DESIGNING FOR VOICE: THE CHALLENGES OF ACCESS, AUTONOMY, AND ACCOUNTABILITY

A Dissertation

Presented to the Faculty of the Graduate School

of Cornell University

in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

by

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May 2018

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Cornell University 2018

Voice refers to a person's ability to express their rightful opinions. This has long been a central concern for many sociologists, political scientists, and human-right activists, among others. Voice has also gotten attention of the Computer Scientists, especially of some researchers of Human-Computer Interaction (HCI) and Information and Communication Technology and Development (ICTD) in recent years, and various computing systems have been built to help people raise their voice in various contexts. However, the core challenges for designing appropriate computing technologies to support the voices of marginalized communities have mostly been unexplored. In this thesis, I have explored the theoretical and technical aspects of voice that are important to conceptualize the idea of voice and to design for it.

This thesis presents a broad theoretical definition of voice based on the historical development of the ideas of justice and democracy, which are essential to understanding the politics and poetics of silencing. This thesis then advances two important notions of voice - "voice as a value", and "voice as a process". Furthermore, this thesis highlights three major components of voice that are necessary both for conceptualizing the idea of voice and for designing technologies to support a voice– access, autonomy, and accountability. These three components of voice are explained through three major projects that I completed during my Ph.D. at Cornell University. The first project is called

"Suhrid", and it was conducted with a group of low-literate rickshaw drivers in Dhaka, Bangladesh. *Suhrid* demonstrates the complexities around 'access' without which voice is not possible. The second project presented in this thesis is called *"Protibadi"*, which reveals the challenges with 'autonomy' by demonstrating the hardship of Bangladeshi women in voicing their experiences with sexual harassment. The third project focuses on the tensions around 'accountability' - an inseparable component of voice. This project is based on my study to understand the public reactions to a recent government order in Bangladesh that has enforced the registration of each mobile SIM card with the biometric information of its owner. These three projects, as a set, define the concept of and complexities around voice, and demonstrate the challenges around designing for access, autonomy, and accountability. This thesis thus contributes to the growing interest in Computer Science, HCI, and ICTD around social justice, inequality, empowerment, and international development.

BIOGRAPHICAL SKETCH

Syed Ishtiaque Ahmed was born in Bangladesh. He was raised in Dhaka, the capital of Bangladesh. He went to the country's leading High School, *Ideal School & College*, for his secondary education, where he graduated with the *Best Student* award. He was also awarded the competitive Primary and Secondary government scholarships while studying there. Then he attended *Notre Dame College*, the top institution of higher secondary education in Bangladesh, and graduated with the *Award of Merit* for securing the top academic position there. After that, he got himself admitted into the Computer Science & Engineering (CSE) undergraduate program of *Bangladesh University of Engineering & Technology (BUET)*, which is regarded as the top engineering school in the country. He earned his Undergraduate and Masters degrees there with the *University Scholarship* and the *Dean's List* awards. He was appointed as a Lecturer in CSE, BUET, where he taught for two years. During that period of time, he established the first Human-Computer Interaction (HCI) research laboratory in Bangladesh, and started building computing technologies to improve the quality of life of the local marginalized communities. During the same period of time, he also launched the first open-source digital map-making campaign in Bangladesh, called *OpenStreetMap Bangladesh*. In 2011, he received the prestigious *International Fulbright Science and Technology Fellowship* for his academic achievements and his contributions to the country.

Ishtiaque started his Ph.D. at Cornell University in the Fall of 2011. He was fortunate enough to be advised by Prof. Steven J. Jackson. He was a member of the reputed *Social and Cultural Computing Lab* of Cornell Information Science. His research primarily focused on understanding people and designing technologies, with a special emphasis on the problems of the marginalized com-

munities in the Global South. He worked with and designed technologied for various marginalized communities in Bangladesh and India during his Ph.D. including low-literate rickshaw drivers, mobile phone repairers, victims of sexual harassment, readymade garments factory workers, autorickshaw drivers, and rickshaw painters. In 2014, he earned his Masters degree in Information Science where he presented his ideas of bridging the gap between ethnographhy and design. He worked as a research intern at *Microsoft Research India* in the Summer of 2015. He was also a graduate research fellow of *Intel Science and Technology Center for Social Computing* in the later part of his Ph.D. His research work has been regularly published in the top research venues of HCI and ICTD. He defended in Ph.D. in 2017. In the same year, he joined as an Assistant Professor of Computer Science at the University of Toronto.

This thesis is dedicated to my parents without whom I would not be here today-

Syeda Ismat Ara and **Syed Masum Ahmed**

ACKNOWLEDGEMENTS

First and foremost, I would like to thank my amazing advisor, Prof. Steven J. Jackson. His contribution to my Ph.D., and to the process of my growing up as a scholar in general, cannot be expressed in words. He has always been there as a constant source of support, motivation, encouragement, and all kinds of positive energy. The nature of my research is very inter-disciplinary, and with a technical background, it was not very easy for me grasp the big ideas of social and political sciences in the beginning. Steve took a lot of patience to educate me, and work with me so that I could conceptualize those big ideas and use those in my projects. This kind of advising requires very deep knowledge of the philosophical aspects of a problem and a broad understanding of different interpretations of that problem. Very often our discussions would move back and forth between computer science and social science, and between philosophy and design. Steve possessed a very deep knowledge of the social aspects of a problem that I cared about, and some amazing advising skills that I required to build my projects. Steve taught me how to think as a scholar, how to engage in scholarly arguments, and how to develop a mind that could think of big infrastructural questions going beyond the surface-level challenges. Hence, my academic journey with Steve was very rewarding, and I learned some of the most important lessons in my life while working with him. He was also incredibly supportive during the hard days of my Ph.D., and I learned from him how to function as an honest and compassionate human being even under the tremendous pressure of academia. The love and compassion that I have received from my advisor have inspired me to become a better version of myself, and I hope to extend the similar kind of treatment to my students in future.

I would also like to thank my other committee members, Prof. Dan Cosley

and Prof. Nicola Dell. Dan is one of my most favorite teachers at Cornell. I learned most of the basics of HCI from his amazing lectures. While working on my project, "Suhrid", with him, I also learned some very important lessons on design that I always treasure. He has also been very friendly and supportive to me since my first day at Cornell, and I have always got very good advice from him regarding any academic issue. Nicki, on the other hand, is a good friend of mine. She is also an incredibly supportive person. She helped me a lot during the last couple of years of my Ph.D. when I was developing the final pieces of my thesis. Her smart and intelligent comments made me think more carefully. Besides them, I also worked closely with Prof. Shelley Feldman of Development Sociology Department of Cornell University, who had been a member of my Ph.D. committee till my A-exam. I learned a lot about philosophy, development, and political economy from her. She also helped me become a better ethnographer by sharing her own experiences of conducting her fieldwork in Bangladesh. I also worked with and learned a lot from Prof. Carl Lagoze and Dr. Theresa Velden, who left Cornell when I was in the second year of my Ph.D. I also worked as a Teaching Assistant with Profs. Phoebe Sengers, Gareme Bailey, and Gilly Leshed, and I learned a lot about teaching and research from them. I thank all these great minds for their huge contribution to my intellectual growth and to the successful completion of my Ph.D.

I would like to thank my family for their sacrifice and constant support during my Ph.D. My mother, Syeda Ismat Ara, always inspired me to become a big scholar and overcome the challenges of my life with the power of knowledge. Her words kept me focused during the hardest times of my Ph.D. My father, Syed Masum Ahmed, always told me that I could overcome any challenge with my honesty, hard work, and wisdom, and his support was necessary

for me to undertake the new challenges in my Ph.D. My wife, Nusrat Jahan Mim, sacrificed a lot for the successful completion of my Ph.D. She always provided me with the emotional support that I needed to survive and overcome the challenges. Her own work in architecture and design also inspired me to think critically and improve my work on designing computing technologies. Co-authoring a CHI paper with her in 2014 was one of my best experiences in my Ph.D. life. My sister, Syda Tasmia Sulana, and her two kids, Samara Nawar (Hiya) and Zaim Al Amayar (Spondon), remained as a source of joy and happiness throughout my Ph.D.

I am also thankful to my incredibly supportive colleagues and labmates at Cornell Information Science. My friendship with Shion Guha and Mashfiqui Rabbi did not only contribute to my intellectual growth, but also helped me survive some difficult episodes of my Cornell/Ithaca life. I also learned a lot from my everyday conversations with my very talented labmates– Stephanie Steinhardt, Leo Kang, Samir Passi, Vera Khovanskaya, Maggie Jack, Sharifa Sultana, and Laura Houston. I want to emphasize on the role of Ehsan Hoque in my intellectual journey, too. He first introduced me to the beautiful world of HCI back in 2010. Since then, he has always been a great mentor for me and motivated me with his amazing research. I am also thankful to the (then) Bangladeshi undergraduate students who worked with me in different projects. They include Md. Rashidujjaman Rifat, Maruf Zaber, Mehrab Bin Morshed, Sharmin Afrose, and Md. Romael Hoque. They provided me with an incredible support. I also want to thank all my wonderful co-authors and collaborators including Hasan Shahid Ferdous, Nova Ahmed, Neha Kumar, Priyank Chandra, Joyojeet Pal, Daniela Rosner, Faheem Hussain, Jacki O'Neill, and Jay Chen. I learned a lot while working with them in various projects, and while writing papers

together. I hope to continue collaborating with them in future.

I also want to thank all my dearest friends who cheered me up whenever I felt down during my Ph.D. days - Md. Ariful Islam, Shebuti Rayana, Ahsanul Karim, Ishita Kamal Khan, Mansurul Alam, Rehana Tabassum, Jesin Zakaria, Mirfat Sharmin, Walee Mamun, and Md. Mizanur Rahman. I am also grateful to all my online friends for engaging me in many intellectual conversations, which eventually helped me improve my analytical ability and writing skills. I am especially indebted to some of my online/offline friends who not only taught me many things that I never knew, but also helped me avoid many biases that were invisible to me. They include Ragib Hasan, Javed Ikbal, Ashraful Hannan, Aminul Islam, Masud Karim Khan, Omar Shehab, Tanveer Ehsanur Rahman, Mohiuddin Khaled, Jaffrey Al Kadry, Arannya Monzur, Nureen Faiza Anisha, Abdullah Ibn Mahmud, Upol Ehsan, Nazmus Saquib, Deeni Fatiha, Tamanna Islam Urmi, and many others. I am also thankful to my Bangladeshi friends in Ithaca including Maksud Bhai, Nishi Bhabi, Nimit, Pakhi Apa, Mozammel Bhai, and others for their warm hospitality and cooperation.

I am also thankful to the endless beauty and incredible openness of Ithaca. I am and will always be in love with the beautiful gorges, hills, slopes, and the breathetaking views of this small town. The foods, festivals, and colors of Ithaca will always be in my heart no matter how far I go from here. I consider myself incredibly lucky and proud to be able to study at Cornell and to spend some great time of my life on the gorgeous slopes of Ithaca.

Finally, I want to thank International Fulbright Science and Technology Fellowship for supporting my expenses for the first three years of my Ph.D. I am thankful to Intel for supporting my research through their grants for social computing research. I am also thankful to National Science Foundation (NSF) for

supporting my research on mobile phone repair. I want to thank Microsoft Research India for allowing me to work as an intern in the Summer of 2015, and learn by working with some of the great minds of ICTD. Also, I am thankful to the faculty and stuff of Cornell Information Science and Cornell ISSO for their support and cooperation. I also want to thank ACM SIGCHI community and ICTD community for supporting my research through their constructive and encouraging comments and feedback.

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CHAPTER 1

INTRODUCTION

I start this dissertation by sharing three stories from my fieldwork in Bangladesh. These stories are taken from my field notebook and were originally written in Bengali over the course of three field studies.

