Sharma, A., Vashistha, A., Choudhury, M. D., and Kumar, N. (2021). "can i not be suicidal on a sunday?": Understanding technology-mediated pathways to mental health support. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Pfeil, K. P., Masnadi, S., Belga, J., Sera-Josef, J. T., and LaViola, J. J. (2021). Distance perception with a video see-through head-mounted display. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Pine, K. H., Lee, M., Whitman, S. A., Chen, Y., and Henne, K. (2021). Making sense of risk information amidst uncertainty: Individuals' perceived risks associated with the covid-19 pandemic. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Pitt, C., Hock, A., Zelnick, L. R., School, K. D., Washington, U. O., Education, C. O., and Medicine, D. O. (2021). The kids are / not / sort of all right*. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Prange, S., Shams, A., Piening, R., Abdelrahman, Y., and Alt, F. (2021). Priview– exploring visualisations to support users' privacy awareness. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Pretorius, C., Coyle, D., and Chambers, D. (2018). Intelligent techniques to support online mental health communities: resource recommendations for 4 levels of stepped care. In *Paper presented at the Proceedings of the Second African Conference for Human Computer Interaction: Thriving Communities, Windhoek, Namibia.*

Raju, D. K., Seunarine, K., Reitmaier, T., Thomas, G., Meena, Y. K., Zhang, C., Pockett, A., Pearson, J., Robinson, S., Carnie, M. J., Sahoo, D. R., and Jones, M. (2021). Pv-pix: Slum community co-design of self-powered deformable smart messaging materials. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Rocha, B. G., Kolk, J. M., and Andersen, K. (2021). Exquisite fabrication: Exploring turn-taking between designers and digital fabrication machines. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Roffarello, A. M. and Russis, L. D. (2021). *Coping with Digital Wellbeing in a Multi-Device World*. CHI.

Schaadhardt, A., Hiniker, A., and Wobbrock, J. O. (2021). Understanding blind screen-reader users' experiences of digital artboards. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Scheepmaker, L., Kender, K., Frauenberger, C., and Fitzpatrick, G. (2021). Leaving the field: Designing a socio-material toolkit for teachers to continue to design technology with children. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Schlosser, P., Matthews, B., Salisbury, I. S., Sanderson, P. M., and Hayes, S. (2021). Head-worn displays for emergency medical services staff: Properties of prehospital work, use cases, and design considerations. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Seberger, J. S., Llavore, M., Wyant, N. N., Shklovski, I. A., and Patil, S. (2021). Empowering resignation: There's an app for that. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Seberger, J. S. and Patil, S. (2021). Us and them (and it): Social orientation, privacy concerns, and expected use of pandemic-tracking apps in the united states. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Sparrow, L. A., Gibbs, M. R., and Arnold, M. V. (2021). The ethics of multiplayer game design and community management: Industry perspectives and challenges. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Thompson, J., Liu, Z., and Stasko, J. T. (2021). Data animator:

Authoring expressive animated data graphics. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Tsai, C., You, Y., Gui, X., Kou, Y., and Carroll, J. M. (2021). Exploring and promoting diagnostic transparency and explainability in online symptom checkers. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Tseng, E., Freed, D., Engel, K., Ristenpart, T., and Dell, N. (2021). A digital safety dilemma: Analysis of computer-mediated computer security interventions for intimate partner violence during covid-19. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Uriu, D., Toshima, K., Manabe, M., Yazaki, T., Funatsu, T., Izumihara, A., Kashino, Z., Hiyama, A., and Inami, M. (2021). Generating the presence of remote mourners: a case study of funeral webcasting in japan. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Utz, C., Becker, S., Schnitzler, T., Farke, F. M., Herbert, F., Schaewitz, L., Degeling, M., and D"urmuth, M. (2021). Apps against the spread: Privacy implications and user acceptance of covid-19-related smartphone apps on three continents. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Vu, M., Huynh, V. N., Bednarczyk, R. A., Escoffery, C., Ta, D., Nguyen, T. T., and Berg, C. J. (2021). Experience and lessons learned from multi-modal internet-based recruitment of u. *S. Vietnamese into research. PloS one*, 16:8.

Wang, Y., Liang, W., Huang, H., Zhang, Y., Li, D., and Yu, L. (2021a). Toward automatic audio description generation for accessible videos. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Wang, Y., Yu, A., Yi, X., Zhang, Y., Chatterjee, I., Patel, S. N., and Shi, Y. (2021b). Facilitating text entry on smartphones with qwerty keyboard for users with parkinson's disease. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Wu, Z., Yu, C., Xu, X., Wei, T., Zou, T., Wang, R., and Shi, Y. (2021). Lightwrite: Teach handwriting to the visually impaired with a smartphone. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Xin, D., Wu, E. Y., Lee, D. J., Salehi, N., and Parameswaran, A. G. (2021). Whither AutoML? Understanding the role of automation in machine learning workflows. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Xu, W., Liang, H., Yu, K., and Baghaei, N. (2021a). Effect of gameplay uncertainty, display type, and age on virtual reality exergames. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Xu, X., Li, J., Yuan, T., He, L., Liu, X., Yan, Y., Wang, Y., Shi, Y., Mankoff, J., and Dey, A. K. (2021b). Hulamove: Using commodity imu for waist interaction. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Yakura, H. (2021). No more handshaking: How have covid-19 pushed the expansion of computer-mediated communication in japanese idol culture? In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Yoo, M., Odom, W., and Berger, A. (2021). Understanding everyday experiences of reminiscence for people with blindness: Practices, tensions and probing new design possibilities. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Yu, E., Arora, R., Stanko, T., Bærentzen, J. A., Singh, K. P., and Bousseau, A. (2021). Cassie: Curve and surface sketching in immersive environments. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Yuan, Y., Cao, J., Wang, R., and Yarosh, S. (2021). Tabletop games in the age of remote collaboration: Design opportunities for a socially connected game experience. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Zhang, M., Wang, R., Xu, X., Li, Q., Sharif, A., and Wobbrock, J. O. (2021a). Voicemoji: Emoji entry using voice for visually impaired people. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Zhang, R., Bazarova, N. N., and Reddy, M. C. (2021b). Distress disclosure across social media platforms during the covid-19 pandemic: Untangling the effects of platforms, affordances, and audiences. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Zhang, X., Chandrasegaran, S. K., and Ma, K. (2021c). Conceptscope: Organizing and visualizing knowledge in documents based on domain ontology. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Zhang, Y., Sun, Y., Padilla, L. M., Barua, S., Bertini, E., and Parker, A. G. (2021d). Mapping the landscape of covid-19 crisis visualizations. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Zhang, Z., Alvina, J., Héron, R., Safin, S., Détienne, F., and Lecolinet, E. (2021e). Touch without touching: Overcoming social distancing in semi-intimate relationships with sanstouch. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.

Zuckerman, O., Sadka, O., Gissin, R., and Erel, H. (2021). Tui as social entity: a study of joint-actuation and turn-taking-actuation in actuated-interfaces. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*.