> ***Summer 2013, Dhaka, Bangladesh***
>
> *May 29, 2013: I have now been working for over an year on designing and building a piece of technology to help Bangladeshi women combat sexual harassment in public places. I have been working here with a researcher from a local university and a team of bright undergraduate students from Bangladesh University of Engineering and Technology (BUET). In the primary phase of this project, we conducted an online survey and asked university-going female students about their experiences with sexual harassment in public places. Each of the respondents anonymously reported that they were either directly or indirectly a victim of sexual harassment. However, the surveys did not tell us much about these incidents' contexts. So, we decided to collect more information from university-going female students through conducting interviews. The interviewers were female professors from three major local universities in Dhaka. We advertised with recruitment flyers at those universities. However, after 10 months we only got 11 complete interviews. There were some women who initially signed up for the interview, but later cancelled. Some others simply did not show up. Some came and started their interviews, but stopped in the middle and decided not to proceed. Some bursted into tears and left. Some had their mothers accompany them to the interview. Some completed their inter-*

views, but later called our interviewers and requested them to delete their interviews.

August 30, 2013: Our mobile phone application "Protibadi" has been available to the public for more than a month now. This application has been built off of all of information we could piece together through our interviews, survey, and focus group discussion. Initially, there was a lot of enthusiasm around this app and there were more than a couple hundred downloads in the first two weeks. Now, we have thousands of reports in our website through this app. However, we also noticed a gradual decline in the rate of reporting. We conducted a user-study last week to learn the reason behind this decline. We learned that many women did not like this app because their parents started restricting their movements outside of the home after seeing so many harassment incidents reported across the city. Some users stopped using the app because they were bullied on social media by other male and female users for reporting harassment. Other users complained that reporting was futile because nobody was taking any action against the reports.

Winter 2014, Dhaka, Bangladesh

December 20, 2014: We have been studying the use of mobile phones by the rickshaw drivers in a rickshaw garage in Kamrangirchar, Dhaka. It is interesting for us to know how these rickshaw drivers with low literacy are using mobile phones with an English language interface. We have been observing them for more than six months now. We have many friends in that garage now, and on a couple of occasions, we have also accompanied the rickshaw drivers by riding on their rickshaws. We have seen that the

drivers need help from other people to use their mobile phones. The problem is, when the drivers are away at work, it is very difficult for them to make a phone call because they do not always have people to help them. However, the garage owner can call their phone and track where they are. The drivers also cannot use the phone at night when they are at their home.

The other problem is that these rickshaw drivers have to disclose every single use of their phone to the garage owner, which has also limited their mobile phone use. At the same time, for each rickshaw driver, there are only a few persons there to help them to operate their mobile phones. While most rickshaw drivers get help from the garage owner, some of them also get help from local shopkeepers and mobile phone repairers. Since the wives of the drivers are not often allowed to interact with males outside their families, they cannot use mobile phones at all.

Summer 2016, Dhaka, Bangladesh

July 15, 2016: For the last month, I have been studying the "biometric mobile sim registration" process that has recently been enforced in Bangladesh. I am now conducting interviews with some urban middle-income families in Dhaka. In most cases, people are confused, suspicious, and a little afraid. Many of them think that the government is surveilling their mobile phone use. Some of them think that the telecom companies and government will be listening to what they talk about with their contacts. Others are afraid because they think they can be wrongly accused for something they did not do. Many of them considering being extra careful when using their mobile phones.

Many of my participants are also concerned about the biometric registration process itself. This process requires them to provide their fingerprints to register a SIM. Many participants are not sure how their fingerprints will be used in future. Many fear that the government may misuse their fingerprints to serve their own purpose. They are also afraid that the telecom companies may start blackmailing them with their fingerprints. In Bangladesh, one can even buy and sell properties with fingerprints, which is very common in communities with low rates of literacy. Many of them are now concerned that other people can now take their properties using their fingerprints. However, no one can ignore this requirement if they want to use a mobile phone.

These stories provide us with glimpses of situations where people are barred from freely expressing their feelings, opinions, and thoughts. These stories also depict the massive challenges and complexities of designing for voice, and how those challenges and barriers operate even in applications designed to overcome limits and extend possibilities of voice. If we look around, we will find a plethora of such stories of silencing. For example, millions of women around the world are victims of different kinds of sexual harassment either directly or indirectly, but they cannot talk about it because of various social constraints. Thousands of low-paid workers across the world are regularly tracked and monitored, and their voices are silenced because of their insecure jobs and overall economic condition. Billions of low-literate people are not able to voice their concerns over social media. Artificial intelligence algorithms show a bias against these historically marginalized communities and limit their voices further by representing them badly. Refugees are silent when they are called "illegal". Governments in many countries are imposing different kinds of surveil-

lance upon their citizens and limiting their voice. There are many such examples where people are being deprived of their voice.

Lack of voice is one of the most pressing problems in today's world. A huge number of people across the globe are detached from the very politics that are shaping their fate, and the whole project of democracy, and its practical impact, is now in question. For example, there is a rise in the number of authoritarian governments around the world. People's democratic right to express their political opinions is being limited in those places. Additionally, commercial companies have started deploying advanced technologies to surveil our lives and diminish our privacy. As a result, ordinary people do not feeling safe with their private information. Furthermore, some people are spreading fake news, hate speech, and propaganda over social media. Consequently, it is becoming difficult for ordinary people to trust information, and without information, they struggle to build arguments. This problem with voice is becoming even more challenging day by day as technologies are getting stronger and being used in every sphere of human life.

The situation is severer for the people in marginalized communities where resources are constrained. People in those communities are often excluded from the fruits of development program due to a lack of infrastructural privileges. They often struggle to raise their voice in public discussion due to lack of access and autonomy. Even when they voice a concern, they are often ignored. As a result, in today's world, underprivileged communities, including women, LGBTQ groups, refugees, physically and psychologically different people, poor and low-literate people, are often ignored, deprived, or discriminated. Furthermore, marginalized groups in those communities are even more deprived.

These deprivations are sometimes the result of physical or economic vulnerabilities, and sometimes the result of various social and cultural practices. For example, a woman in a poorly funded refugee camp finds herself at the intersection of different kinds of marginalizations that make it very difficult for her to stand and fight for her rights.

In the last couple decades, computing technologies have contributed to social changes in both wealthy and low-income countries. In a lot of places, technologies are considered to be vehicles for economic and social development. While the relationship between technology and development has been debated for a long time, the recent advancement of computing technology promises a more equitable future. In the last two decades, mobile phones and social networks have connected billions of people around the world [146, 198, 55]. In today's world, due to this advancement in communication technologies, people enjoy the freedom to communicate easily with others, gather information, share their emotions, and build opinions through communal support. In very recent years, we have also seen computing technologies playing an important role in mainstream politics. For example, in the series of political movements in the Arab world [304, 177, 22, 127], mobile phones and social media are considered to have played a vital role in spreading information among protesters and uniting them. Those movements have brought radical changes to the political system of those countries.

Besides these large scale movements, we have also seen people organizing different kinds of events to demonstrate their concerns, agonies, resistance, and to protest different entities. In Twitter, for example, hashtag movements are commonplace. People often express their united voice under a hashtag (#). In

2017, on Twitter, women from all around the world expressed that they experienced sexual harassment with the hashtag, #metoo. On Facebook, people often change their profile pictures to show their solidarity with a movement. In addition, political leaders often join public conversations through social media. The general public are now able to ask them questions directly, which was not possible so easily even a few years, ago. Many other people also conduct their political campaigns on social media. Leveraging the power of information dissemination and network connections, people are now able to easily spread their emotions, feelings, concerns, and advice to thousands of people all around the world to build a political unit.

Technologies are also being used to help local government and political infrastructure as a whole. For example, in UK, the government is slowly moving toward participatory policy making [273]. They have made all relevant government data available to the general public as a part of the "open data" movement, and the general public are now able to participate in a policy making with their mobile phone [71]. The governments of India and Bangladesh are converting themselves to "digital". Under the "Digital India" project the Indian government is allowing the citizens to access to certain benefits through their biometric identities [289]. In Bangladesh, the "Digital Bangladesh" initiative is making some governmental information easily accessible to public under their "Access to Information (A2I)" project [147, 296]. Citizens are also engaging in local politics in India over various communication media. For example, "CGNet Swara" [202] and "Gram Vaani" [195] are voice-based platforms where citizens can complain about their local government. Such initiatives are advancing technologies toward giving people more opportunities to voice their concerns.

However, such initiatives are still far away from giving proper access, autonomy, and accountability to people in marginalized populations. For example, millions of people in developing countries do not have a mobile phone. Millions of others cannot operate them because of they lack adequate digital literacy. So, the information available through mobile phone services are still unreachable for them. Second, the information that people receive from the government cannot be challenged in most cases. For example, the A2I project in Bangladesh only provides the government's information to citizens, but citizens do not have the chance to add their response. Social media are often thought to be the place where such concerns and grievances could be accommodated. However, the information that people see on social media is often fake, and hence people cannot often trust these platforms. Furthermore, people often receive biased information on social media due to the politics of the platform. Furthermore, social networks are often divided into different "bubbles", and the opinion building that happens inside one bubble often fails to communicate with others. In addition, people from marginalized communities, due to the lack of their social resources, are often not connected to the right audience.

Besides these technical hurdles, there are different social and cultural norms that also hold people back from voicing their concerns on social media. For example, a woman in Bangladesh faces a cultural barrier when she wants to raise her voice against the violence she experienced. The mobile phone repairers in Dhaka often struggle to demonstrate to renovate their market due to their lack of social status. Readymade garments workers in Bangladesh do not talk about their exploitation inside of factories because they fear losing their jobs. Such social and cultural constraints also limit the voice of marginalized communities, which often go beyond the capacity of technology.

Designing for voice is hence a developing area of research. Scholars have been trying to build systems that are cheaper, more accessible to physically and psychologically different people, friendly to low-literate users, and privacy-preserving. Systems often give marginalized people surface-level access only. As a result, the voice of these people are still rarely represented through technology. At the same time, these technical solutions do not often consider wider social constraints and hence fail to be effective in the field. Besides these, there are bigger challenges with management and organization, too. Competing voices need to protected in a way that the voice of the weaker party is not affected by their stronger opponents. Also, expressing a concern warrants a responsibility that the system needs to attribute to the right party. While all these areas have been touched on by scholars to some extent, how we can think of design for voice, systematically and holistically, is still largely unexplored.

The central contribution of this dissertation is hence two-fold. First, it offers a procedural and practical framework for voice. This framework provides an analytical tool to determine if some voice is suppressed in a system. Going beyond the technicalities, this framework offers a broad view to understand if a system, technical or not, is allowing voice at all. Second, this dissertation also provides a guideline for designing computational tools to engage with the problem of silencing and how to support voices in a marginalized community. This framework also offers several insights into the philosophical underpinnings of voice that connect this framework to broader scholarship in democracy, ethics, and development. This framework is particularly relevant to the disciplines of Human-Computer Interaction (HCI) and Information and Communication Technology and Development (ICTD) - two communities to which I belong. This frameworks will both help the scholars of this community deepen their

analysis around a technical system, and build better technologies that incorporate more voice. The organization of the subsequent chapters of this dissertation is as follows:

In Chapter 2, we offer a comprehensive understanding of voice. This starts with a definition of voice. Then we explain two kinds of conceptualization of voice; namely, voice as a value, and voice as a process. The discussion on voice as a value incorporates the historical development of the idea of justice and its relationship with voice. We show how voice embraces an open ended idea of fairness and equality. The discussion on voice as a process, on the other hand, is built on the rich scholarship on democracy in political science. We offer a fresh way to understand voice as a process through three main ideas of democracy: access, autonomy, and accountability. This chapter sets up the idea of voice that later unfolds in the later chapters of this dissertation.

In Chapter 3, we extend the discussion on voice to its applications in HCI. In this chapter, we highlight three major areas within HCI where voice can contribute significantly. First, we describe how voice can advance the research around participation and participatory design. Second, we explain how the idea of voice can be leveraged to propel the growing movement of ethics inside HCI. Third, we connect the idea of voice to the ICTD related works in HCI. This chapter shows some limitations to the existing scholarship in these areas, and explains how the idea of voice can advance theory, design, and practice.

Chapter 4 is a description of a project called "Suhrid" that I conducted in Bangladesh from 2011 to 2014. The objective of this project was to make mobile phones more accessible to a group of low-literate rickshaw-drivers in Bangladesh. We first conducted an ethnography to understand the social values

and practices of that community. Then we designed a mobile phone application, called "Suhrid" through a participatory design process. The core component of this design was "gift", and we designed our system based on the gift-giving practices in that community. This design also challenged the western notion of accessibility that is often centered on individuals. We shifted the notion of access from "individual" to "communal" and situated our design around communal practices. We also deployed Suhrid in the field and conducted an user study to understand rickshaw drivers' response to that system. We received overwhelmingly positive feedback from our users, which indicated the potential of such socially and culturally embedded design around access and voice. Besides shifting accessibility from "individual" to a "social" and "communal" challenge, this project also shows how voice can develop through a social process using existing cultural practices.

Chapter 5 is a description of a project that I conducted in Bangladesh from 2012 to 2014. The objective of this project was to develop computation support for Bangladeshi women to fight sexual harassment in public places. The root of this project lay in a broad inquiry around voice. While doing this project, we learned that mere access to a platform does not ensure a person's voice there. They also need autonomy. The pressing problem of sexual harassment revealed how women were silenced by social norms even when they had access to digital media. This silence revealed a number of theoretical and methodological challenges for designing around voice, which we describe in this chapter. First, we show why and how it is difficult to collect relevant information around a sensitive topic, and thus, how traditional design strategy is hard to employ in such cases. Second, we show how design interventions fail in such sensitive cases because of social practices. We also discuss how many of the types design inter-

ventions in the western world, which are developed based on the cultural assumption of liberal feminism, may not work appropriately in the global south. Thus this project also contributes to the growing scholarship around feminist HCI and postcolonial computing.

Chapter 6 is a description of a project that I conducted in Bangladesh in 2016. The objective of this project was to understand the process and public reactions to the government led "Biometric Mobile SIM Registration" process in Bangladesh. We conducted observations, an online survey, and interviews to understand the challenges of implementing such a giant tech project in a low-income country like Bangladesh. The broad question that we address in this chapter focuses on the tension between voice and accountability. The Bangladeshi government enforced its citizens to register their mobile phone against their fingerprints in 2016. Besides several infrastructural failures, this big, national project also had an impact on public sentiment around digital surveillance. We observed how that perceived notion of surveillance limited the citizens' voices. At the same time, we learned how the project advanced the idea of accountability around the use of digital technologies like mobile phones. We have discussed these in detail in this chapter.

In Chapter 7, we summarize the contribution of this dissertation. In this chapter we also explain different methods used in these projects and how they are relevant to voice related studies. We discuss how ethnography, in particular, played a central role in my projects, and how this method has a great epistemological alignment with the idea of voice. Next, we go through each of the earlier chapters and discuss them in the light of voice. For this, we bring the key lessons from earlier chapters and explain how they work as a set to put forth the notion

of voice. We explain how each of the three projects described in chapters 4, 5, and 6 address three important qualities of voice: access, autonomy, and accountability respectively. This explanation is done through a meta-analysis of the core components of each of those chapters, and then analyzing them against those three qualities of voice. This discussion explores the potential, opportunities, and challenges of designing computational tools around voice.

CHAPTER 2

VOICE: A VALUE AND A PROCESS

In a very basic sense, voice can be considered as just a mechanism to produce sound. However, with the advancement of human civilization, man-made vocal sounds have turned into signals, symbols, and languages. As a result, voice has become a way to express human feelings from the very depth of the heart, coming from an individual's deep sense of justice, autonomy, and accountability, and an individual's identity as it is situated in the broad political contexts of their society and culture. Hence, defining voice in a structured and concrete way is a challenging task. However, we make an effort here to define voice in a way that allows its broadest possible understanding, transcending the role of communication, and bracketing concerns about defending human rights and peace. Hence, we offer the following definition of voice, which will sit at the core of discussion throughout this dissertation:

Voice refers to a justified, autonomous, and accountable expression of human feelings that advances equity and reduces marginalization.

This definition of voice is based on rich scholarship in social and political science around the idea of justice, democracy, and development. This definition shares the spirit of justice toward advancing a moral and ethical practice in society. Voice allows people to protest against any unjust action done to them, and thus promotes justice. At the same time, this definition is aligned with the idea of a democratic environment in a society, which requires people's free and fair participation through voice. Finally, this idea also situates a person in their own moral system so that they are accountable for their voice. We will unpack and explain each component of this definition later in this chapter.

Our definition of voice emphasizes the emotional aspect of human feelings that stands for protecting core human values. However, we do not confine our definition of voice within the mechanistic processes of producing sound. Neither the sound itself nor written forms of it can encompass the whole essence of voice. Voice is not defined by the languages of pictures, video, or art either. We recognize that voice can even be expressed even through silence, invisibility, and absence. While all such modalities of expressing voice, the main essence of voice is not confined within these media. The true essence of voice transgresses them all to secure human values in the broader domains of justice and democracy. The defining characteristics of voice are the right and autonomy to express and fight for one's justified concerns, and hence voice can take a wide range of forms and shapes depending upon the context.

Voice is not a purely individual agenda. As we said, sound converts into signals with the help of meaning, and that meaning is produced through a social and historical process. Hence, we cannot think of voice without accepting the symbolic value system that makes voice possible. Our perception about the world is shaped by the things we learn from our society [44]. Our reactions to the reality we confront is also shaped by the values that we acquire from our society [44]. Hence, both the form and the function of our voice are essentially a part of a larger social process that upholds the value system around us. Now, whether everything that we perceive is a function of how society functions, or if individuals have some control over it, is a long-debated philosophical question that we may not directly get involved with here. However, even if we accept the agency of an individual in creating a voice, the objective of that voice cannot be explained without involving the society within which that individual is situated. An expression of a person, whether as a result of a social process or a

stand-alone individual effort, is only recognized as a voice when other people in the society recognize it too. Hence, the idea of voice is essentially "social" in nature. This argument does not also make voice a purely communicative tool, but points toward a shared understanding of fairness that we will unfold later in this chapter.

Next, voice has an objective. The mere process of bringing out the inner feelings of human beings cannot be justified if we do not consider the reason that drives this process [41]. Voice is produced in order to materialize a concern, and to receive a response to that concern. This means that the objective of voice is to raise a concern to society. This concern can be purely individual or it can be a collective concern that affects many. Voice is created to let others know about that concern, with an expectation of action. For example, workers often raise their voice and demonstrate on the streets [96]. In this process, they let the world know about the injustice and exploitation they underwent in their workplaces [74]. Their objective in raising their voices can be assumed to be to put an end to such injustice through a social process [309].

As mentioned earlier, the formation of voice is a social process, and as we just have discussed, the objective of voice is also to bring justice through a social process. Hence, voice can be imagined as a broad social process through which humans share their concerns with each other in order to establish justice collectively. Besides such an "outward" notion, voice can also be conceptualized as a process through which social beings assert, validate, and strengthen their identity, emotion, and sensibilities. This definition then leads us to the questions - what concerns would be considered worthy of voice, and/or, whether all concerns can result in voice? To answer these questions, we have to realize that

voice calls for a collective social action, and hence that concerns which do not interest other people in a society, whether utilitarian or moral, are hard to justify as voice. For example, if a person is sick, that person's friends and relatives may be concerned. However, their concern may not trigger voice if the sickness is not a result of the society's weak medical infrastructure, or if such sickness has no visible significant impact on society, and no direct social changes can be imagined to end that sickness. However, if that sick person is not treated fairly in the society, and/or they are discriminated by any means - that is a social concern [69]. In such cases, the community can act together to end such suffering. The concern of that patient (and their relatives) can then form a voice. So, voice has to be associated with an invitation, claim, and demand for social justice and fairness [98, 238].

Voice has historically been an interesting concept to philosophers, social scientists, and political scientists for its ties to the core problems of knowledge, ethics, and power. If we look to history, we see how voice has heavily influenced its shaping all around the world. Emperors, kings, and governments have often tried to suppress people's voices to strengthen their control. In response, people often gathered around their shared interest, formed voice, and protested such oppressions. From historical battles against the foreign colonies [217] to recent movements in the middle east (also known as the "Arab Spring" [20, 166]), we can see how the voices of various groups and wider collectives have played a central role in shaping political infrastructures around the world [151]. Voice has contributed to changes in other spheres of society, too. For example, in the industrialized world, workers have often raised their voice to combat exploitation [31]. Women all around the world are raising their voice today to end gender-based inequality and discrimination [214]. LGBTQ com-

munities and their supporters have long been fighting to establish their rights in society [247]. Thousands of native tribes all around the world are finding a way to voice their concerns [170]. Millions of refugees are struggling to reappropriate their voice after being forcefully moved from their original places [91]. Artists are often bringing these issues into their art and making their art pieces embodiments of these voices [24, 196]. Photographers are taking photographs that strengthen these voices. Even web and mobile applications are being made to support such groups voicing their concerns [131].

While voice has influenced different disciplines including philosophy, sociology, political science, art, and law, it still needs to be established in the area of Human-Computer Interaction (HCI). In the third paradigm of HCI [197], for example, researchers have moved beyond understanding interaction as a limited process of how individuals interact with computers, but rather focused more on the broader social, political, and environmental aspects of computing [120]. Scholars who work in this area have been vocal about social justice [29], sustainability [86], inequality [28], hegemony [132, 27], globalization [64], colonialism [133], exploitation [255], marginalization [120], and other broad social concerns that are now inseparably intertwined with computational media and technologies. Thus, moving HCI away from alienated machine-individual interactions leads us to a broader landscape, of mutual emergence of man and machine, and to the politics that shape the way that technological impact is assumed [88]. Such discussions have pointed out the necessity to develop the political aspect of HCI more profoundly. While most of these discussions have brought to the fore different kinds of marginalizations, and the moments of resistance and protest against those, HCI has not really developed much in accommodating different voices in analysis, design, and policymaking. To that end, objectives

in theorizing voice for HCI are to strengthen and enrich its political facets, and connect this discipline more strongly to the historical debates around justice, freedom, and democracy.

To this end, in this chapter, we will first consider voice as a value, and then as a process. This two perspectives are influenced by Nick Couldry's "Why voice matters" book [67], but my articulation of these two perspectives are different from the way Couldry proposed them along with some other perspectives. After discussing these two perspectives, I will explain voice in a broader organizational framing to conceptualize how that contributes to the development of a collective body. Finally, we will gather our understanding from all these discussions to synthesize different aspects of voice, and their implications to the discipline of HCI and beyond.

2.1 Voice as a value

"Voice as a value" refers to the idea that voice is formed, shaped, protected, and supported by the value systems that also define some of the core human characteristics for members of a society, or a shared social and communal space. It is an invitation to conceptualize voice both as a production and a representation of a set of human values that advance the case for justice and fairness. Voice as a value works to support the idea and materialization of justice, and contributes to our understanding of the functions of justice in a society. Let us first turn to the scholarly project around "justice", which we have already referred to a couple of times in our earlier discussions. Justice has been a topic of scholarly debate throughout human civilization, and this tells us about human beings' eternal longing for a lifestyle that is supported by both security and fairness.

Socrates, the Founder of Western Philosophy, saw justice as a virtue [306]. He criticized the existing practice of justice in Athens, where justice used to be defined as a benefit of the rich and powerful [292]. Socrates eloquently pointed out the weaknesses of that practice, and explained why justice should benefit all of the people in the society. For Socrates, justice was important, saying, "People should receive what they deserve" [49]. So, according to him, justice is a way people receive the consequences of what they do. He thought such justice could be delivered in two ways - i) in a society that is protected by "guardians", and ii) inside a human being by practicing reason. In The Republic, Plato states his argument thuslym

> *The army will be composed of professional soldiers, the guardians, who, like dogs, must be gentle to fellow citizens and harsh to enemies (375c). The guardians need to be educated very carefully to be able to do their job of protecting the city's citizens, laws, and customs well (376d). Poetry and stories need to be censored to guarantee such an education (377b). Poetry should: (i) present the gods as good and only as causes of good (379a); (ii) as unchanging in form (380d); (iii) as beings who refrain from lies and deception (381e). [223]*

If we look closely at Socrates' argument on justice, we will find how it supported the idea of voice in two ways. First, he stressed protecting the "law", which he had previously described as a means of building a society with dependency and sharing. The responsibility of law, to him, was to protect a citizen's political interest, which was formed by both "a single citizen's limitations" and "a community's strengths". This is what we also consider to be the essence of voice. Voice is the way individuals live as a political agent in society and flour-

ish to their full potential with the support of others. However, Socrates went beyond mere conceptualization of society as a constellation of social contracts enforced by some "laws". Instead, he emphasized the moral and ethical idea of what is good and what is bad. For instance, Socrates felt it necessary to censor poetry and stories, as we find in the above quotation. This part of Socrates' philosophy on ethics and judgment is important in order to make a distinction between voice and free will in early Greek scholarship. Although his intention was to align poetry and stories with the messages of God [181], which to him was the basis of morality, we can also see how he imagined justice as a socially and morally approved form of practice, and not merely shaped by individuals' free will. This means that individuals' needs must also be approved by a socially accepted and shared set of values. This agreement between individuals and their society also resonates with the central theme of voice that we are proposing. Hence, we can see how our idea of voice shares the same spirit as Socrates's position which later shaped the modern metaphysical branch of Western philosophy.

Plato, a disciple of Socrates, advanced Socrates' idea of justice. According to Plato, justice was not a set of external bindings that human beings were required to be engaged with for their own benefit, but an internal virtue that human beings achieved through the practice of honesty, fairness, and compassion. Plato recognized justice as a quality that superior human beings possessed, and that quality was beneficial in two different spheres of life - personal and social. In the personal sphere, Plato saw justice as a virtue that both secured and represented the supremacy of a person through the power of discerning. Justice, to him, helped superior people distinguish between right and wrong - an important quality that was often missing in "lesser" human beings. In the so-

cial sphere, Plato found justice to be a vehicle for maintaining harmony in the society.For Plato, justice was a deep insight made by superior intellects in the society, through observations and logical arguments. In "Crito" [224], Plato expressed this "human aspect" of justice through Socrates' last words with his wealthy friend, Crito, as this following excerpt highlights.

> ***Soc.*** *Could we live, having an evil and corrupted body?*
>
> ***Cr.*** *Certainly not.*
>
> ***Soc.*** *And will life be worth having, if that higher part of man be depraved, which is improved by justice and deteriorated by injustice? Do we suppose that principle, whatever it may be in man, which has to do with justice and injustice, to be inferior to the body?*
>
> ***Cr.*** *Certainly not.*
>
> ***Soc.*** *More honored, then?*
>
> ***Cr.*** *Far more honored. [17]*

This conversation highlights how Socrates, as a superior human being, could discern right and wrong and thus define justice [18]. Besides the importance of justice, this conversation also expresses how a superior thinking process is required in order to reach the idea of justice [51]. However, later when Crito asked Socrates to escape from prison, arguing that the verdict was not just and thus that escaping would restore justice, Socrates disagreed. This is important to note here that while Socrates relied upon his own reasoning about right and wrong, he did not argue for imposing those to "other people" who might be a victim of his actions [298]. In Crito, we find Socrates saying,

> *But now, since the argument has thus far prevailed, the only question which remains to be considered is, whether we shall do rightly either in escaping*

> *or in suffering others to aid in our escape and paying them in money and thanks, or whether we shall not do rightly ; and if the latter, then death or any other calamity which may ensue on my remaining here must not be allowed to enter into the calculation. [17]*

This shows how justice, although framed as an individual's virtue, was not detached from the well-being of a bigger collective, even for Plato. Plato's take on judgment was more about a quality that virtuous people harboured in themselves [65]. While the rational basis for justice was not ignored, Plato also maintained that such rationality could only be achieved by people who had greatness, and hence only they could achieve such virtue of justice. It is also important to note how Plato emphasized how justice was based on logical arguments. Situating his and Socrates' ideas of justice in their days in Greece, we can see how they both tried to establish justice as a way to reduce unfairness in society and bring accountability to public decision making. While one can definitely argue about the process they prescribed and the way they saw justice, one should also appreciate their intention of effecting social change toward fairness, representation, and morality.

However, Plato's student and a world-famous philosopher, Aristotle, also argued against the way Socrates and Plato saw justice [169]. Not only did Socrates and Plato try to define justice as a virtue of some gifted individuals, they also saw justice as a universal virtue that would not vary from one person to another, or from one place to another. The idea of a universal "right" and "wrong" (moral universalism [225]) has been one of the most representative feature of the old Greek ideology which later gave birth to the metaphysical branch of Western Philosophy [244]. Aristotle's ideas on justice took a slightly different path that

tried to accommodate the contextual differences among individuals, and thus he refused the universality of logical consequences of moral ethics and justice [117]. However, within a particular context, Aristotle also believed in the singularity of a moral decision [122]. His line of argument was later accentuated by Emmanuel Kant's work that attempted to provide support to a universal moral system [144].

Now, these Greek philosophers' versions of justice may not be applicable in today's world. For example, Socrates and Plato gave the responsibility of protecting citizens' voice to the rightful and virtuous people, instead of giving each people the right to stand for their own voice. Also, both Plato and Socrates left out women and slaves while making arguments on fairness for individuals, which they again put in the hands of the rich males who "owned" them. Although Aristotle considered important differences in justice, he was still confined within the idea of defining justice by physical contexts. However, those areas of their philosophy can be attributed to the social and political contexts that they lived in. Considering the lack of mechanisms for scaling up grassroot level voice, and the unavailability of infrastructures for organizing voices for the development of a city into direct democracy, their (and other Greek philosophers') theories can be taken as the most effective ways of defending individuals' voices for their times [212]. If we leave aside those limitations firmly connected with the social structure of old Athens, we can find how both actually tried to defend the following two things:

i) Justice is an idea that a person will determine right and wrong based on reason. So, justice is a rational value. ii) Through justice, individuals or cities will enshrine their moral values, and not individual free will.

These two ideas are extremely important to conceptualize the basic premise of Voice today. First, when we argue for a person's voice, we do not necessarily argue for a person being able to fight for whatever they think to be right or wrong without a proper reasoning. Hence, voice needs to be a rational value. For example, a person may prefer to do business in cloths. They can demand a fair market in which to trade their cloths based on some rational arguments. Any internal and external action that unfairly limits their business scope can be criticized and they can use their voice to stop such actions. However, they cannot demand an unfair advantage either. The fairness here must be judged through a channel of rational arguments, which should incorporate that person's situation in a comprehensive manner, and investigate any unfairness or inequality at any level. Second, voice has to be rooted in some shared and commonly accepted moral codes. While people may vary in their moral choices, and it requires a separate thread of discussion to explain how to accommodate different moral standpoints in a single society, it is important for us to understand that each individual needs to ground their voice in shared moral ethics. For example, there are two camps of people in the United States today - one group supports the right of abortion, while the other group is critical of that. The first group grounds their reasonings into the liberal idea of "pro-choice", while the other group criticizes that, arguing from the conservative idea of "pro-life". The objective of voice is not to judge which one is right and which one is wrong, but to make sure that people can stand for their rights based on a socially accepted set of moral codes and a logical reasoning based on them. Here, both parties have their own reasons for how their claims are connected to some moral and ethical codes that they follow, and neither of their claims have been unequivocally rejected. Hence, they both should be allowed to have their voice raised

and heard.

An important aspect of voice is that it does not try to compare two moral standpoints. For example, it is not the objective of voice to answer whether God exists or not, or which God is true. It is not the objective of voice either to decide if a certain action is actually coherent with the spirit of a religion or an ideology. In fact, voice stands as a protest to any such comparisons of moral standards and measurement. We maintain that any socially established value system should be respected and not be judged against any "objective" scale. People with any moral belief should be able to stand for their rights and voice their concerns as long as they can establish a logical connection between their demand and a socially accepted ethical position. So, voice has both moral and ethical values that need to explicated now. These definitions of "moral" and "ethical" are informed by the twentieth century political scientists, including Habermas, Jane Mansbridge, Seyla Benhabib, Nancy Fraser, and Iris Young [36]:

- **Moral:** In the moral dimension, voice incorporates the values that free a person to choose any moral ground, and his actions should have a logical connection to that moral standpoint. A person's political position may shape their moral choice, and it is their private choice that should be free from any external pressure [110].
- **Ethical:** In the ethical dimension, a person has to accept the socially sanctioned ethical norms. The ethics of a society has to incorporate the maximum possible moral perspectives, and should be open to any moral position that is targeted to people's welfare. Also, individuals should be capable of practicing their own moral beliefs without any external pressure [110].

We will explicate each of these two points later in this article. But before that, we will explicate the role of some tensions around moral standards and their limitations that were revealed in the scholarly works of some of the most prominent philosophers in the twentieth century.

First, we turn to the idea of "utilitarianism". Utilitarianism is, in short, an idea of judging an object or an action by its "utility" in the society, which is objectively measurable. Utilitarianism is a version of consequentialism, which states that the consequences of any action are the only standard of right and wrong. Since the values of voice are opposed to the idea of judging a person's action based on any objective scale, the value of voice is often orthogonal to the values of of "utilitarianism". Utilitarianism flourished in the works of Jeremy Bentham and John Stuart Mills from the late nineteenth to early twentieth centuries. These two scholars established the idea of utilitarianism as a basis of morality through their work in economics and law. Utilitarianism claims that every action can be ranked according to its direct and measurable impact in an objective way. The objective ranking of an action provides society with a new basis for judgement that challenges the subjective judgement systems at the root of many value systems. This line of work was taken up by a group of natural philosophers in mid and late twentieth century, as they attempted to understand society through a set of definite and measurable parameters and functions [254, 104, 276, 118].

One important aspect of Utilitarianism is that it accords all the responsibility of right and wrong to nature. Bentham wrote,

> *Nature has placed mankind under the governance of two sovereign masters, pain and pleasure. They alone point out what we ought to do and determine*

> *what we shall do; the standard of right and wrong, and the chain of causes and effects, are both fastened to their throne. They govern us in all we do, all we say, all we think; every effort we can make to throw off our subjection to pain and pleasure [161]. will only serve to demonstrate and confirm it. A man may claim to reject their rule but in reality he will remain subject to it. [38]*

So, while Bentham allowed that people made subjective choices, he opined that there was an objective (naturalistic) and quantitative measurement of a person's action based on some "natural rules". This was the basis of Bentham's idea of justice. From this perspective, Bentham tried to see the whole world of actions in two colors - pains and pleasures. This worldview was essentially problematic in two ways:

i. This definition of utility rejects the idea of the subjective versions of pains and pleasures [270]. For example, eating pork may be pleasant to a Christian, but painful to a Muslim - purely based on their moral beliefs. Pork may have an equal positive effect in both bodies, but they may derive totally different levels of satisfaction out of it. Similarly, if a person's son is a thief and is punished - his emotion may not be same to another person in the same community who is not related to that thief [242]. Third, even within the same contextual setting, two persons can have two different emotional responses to a same treatment. For example, after watching the movie "Titanic", two twin brothers may have different levels of sorrowness. This may entirely depend on their personal tastes [277]. So, pain and pleasure are both qualitatively and quantitatively different for every human being. Trying to objectively measure them is both impossible and problem-

atic. Hence, utilitarianism, although willing to do "justice" by being fair to everybody, is bound to be unfair to many people at the end [269].

ii. The idea of quantitatively measuring pains and pleasure destroys the voices of people who make choices that cannot be objectively proved to contribute to pleasures [270]. For example, the followers of Hindu religion make statues that are made of clays, and dress them with expensive clothes and ornaments [157]. After the rituals, they throw them all to water, and those expensive things get lost in the water. In many Hindu communities, there are many poor people who struggle to find food. Helping those poor people with money instead of "wasting" wealth in the ritual may seem to be the logical argument of consequentialism and utilitarianism [148]. However, in Hindu religion they believe that it is more important to make their God happy by offering costly objects than feeding poor people, which they believe to be the responsibility of the God [148]. Now, imposing utilitarianist quantitative judgment on such religious actions will not only demean their religious spirit, but also will destroy their voice for advancing their religious practices [113]. Instead of measuring their actions based on an external objective scale, we must judge Hindu rituals according to the rich and celebrated Hindu cultural values that have heavily contributed to civilization for a long time in the history in their own ways [294].

John Stuart Mill, a student of Bentham and another big scholar supporting utilitarianism, stepped aside from Bentham's idea of measuring happiness quantitatively [192]. However, he still held firmly the idea of objective measurement [193]. He brought the idea of "high pleasure" and "low pleasure". According to him, mental pleasures are "high" that cannot be measured in quantitative scale, but physical pleasures are "low" than can be measured quantitatively

[190]. This distinction helped him explain how utilitarianism could still support the idea of religious rituals which might not have any obvious proofs of pleasures that could be measured quantitatively. However, instead of measuring the high pleasures quantitatively, he proposed them to be ranked based on objective experiences. He wrote in his celebrated book, "Utilitarianism",

> *What do you mean by "difference of quality in pleasures"? What, according to you, makes one pleasure more valuable than another, merely as a pleasure, if not its being greater in amount? There is only one possible answer to this. Pleasure P1 is more desirable than pleasure P2 if: all or almost all people who have had experience of both give a decided preference to P1, irrespective of any feeling that they ought to prefer it. [191]*

So, Mills believed that "all or almost all" people's experiences could be taken as an objective standard to rank the "human feelings". This idea is problematic for the idea of voice that we are proposing for a couple of reasons. First, the feelings of "almost all" people may not be the same for the rest. So, this scale cannot do justice to minorities [243]. Second, this kind of ranking rejects any other modalities of arguments except the mental "satisfaction" [231]. This may eventually run into a conflict with physical pleasure, for example. Scholars for centuries have pointed out different moral dilemmas associated with such physical/mental dichotomy [93]. For example, will we buy a tasty unhealthy food or a no-so-tasty healthy food? Or, will we take the risk of climbing Mount Everest for mental pleasure? The answer to these questions requires decisions that involve both a person's physical ability and psychological state [228]. So, two persons with two levels of physical strength may take two different decisions according to their perceived physical and mental satisfaction. Any decision that

is psychologically preferable for a person with one kind of physical strength may be unsatisfying for another person physically, and vice versa. Mill's utilitarianism does not leave space for such differences [295].

The value of voice also addresses an important issue that has been ignored by utilitarianism, both by Bentham and Mills. For both of them, since they ground their arguments in naturalism [40], objects have the natural quality of being "desirable". According to this argument, "gold" has the natural value of being desired. We argue that such notion is problematic and neglects the politics of valuation [160]. We maintain that values are man-made, and without a historical and social context, things would not become "desirable" [178]. Hence, no matter how much the objective value of gold today is, one cannot deny its root in the way some people in the history valued gold [302]. The broader intention of this argument is to come out of any naturalistic idea of good or bad, because that may significantly impact one's voice. Only if we maintain that the values of voice are inherently made of human emotions, their moral positions, and their political rights, which can have different forms according to different contexts and different interpretations, will we be able to see how different people have different voices which are equally correct and acceptable.

2.2 Justice and Voice in Contemporary Scholarship

Next we turn to two contemporary philosophers of justice and ethics to further clarify how we will understand voice as a value that - i) cannot be purely objectively measured, ii) is embedded in rational and moral practices, iii) can have multiple forms. These two scholars are John Rawls and Amartya Sen. They

have shown how justice can be thought of from each individual's perspective, and can yet accommodate the larger social value system that they live within.

John Rawls heavily contributed to the building of a broad idea of justice that addresses the social injustice and discrimination while judging an individual's action. Rawls' core contribution was based on the idea of "fairness" that he explained through a famous analogy of "the veil of ignorance" [236]. Rawls has invited us to a thought experiment where we see an individual, with no prior knowledge of the world, has to choose a place in which to be born and raised. Since that individual has no prior information that can help them distinguish between two places, it is impossible for them to decide which place is better than any others. Rawls calls this situation being "veiled by ignorance". So, that individual can end up choosing a fate of a rich and educated person in a very rich country, or end up choosing the fate of a poor person in a developing country. From behind the veil, it is impossible for them know where they may end up. However, they know the consequences of each of the possible alternatives and the struggles and challenges associated with the choices.

According to Rawls, fairness and justice can be achieved by positioning a person behind this veil of ignorance [239]. Behind the veil, a rational person should think that they may end up being the most unfortunate person on earth. So, they should not opt for any rules that does not benefit such people. Instead, they should be promoting progressive ideas that support the welfare of the most disadvantaged populations. Rawls claims that taking people behind the veil is a good way to make them get rid of their own subjective biases, and make people more considerate about underserved and marginalized communities. His idea of fairness is hence associated with the idea of equity. Rawls says-

> *The principles of justice are chosen behind a veil of ignorance. This ensures that no one is advantaged or disadvantaged in the choice of principles by the outcome of natural chance or the contingency of social circumstances. Since all are similarly situated and no one is able to design principles to favor his particular condition, the principles of justice are the result of a fair agreement or bargain. For given the circumstances of the original position, the symmetry of everyone's relations to each other, this initial situation is fair between individuals as moral persons, that is, as rational beings with their own ends and capable, I shall assume, of a sense of justice. [239]*

Rawls has used his version of "contract theory" to further advance his idea of justice. The "contract" to him is a rational agreement between an individual and the society through which a person is expected to make their choice in a just society. However, Rawls' contract theory is different from the previous versions of contract theory given by Hobbes [123], Locke [165], Rousseau [245], and Kant [145]. Rawls' "Original Position" (behind the veil of ignorance) assumes the most basic state of society, and Rawls suggests two processes for how an individual's "contract" with society develops there. Rawls calls them the "two basic principles of justice" [232]. First, each individual will have an equal amount of liberty. Second, if there is an inequality in society that cannot be removed by any means, actions should be taken in a way that the victims of that inequality get other advantages as their compensation. If we take a closer look, we will see that Rawls thus strictly stresses impartiality and equality in society - which he calls fairness. This emphasis in his thesis shows that his claims are largely theoretical, causing scholars to question whether his ideas are actually practicable. However, the essence of fairness in his definition of justice is in tune with the idea of voice that we are putting forth. Like Rawls, we argue that a person's

voice is often suppressed by their contextual constraints. As a result, we often have to take these infrastructural inequalities "for granted", and hence that voices from the most marginalized populations do not often reach the public debates. At the same time, people from the most disadvantaged communities often struggle to understand the injustice happening to them as they are rarely given the opportunity to see everybody in a level-playing field. Revealing these inequalities and designing a free and fair progressive justice system can help grow a voice, and make it heard. Hence, Rawls' "veil of ignorance" in fact does not obstruct our vision, but actually helps us see more clearly infrastructural inequality and its consequences [235]. Rawls' theory of justice is actually a radical turn in the scholarship of justice in two ways. First, Rawls has proposed a way to think about justice that does not only consider individuals to be responsible for an action, but also incorporates the effect of their social surroundings [234]. Second, Rawls has proposed a way for how the subjective nature of justice can be incorporated in a judgment system that does not essentially "measure" a person's action in a way that "others" can comprehend [237]. Thus, Rawls' theory of justice is a major breakthrough in the discourse on justice among the contemporary scholars in law, economics, philosophy, and sociology [36].

Rawls' theory helps us conceptualize voice as a value in a way that is very important for advancing the case for voice. It helps us understand the validity of a voice without using the overwhelming (and often unfair) parameters set by utilitarianism. In fact, Rawls has criticized utilitarianism several times, arguing that utilitarianism tries to set an objective scale to judge when injustice (inequality) has already taken place [233]. Hence, by offering an equal place to start from (original position), Rawls sets up a common ground for all to think about justice for themselves. Thus, Rawls advises us not to judge others, but to judge our-

selves by placing us in the "other's" position. We consider this as an extremely important step toward advancing the value of voice, because it answers some fundamental questions regarding the possibility of justice. For example, it is required to understand if somebody's voice is justified, but due to the challenge of "otherness" we often fail to comprehend the demand for fairness associated with that voice [116]. The scale that utilitarianism has provided cannot serve this purpose, and rather limits the voice of its disadvantages. However, Rawls has shown us a way to overcome this challenge of otherness [249]. Rawls says,

> *The veil of ignorance prevents us from shaping our moral view to accord with our own particular attachments and interests. We do not look at the social order from our situation but take up a point of view that everyone can adopt on an equal footing. In this sense we look at our society and our place in it objectively: we share a common standpoint along with others and do not make our judgments from a personal slant. Thus our moral principles and convictions are objective to the extent that they have been arrived at and tested by assuming this general standpoint and by assessing the arguments for them by the restrictions expressed by the conception of the original position. The judicial virtues such as impartiality and considerateness are the excellences of intellect and sensibility that enable us to do these things well. [239]*

Thus, Rawls has attempted to achieve the perks of an utilitarian judgment while avoiding the shortcomings of it. Unlike utilitarian scholars, Rawls has advocated for securing a fair treatment of each individual regardless of their position in the society. At the same time, his judgment has also taken into consideration social approval by allowing others to fairly judge an action. Thus the

basic ingredients of voice are advanced through his scholarship in justice.

Amartya Sen, the Nobel Laureate economist, has also heavily contributed to the theory of justice. Sen has built his argument being in a conversation both with the utilitarian definition of justice and Rawls' model of social justice. According to Sen, a comparative model of justice can both bridge the gap left by utilitarianism, and improve Rawls' model of social justice. The central idea of Sen's theory is "social choice" [265]. Inspired by the "social choice model" that was originally developed by economists, to make a better selection among a number of options in the market by incorporating their social aspects, Sen has proposed a comprehensive model of justice [258]. Social choice theory, through a quantitative model, generates a ranked order of choices available for a human being living inside a society [271]. According to Sen, following this ranked list is a rational behavior for an individual. Sen has not suggested though to follow the quantitative model of social choice theory to rank the available choices for performing an action, but he has leveraged this idea to provide a person with a rational process to order their options based on their contextual demands and stipulations [260].

Like Rawls, Sen has also criticized the utilitarian idea of justice and the consequential way of evaluating an act. However, Sen has taken this argument even deeper and brought in the differences between "transgressional" and "comparative" justice. For Sen, a justice system that requires a transgression from one individual's values to another individual's is problematic. For instance, in Rawls' model, Sen criticizes how a person needs to become another person (through the veil of ignorance) for securing justice. This transgression is essentially dependent on the availability of information for the decision maker, which Sen has

seen as a privilege. An African American woman, for example, needs to learn about the condition of a person even more marginalized than her to judge an action, and this information may not be readily available to her. Besides pointing to the challenge of availability of information, Sen also aligns himself with the feminist argument defending the unique nature of knowledge that cannot be accessible to "others" [115]. Hence, the model of comparing two people, which Sen sees as a transgression, may be vulnerable to infrastructural imperfection and unequal information distribution. Hence, Sen has proposed a "comparative" model of justice, which essentially compares the choices a person has while making a decision. Building on his social choice theory, Sen makes an entre into a person's choices through reasons at this level [265]. Hence, Sen's model allows us to judge a person's action without engaging ourselves with any imaginary thought experiment that may require knowledge that we do not necessarily already have [264].

By digging deeper into Sen's conceptualization of justice, we find two important components of voice as a value. First, rationality: like Rawls, Sen believes that rationality is the base of justice, but that has to be interpreted in a broad social perspective. Sen embraces the possibility of multiple rational outcomes in his theory of justice. However, while making a rational social choice, Sen has leveraged a more utilitarian version of ranked choices (like John Stuart Mills). According to Sen, if a person has two choices, they need to make an ordering of those choices by factoring in their personal and social constraints, and maximizing their personal and social benefits. Since a person is required to make this choice before the action actually takes place, this decision is based on the person's expected output for each of the actions, which again is dependent on the information available with them. Since justice is based on the decision a person

makes before taking the action, Sen's model is essentially deontological in nature, and not consequential. In such a deontological model [266], understanding a person's rationality in making a choice involves a thorough examination of the person's historical context [259]. Sen claims that such an investigation may be avoided by having a deeper understanding of the society and culture in which the person is embedded [261]. Sen thus transfers the responsibility to verify a person's rationality to the value system(s) the person is attached to. Hence, the base of Sen's rationality is essentially social and cultural values [267, 210].

However, dependency on social and cultural values as the basis of rational choice, as suggested by Sen, leaves us with two challenges. First, how can a person raise their voice against an injustice to them that is supported by the social and cultural values surrounding them? For example, how can a Bangladeshi woman protest the marginalization against her while that male-dominated society supports that deprivation? Liberal feminists have expressed their concerns regarding this issue. Prioritizing the "social" over "individual" may essentially hamper the progressive idea of making social changes toward a more equitable society [83, 25, 299]. However, in his defense, Sen has shown how individuals can make rational arguments that are not supported by their immediate social atmosphere [268]. Sen has argued that limiting a person's choices itself is a social injustice that has to be taken into account, besides evaluating a person's merit in picking up the right choice [263]. According to this argument, a woman in Bangladesh, who has been deprived of school education by her society can claim justice based on the fact that her options have been made limited by the society. Now, her society may not immediately approve of her demand for sending her to school, but society must also need to explain how they have offered fairness and justice to that woman by providing her with equal opportu-

nities (choices). For example, in some conservative communities in Bangladesh, women are not allowed to go to school. Hence, many women do not get the opportunity to have education. However, in some such communities, female teachers come to the community to teach women at their home. In such scenario, the community may explain that they have offered an alternative way of education for the women, and thus have ensured justice for them. A subsequent inquiry may investigate the quality of that alternative. Thus, the idea of choice can advance justice through social values and practices. Now, while this idea of providing more choices represents a greater degree of freedom to individuals, Sen has never mentioned how many choices a person should ideally be provided with (minimum level of choices) [211], or if all the people in a society should be provided with an equal number of choices. For this, Sen has always argued for "more justice", and maintained that there should be no limit to this. He rather focuses on equality in the number of choices.

The second important component in Sen's idea of justice is capability, which again involves the idea of information, and an individual's ability to consume and make use of information to make a rational social choice. This notion of capability marks a notable difference between Sen and Rawls. While Rawls is more concerned about the infrastructural inequality that an individual is exposed to, Sen takes into consideration the strength of the individuals (as a part of a community) to fight against those odds. Hence, according to Sen, justice is not only about making a choice that resembles the informed choice another person in their place might make (like Rawls), but also a process of building individual's capability to make an informed choice.

These two basic components of Sen's thesis, choice and capability, allow us

to think of voice in a broader sense. Sen says,

> *A person's voice may be relevant because he or she is a member of the group that is involved in the negotiated contract for a particular polity, but it may also be relevant because of the enlightenment and the broadening of perspectives that such a voice coming from outside the contracting parties might provide. [269]*

In fact, Sen has seen voice as a way to think about human development. Sen has taken into consideration both the physical (instrumental) and social (constitutional) aspects of freedom of human beings for their development, which, in essence, overlaps with the idea of voice we are putting forth. Both Rawls and Sen thus have provided us with a very broad idea of justice through which we can see the inequality of and injustice to an individual or a community. Both of their frameworks of justice aim to reduce social injustice. Our idea of voice also resonates with that broad understanding of justice, but rather than suggesting a social change through structural (legal) means, we advocate a comprehensive socio-technical arrangement for empowering people to develop voice to fight for justice.

Finally, we summarize our discussion based on theories of justice to show how we can see voice as a value. We propose the following ideas that help us conceptualize voice as a value:

a. Voice has an objective to reduce the injustice and discrimination in the society. Hence, like justice, voice is also a value that fights against both the immediate crimes and the historical deprivation toward a person or a community. Voice is a value that advocates for corrective measures to be taken in

society. By voice, we hence express our belief in a free and fair society, where no two people will be discriminated against for their biological, national, or political identities. At the same time, by voice, we share the optimism that such free and fair society is possible and that will be beneficial for the society to advance.

Regarding this optimism, we build on the work of John Rawls and Amartya Sen, both of whom have argued that a reduction of injustice is essential to the comprehensive development in the society. Sen has argued that, without justice, only a part of the society can make progress [261]. Drawing on the data of famines that have taken place all around the world, Sen has argued that discrimination and lack of democracy are actually responsible for those failures [262]. A proper distribution of wealth through a democratic system must ensure that all groups in a society are getting equal access to thenational wealth. Voice is hence, at least for Sen and Rawls, focused on fairness as a means to move society toward a better justice system.

b. Voice is a situated value, and not a fixed one. It takes different forms at different circumstances. Hence, voice cannot be codes by any fixed scriptures, rather voice is a moral and ethical practice that follows the social and cultural norms of the time and place in which an action is situated. We build on Amartya Sen's idea of "naya" and "neeti" to explicate this point of situated fairness in voice. Borrowing from Hindu mythology and cultural practices in India, Sen defines "naya" as a set of principles that has been determined by religious scriptures. According to Sen, following such "naya" is not dependent on the practice of human beings. This means that such virtues are present and accepted even if people do not agree with them. This form of justice is "out there" in an objective form. On the other hand, "neeti" is a set

of virtues that people follow based on their personal and social judgments. These rules are neither clearly mentioned in religious texts, nor contradictory to religious values. However, the actual source of those rules are cultural practices that are socially situated. The objective of "neeti" is to protect people from harm [269]. Sen argues that while "naya" and "neeti" both means "justice" in Hindu culture, "neeti" is more important for implementing social justice. He argues that such "neeti" can only be achieved by a social consensus while taking into consideration the situation of every member of the society. We argue that voice is one such value, like "neeti", underpinned by social practices and justified by cultural norms.

c. Voice is a value for multiplicity. This means that in a particular context there may be different many kinds of voices coming out of different individuals, and all of them can be equally fair and acceptable. One of the core components of voice is polyvocality. Voice is a belief that human needs and concerns may not be reduced to any single rational conclusion, and such a reduction may not bring justice to everybody. Hence, different voices are required to challenge, reshape, and deconstruct a dominant power. At the same time, voice cancels out any rational determinism toward dictating people's fate. Voice is sympathetic to different arguments, all of which are targeted to people's betterment according to their own belief system. Hence, voice, as a value, is a resistance to value-singularity and imposing one's value system upon another.

We build on the work of Rawls and Sen once again to unpack this aspect of voice. The central hypothesis in Rawls' work is based on the idea that a "worldview" is different for different people [239]. He gives examples of the differences between a person living a lavish life in a rich family and a person living

a hard life in an impoverished community. Based on these two persons' backgrounds, they are exposed to two different worldviews, and hence they cannot be judged against the same scale. Hence, the logical arguments that are valid for one person may not necessarily be valid for the other. Sen has extended this argument and said that these two persons also have different sets of capabilities and choices. Hence, their actions are also conditioned by the choices available to them. Both of these scholars hence have taken us out of any singular value-system and have offered a broad perspective for understanding justice. We must embrace the spirit of multiplicity while thinking of voice as a value, too. Voice is not about creating and nurturing one kind of moral standpoints over another, rather voice is a value for multiplicity, constant confrontation, criticism, experimentation, and argumentation.

2.3 Voice as a Process

Voice is also a process. Asking for voice to be seen as a process incorporates two basic avenues of active research agendas - a) how voice is created, nurtured, organized in a society, and b) how voice plays a vital role in protecting right and autonomy of people. These two questions have been sitting at the core of the scholarly debates in political and social sciences for a long time now. We now will turn to a select set of scholars in political and social sciences to get deeper into those discussions around the conceptualization of voice as a process.

We open our discussion with the seminal work of Jurgen Habermas, who is credited for his pioneering work on deliberative democracy [110]. Habermas took the challenge of negotiating between two extremely opposite ways of un-

derstanding democracy - a) liberal and b) republican [111]. The differences of these two opposite poles, among others, include voice - the way it is formed and the way it functions. For the republicans, voice is only possible through a moral consensus among a community, and the objective of voice is hence to shape the government instruments for moving the society toward a broad ethical goal that is agreed upon by members of that society. Hence, voice here is only admissible if that is permitted by the ethical codes of a society. This position of the republican political system is essentially a protection for the values that a society has long held within them [109]. Rather than focusing upon individual interests, politics for republicans emphasize group-efforts, where the group can only collectively raise their voice according to their shared value system [107]. Habermas has taken issue with this way of thinking about voice. He argues that such moral policing by society filters out concerns that are not supported by a social value system. Individual concerns are overlooked by large ethical imperatives. As a result, democracy fails to serve the voice of the people, and instead starts to serve certain ideologies. Habermas says,

> *The guarantee freedom not from external compulsion, but possibility of participation in a common praxis, through the exercise of which citizens can first make themselves into what they want to be - potentially autonomous author of a community of free and equal persons [110].*

Habermas finds the position of the liberals problematic, too. For liberals, individual voices do not need to be justified by any means. As a result, each person can hold a position without any explanation. Habermas saw such negative freedom problematic for larger ethical concerns of the society [39]. Under this liberal system, a person may want to have something purely based on their

personal interest, that may be detrimental for the commons. Habermas finds this problematic because the citizens are not coming to a consensus based on any argument, and hence the ethical basis of democracy becomes dependent on the individual moral spirit of its citizens [108]. Even more importantly, a consensus upon an issue may derive from multiple sources of reasons, none of which needs to be explicated and justified under a liberal system [90]. Thus a potential risk with any decision may remain underexplored. As a result, individual voices, though they seem to be taken care of in the liberal system, in reality get ignored by the over-emphasis on the majority voting that does not necessarily ensure any protection to the marginalized voices.

Habermas hence has seen the necessity to develop a model that balances the opposite demands of republican and liberal camps. To this end, he has proposed a model known as deliberative democracy [90, 47, 112]. The core idea of this system is to divide the social landscape of justice into two separate political spheres - public and private. According to Habermas, a private sphere is where a person can practice things according to their moral values, and within that sphere they should not be questioned against any "generalized" scale of human good. An individual may raise their voice inside their own private sphere according to the local values situated in that particular sphere. However, when a voice leaves the private sphere and gets heard by other people who do not necessarily belong to the same moral camp, that voice must be justified by ethical means. Habermas calls this as public sphere where different voices from different moral camps interact [54]. Habermas has drawn a hard line between the public sphere and the private sphere, and blocked the path of moral reasonings to public ethics. Since his model is based on the process of how a voice travels through private and public spheres, his model is also called the procedural

model of democracy [35].

According to Habermas' model of deliberative democracy, a voice is a subject of persuasion and deliberation [35]. A person's concern needs to be explained and justified to others through some communication channels. If a person fails to explain their concerns to others, or others fail to understand the concerns of that person, then it may become impossible to form a consensus. This model is hence heavily dependent on a person's ability to communicate with others, and the availability of information [308]. Second, a community level verification of a voice for its moral standard must be established through an ethical justification in the public sphere. This means that a concern needs to have both moral and ethical (which Habermas defines as a more generalized set of codes, or basic human rights) justifications. This model hence becomes sympathetic to both individuals' concerns, and still blocks any unethical demands raised by the individuals [34].

Habermas' model thus demonstrates how voice can be seen as a process that both addresses the concerns of individuals, and avoids the potential risk of being derailed toward an unethical choice. While this model holds the spirit of voice in general, several scholars have criticized this model from different perspectives [200, 174, 35, 307]. Here we will present a select set of scholarly works around democracy that will further accentuate the points we want to highlight in conceptualizing voice as a process. For this, first we will turn to the work of political philosopher, Iris Marion Young. Young has taken issue with the deliberative model in the communicative part [307]. The core assumption of Habermas' model requires citizens to communicate with others for building a voice. A person's communication skills are required to form a voice regardless

of the importance of their concerns. Such emphasis on communication hence becomes an issue of accessibility for people not privileged enough to possess the required skills for communication. Young has analyzed such situations in detail in her work, and pointed out several problems that people from marginalized communities suffer from because of these barriers of communication [308].

Young starts by explicating the logical base of deliberation that sits at the heart of Habermas' model. To justify a voice, one does not only needs to know the problem very well, but also needs to possess at least two qualities - a) eloquence for conveying the message to "others", b) a certain amount of knowledge about "other's rationality". Young has argued that rationality is culturally situated, and hence conveying one's argument to others requires a learned skill. This requires some cross-cultural knowledge that can only be achieved through a particular kind of education, which is more a privilege than a right for most people in the world. Young points out that Habermas' model is dependent on such knowledge and skills. Young goes on to say that people from privileged classes can skip these requirements because of their privilege, and because the "public sphere" is often owned and occupied by them. Hence, establishing a voice is much easier for them than for a person from a marginalized community. Young gives an example of an African American woman in America who may not have a proper education to argue and defend her case in the court. According to Young, the voice of that woman is hard to establish, and it is also hard to recognize for a white male person, the likes of whom populate the US courts. Hence, Young finds that Habermas' model of democracy is not "accessible" for people who do not have privilege.

Young has then proposed to make the gate of voice open for "others" to com-

municate in their own languages to make deliberative democracy fairer. Young has suggested a set of actions to make the public sphere more accessible for underprivileged communities. First, Young has suggested "greetings" to welcome everybody. Young believes that a greeting is important to make a room for a person in a discussion. According to Young, a greeting is not only uttering some words, but also ensuring that each person in a discussion feels equally respected and comfortable. A greeting means that each person will be invited and requested to take part in a discussion, so that each of them feels equally important. Young has suggested that we should make an effort to understand each person's background and make the platform accommodating. This is, according to Young, a very important step toward making the democratic platform more accessible and allowing the voices of the marginalized communities. In many cases, people from underprivileged communities are not welcome in discussions - many of which actually determine their fate. Young has harshly criticized such kind of deliberations, and has called for making the deliberative platforms equally accessible for all.

Second, Young has suggested focusing on "rhetoric". Young believes that rationality propagates through its symbolic meanings, and the role of rhetorics is important there. In many platforms, we only allow rhetorics that are only familiar with a certain group of people who are privileged. Rhetorics from other communities are not welcome there. However, Young has noticed that rhetorics are an essential means of conveying one's arguments, and not allowing a person use their own rhetorics often limits the voice for many. Young says,

> *"... the opposition between rational speech and rhetoric by distinguishing between illocutionary and perlocutionary speech acts. ... ... In a dis-*

> *cussion situation in which different people with different aims, values, and interests, seek to solve collective problem justly, it is not enough to make assertion and give reasons. One must also be heard. Rhetoric announces the situatedness of communication. With rhetorical figures a speech constructs the speaker's position in relation to those of the audience [36].*

Third, Young has emphasized the importance of storytelling. Young believes that stories contain powerful messages that are not always easy to convert into arguments. She also argues that in many communities moral and ethical ideas are coded into stories, and without allowing such stories into the argument, it is difficult for people to convey their arguments. Young thinks that narratives are also essential for cultural exchanges. A lot of cultural resources are encrypted in the stories that the community treasure through their day to day practices. The subject of judging an incident is a matter of aligning that incident to the stories they know. Hence, the subject of justice is not often an isolated action, but a narrative that is superimposed on the cultural narratives of a community. Young has advocated for making room for such storytelling in deliberation and argumentation.

Taking together, Young's advocacy for a communitarian model of democracy is based on a performance-based process of voice building. Young has invited us to be open and welcoming to voices that are not in a strict format, but that come in many different forms that we may not be familiar with. This core argument of communitarian democracy is hence concerned about determinism in the mechanistic aspect of voice building. While the spirit of assuring equal opportunity for all voices in Young's scholarship is to welcome others, it should also be noted that such a model eventually transfers "a burden of knowl-

edge" to the community who are more privileged. For instance, if we take again the example of African American woman that Young has cited, we see that the white males are now responsible for understanding the background, languages, and rhetorics of the black community. On the other hand, if knowledge about the white males is asked of that woman, who Young has claimed to be already disadvantaged, then it is clearly an injustice. So, this model is based on an idea of unequal distribution of responsibilities between parties that are involved in a discussion. Furthermore, in many situations, it is hard to determine who is more privileged that the others, and providing the communitarian advantage to one and not to the other may become unfair. While the proposal of communitarian democracy and voice building argument advanced by Iris Young raising many questions, we acknowledge that her advocacy for equal access for voice is essential to conceptualize voice as a process.

Next, we bring to the discussion the criticism by the feminist political scientist, Jane Mansbridge, who has expressed her concerns about the coercion that is essential in a democratic system [174]. Mansbridge has pointed out that a democratic system cannot work without coercion. The basis of a democratic system is "popularity", or the approval of the "majority". This essentially means that the choice of the majority will be enforced in the community and the choice of the other minor groups may be ignored, and in some cases may be suppressed. Mansbridge has not challenged the necessity of such coercion. Instead, she has supported the need for coercion for democracy to work well. She opines that such coercion is often needed to implement many positive actions, and the opinions of the majority should be respected.

However, Mansbridge has also been concerned about the negative impact of

such coercion in forming voice among the marginalized communities. She mentions cases where minority groups or less privileged groups may not be able to build a voice if they are not provided with enough protection. Here, Mansbridge's position is deconstructive, taking refuge in the philosophy of Derrida and Foucault. Mansbridge argues that even for a majority party to work better in a democratic system, they need to build the voice opposing them. Challenging a totalitarian regime is only possible by nurturing voices that have been ignored in majority voting. According to Mansbridge, a totalitarian government does not only impose power upon the citizens, but also imposes an ideological correctness to underpin their actions. Voices from the citizens' ends are often required to challenge the practical impacts of those ideologies in the ground. Hence, Mansbridge considers voice to be an essential component of a functional democracy. For her, voting or election in choosing the majority opinion is only a part of a whole continuum of democracy, which she believes can only be constructed by careful nurturing of voice. She says,

> *The legitimacy of one person/one vote, or more radically equal power, in an adversarial position does not derive from medieval conclusion that a majority is, all things equal, more likely to be substantively right than a minority. Rather, than a rationale that has developed slowly since the seventeenth century, the legitimacy of the majority rule (and of equal power in decision more generally) derives independently of any postulated outcome of uncoerced communication, from two sources. [174]*

Mansbridge hence has advocated for building and nurturing political "enclaves". She has defined enclaves as a protected place for political opinion building. For her, enclaves are the places where individuals can develop their

voice through the help of their peers. A person with a concern, may not have proper language and communication skills to exercise their voice, as Young mentioned. Also, a voice should be shaped and tested through different layers logics, proofs, arguments, examples, and justifications before being exposed to the public. Such a process is not always possible to executed by a single individual. Also, reaching out to a critical mass to develop an opinion around a concern is fundamental to the development of a voice, which is also hard for an individual without the support of a peer group. So, a political enclave should function as a hatchery, or a nursery, where voice is nurtured. The enclaves are formed with people who share similar sentiments, and who possibly have an oppositional opinion to the dominant majority. However, enclaves do not necessarily have to align themselves with the interests of the "counterpublics". The objective of the enclaves are purely political and attached to the structural functioning of the government. Hence, although protected from external coercion about building their voice, enclaves are "accountable", and have to acknowledge the coercion otherwise exists.

As we can see here, Mansbridge has focused on the necessity of creating a space for minorities to raise their voice. She emphasizes positive and affirmative actions so that people from minority groups can come closer, and work together to make their voice heard. This formulation of voice sits at the heart of democracy; and Mansbridge maintains that such voice nurturing platforms are the building blocks of democracy as a whole. While Young puts the responsibility of "learning" on the shoulder of "others", Mansbridge has distributed that responsibility among people of the same group who have similar concerns. Hence, the mechanisms for voice building are different for Young and Mansbridge. However, both of them advocate for a democratic platform that is equally accessible

for all people, and for protecting the voice from all kinds of external coercion.

Finally, we turn our attention to the revolutionary work of the political philosopher, Chantal Mouffe [201]. Mouffe has taken issue with Habermas' model's central assumption of consensus. Habermas heavily presupposes that with rational arguments and enough persuasion, a citizen will be able to convince others of a "genuine" concern [199]. Mouffe identifies this as a fake belief on rational convergence. According to her, two (or more) equally rational chains of argument may diverge, and may not ever come to a consensus. Hence, it is rather too optimistic to expect that a citizen will be able to convince others, either in a private sphere or more importantly in a public sphere, through rational argumentation. Mouffe has seen this effort of persuasion as narrow, shallow, and pointless. She has pointed out the historical debates around religion, morality, and ethics - that have several rational and logical chains and still could never be resolved.

Mouffe has further argued that the rational backbone of Habermas' model is in fact its own Achilles heel. She has emphasized that people's decisions are often moved by their emotional force, rather than rational arguments. Hence, instead of focusing on convincing others, Mouffe has advocated for a different kind of democracy that is adversarial in nature. Mouffe has turned to a chain of philosophy that was introduced by Friedrich Nietzsche on Nihilism [206], and then later brought into the area of politics by Carl Schmitt [256]. The root of Mouffe's argument is the fundamental flaw in the positivist approach of consensus. She emphasizes that a system that relies on such an assumption is vulnerable to discrimination to one or more ideologies. Her claim aligns with a growing body of work in Social Science that is critical to the rational treatment

to the society.

Mouffe hence proposes that democracy should embrace the multiplicity and poly-voice that are inherent and inevitable in the mental landscape of the citizens. Mouffe calls for carefully avoiding any deterministic decision about right or wrong, and even avoiding any optimism toward consensus. For her, it is the duty of democracy not to reach a single voice by convincing others, but to accommodate other voices. For this, Mouffe has proposed "Agonistic" democracy. The idea of agonism is rooted in the Greek history of combat between warriors, where the objective of each of the warriors was not only to show their superior skills, but to show the faults of others. Hence, completely contrary to the idea of deliberation, Mouffe's idea of democracy advocates for conflicts and confrontation. Mouffe argues that voice is formed by criticizing the failings of the competing voices. The development of voice is less about inclusion (Young), or protection (Mansbridge) to her, and more about criticism. Mouffe says,

> *To believe that a final resolution of conflicts is eventually possible - even if it is seen as an asymptotic approach to the regulative idea of a rational consensus - far from providing the necessary horizon of the democratic project, is something that puts it at risk. Indeed, such an illusion carries implicitly the desire for a reconciled society where pluralism would have been superseded. When it is conceived in such a way, pluralist democracy becomes a "self refuting ideal" because the very moment of its realization would coincide with its disintegration. [200]*

Mouffe's argument hence is just another way of saving voice from a totalitarian rationality. This is one important aspect of voice that we have always emphasized in this article. The positivist rational aspects of justification may

lead toward a suppression of voice, especially ones that are not possible to reduce to a consensus, or ones that contradict some group's cherished beliefs. For instance, debates around religions and morality may not be easy to reduce to any single conclusion, no matter how much effort we put into them. The objective then should not be to convince others to accept one's view since it is a difficult task to move people from their religious or political beliefs, but to find a way where all such voices can co-exist without harming each other. The ethical basis of Mouffe's invocation toward criticism and confrontation is hence the protection of human rights. While it is challenging to find ways to accommodate different competing voices in a society all of the time, Mouffe's work is important for us to conceptualize voice as a process that is not confined within any rational or moral system.

The above scholarly discussion among political scientists about creating, nurturing, and organizing voice provides us with a deep understanding of voice of as a process. Starting from fundamental work from Habermas, to the criticisms of his model by Young, Mansbridge, and Mouffe, this line of scholarship shows us how these political scientists have always been trying to protect human voice by suggesting different paths. Moreover, voice has always been considered to be the basic building block of a functioning democracy, and the organization of a city, a community, or a nation in a civilized world. The relentless scholarly work of these and other scholars has revealed several essential components of voice as a process, which we need to be cognizant of, and work toward achieving, to ensure that all voices are freely made, nurtured toward a moral and ethical understanding of democracy, and incorporating differences.

While the abovementioned scholarly discussions have helped us to concep-

tualize voice as a process, there are a couple of limitations in these discussions, too. First, in many cases these discussions are more idealistic than practical. For example, Young's idea of a communitarian democracy is very hard to achieve in practice. And even if it can be achieved, that will put a tremendous responsibility on people who participate in political discussions [35]. For example, if people from two different languages and cultures start arguing on political issues, both of them first need to learn about the other's background, history and literature. Besides the fact that such knowledge is not always readily available and not very easy to learn, it is often impossible to understand somebody's background context based on such external knowledge. Hence, such an effort can eventually prove fruitless. Moreover, such a communitarian burden will eventually slow down the political process. People will start spending more time in communication than on the actual political debates - which may not eventually be much more effective in advancing the case of democracy.

Second, in many cases, these scholarly discussions are incomplete and inconclusive. For example, Chantal Mouffe's criticism to Habermas is an excellent scholarly work that shows how it is often impossible for two equally correct logical arguments to converge. She has suggested that people take agonistic positions to any opposing political choices. While this may sound logically correct, Benhabib has pointed out that this is and impractical if not impossible solution [35]. If a government allows its citizens to fight with each other (and with the Government), the state will quickly move into a grand chaos. Compared to this, Mansbridge's suggestion of accepting coercion sounds more practical [173]. However, she fails to draw a limit to this coercion. How much coercion can be considered as not harmful for developing a voice, and when should we raise a concern about that [209]? Answering such questions may not be possible in a

straight-forward way, but such questions reveal why a higher power is needed over government to make her model work, which thus makes it a challenge to imagine her model working in a sovereign state.

Third, all of these scholars' writings on democratic platforms have been written as if it would be possible to completely overhaul and reform the state according to their suggested policies. While such arguments can often help us assess the functions of a government, it is highly impractical to imagine designing the democratic infrastructure of a nation from the scratch based on these theories [281]. In most of the countries in the world, democratic values are more grounded in their cultural and nationalistic ideologies than in any academic literature [282]. Most citizens have to live within a political context, have to accept the constraints, and have to operate under a given legal infrastructure [189]. Hence, such theories may not be useful for most people, who have little or no power to make any changes to the way their government works.

The above discussion around democracy and differences reveals the tensions around the concept of voice as a process. We understand that voice, as a political process, requires a proper platform to grow, protect itself, and get heard. At the same time, the platform, infrastructure, technology, or policy that will facilitate this voice must be carefully designed so that competing voices do not suppress each other, and every voice can reach its audience. We posit that a person, if willing to voice a concern, must receive these infrastructural and procedural supports. To extend our discussion on voice as a process to a more concrete level of understanding, we define three major qualities of voice - access, autonomy, and accountability. Combined, these three qualities represent voice as a process. This means, to qualify as a voice, a process - i) must be accessible

to the person or community who has concerns, ii) must be free from any unwanted external coercion, and iii) bear the responsibilities of its consequences. In the following paragraphs, we expand each of these three qualities to produce a better understanding of voice as a process.

CHAPTER 3

VOICE AND HCI

In this chapter, we describe the role of voice in Human-Computer Interaction (HCI). For this we start with our definition of voice and gradually develop an interpretation of voice that is more relevant to HCI literature. We maintain that voice refers to a justified, autonomous, and accountable existence of human feelings that advances equity and reduces marginalization. Voice is a value that holds and represents fairness, equality, and participation. At the same time, voice is a social process through which a person realizes their justified demands, converts those demands to expressions, and connects those expressions to actions toward social change. Voice is also a way of conceptualizing the development of individuals and organizations through autonomous actions.

In more specific terms, voice is an invitation to incorporate the values against discrimination in a system through acceptance, democracy, and participation. Building on the works of Rawls and Sen, we define voice as a platform that accepts multiplicity, polyvocality, and compassion. Through such openness, voice creates an avenue for raising all kinds of moral and ethical concerns and allows people to fight for them in a body. Thus, voice rejects any particular standard of being 'correct", and thus allows people to stand for any genuine cause that is targeted toward bringing positive changes in the society by eliminating discriminations and marginalizations.

More concretely, voice is a social process through which people become conscious about their identity and rights, realize the politics around them, and finds a collective body to fight and survive. Thus, voice shares the requirements of a communitarian systems that is accessible for all in all modes of communication.

Building further on the work of Iris Young, we argue that the first requirement for a system to be supportive to voice is for it to be equally open to everybody regardless of their identity and orientation. Second, the system should allow everyone the kind of autonomy they require to make changes to the system itself. Building on the works on Chantal Mouffe and Jane Mansbridge, we here argue that the actions of individuals should not be constrained by existing standards and ideologies (even those of the very system the individuals are in). Such a form of autonomy is both important and essential to voice. At the same time, voice also needs to be accountable to society. A careful design for voice should ensure that nobody is harmed by the actions of a voice. Thus, voice offers a right balance between autonomy and accountability so that people can gain their required autonomy to work toward the necessary positive changes in society.

Thus, taken together, voice is basically a very particular way of seeing the whole range of political actions in design. When looking at voice as value, we see how it is aligned with the spirit of justice and ethics. Values have been a topic of interest of HCI researchers for the last two decades (see Nissenbaum [207], and Friedman [99], for example). A significant amount of HCI research has focused on how values are inscribed in design, how values are created through practice, and how values are (re)produced through larger politics (Light et al. [163], Dourish & Irani [132], Carl DiSalvo [78], Ledantec et al. [159], Shaowen Bardzell [27], Nimmi Rangaswami [229], Houston et al. [126]). Such discussions capture a big range of agendas in HCI from the design of an everyday artifacts to the whole infrastructure of computer manufacturing. Voice joins this scholarship by building a platform to include diverse, unheard, invisible, and marginalized values from the grassroot level. Such a conglomeration of values requires a careful process of voice nurturing, a strong infrastructure of account-

ability, and a recognition of polyvocality - which summarize the main agendas of voice. Instead of a top-down structure of value inscription, voice recognizes the social process of 'valuation' through which values are formed in everyday practices in our social life. Voice offers a way to understand this valuation process and merge those in the process of design, use, repair, and recycle.

Next, when we consider voice as a process, we find how such values can be materialized through different modes of access, autonomy, and participation in HCI design. Hence, the ideas that compose voice are not radically new, and neither is the spirit of incorporating voice to design. However, defining voice as a value and a process for supporting the politics related research within HCI, advances some growing movements within HCI. While the essence of voice has long been central to many disciplines, including philosophy, social science, arts, and literature, HCI has only experienced different glimpses of it through different scattered studies and design interventions. The objective of our work on voice is to offer a theory that brings all of them together, helps understand the commonalities and differences in different political moments, and connects them to design. In the following sections, we show how this holistic understanding of voice can help the discipline of HCI in three important areas:

3.1 Participation related work HCI

Participation is a well-studied topic in HCI, and there is a whole subarea of HCI that has built upon the studies of participation and design (Participatory Design or PD in short). The pioneering works in participatory design (Shuler [257] , Muller & Kuhn [154], Kensing & Blomberg [149], Sanders [251], Spinuzzi

[280], Holtzblatt & Jones [125], Dix [80], Nardi [205]) have shown the different ways how people can come together and collaborate in designing technologies and services for different purposes. The tensions in such participations, starting from politics of power to the ethical concerns regarding 'otherness', have also been raised in the literature of PD.

In his book, 'Participatory Design: Principles and Practice', Shuler described how the early history of participation in the Nordic regions of Europe resulted into solving different community-level problems by involving the stakeholders of the community [257]. Bardzell has argued that the power distribution, especially among different genders, has been historically very flat in the Nordic countries, which supported such collaborative environment [28]). However, that condition may not hold true for other places in the world. Nonetheless, different mechanisms for the distribution of task, risk, and responsibilities, as mentioned in that book of Shuler, have remained important for designing a participatory system even today. Later, Muller and Druin contributed to the conceptualization of participatory design by defining that as the 'The Third Space of HCI' by pointing out the fact that while participating, the designers and the participants - all enter into a space that is alien to all [154]. Hence, they require carrying out certain norms there that are foreign to all the stakeholders. Positioning participation in a 'third' space essentially works for de-politicizing the idea of PD, which has remained a bone of contention for the researchers in this space for a long time. For example, Kensing and Blomberg agreed on the potential of seeing such collaboration through the merely utilitarian lens of executing tasks, but also pointed out how competing interests, pre-existing emotions, and barriers to communication may politicize the third space where the participation happens [149]. Later, the works of Sander [251], Spinuzzi [280], and

others have demonstrated how technology can incorporate different modes of participation and collaboration and further complicate the scenario. However, such complexity often remains hidden from our eye with the 'magic' of technology. In today's world, we see large participatory and collaborative digital platforms including Wikipedia, Open Source products, and tools like Google docs or Uber that demonstrate how we can bring the idea of sharing, care, collaboration, and participation together to build something big. However, the underlying tensions around contentions and differences in opinions are routinely reported in literature, but we seldom see a design for accommodating polyvocality [179, 162, 76, 140]. .

The idea of participation relies on several factors including access to participation, autonomy to participate, and having a common goal. For many people in the world, participation over digital media is not an option because of economic, educational, and cultural constraints. In many countries, citizens are not allowed to participate freely in discussions that involve the interest of the government. In many societies women are not allowed to participate in public discussions with men. Hence, the technical arrangement to facilitate an equal ground for participation is often pointless for those people. Furthermore, when it comes to the point of tension between the interests of a privileged class and a an underprivileged class, such technologies can only help one group of people, thus making technology even more biased against the underserved communities. The objective of voice is to make such participation tools free, democratic, and equally accessible to all. In this sense, voice will both expand the range of participation, and improve its quality.

Besides making participation more accessible for underserved communities,

voice advances the arguments about accessibility in HCI (see [3, 279, 43, 152, 215, 23], for example). Most accessibility research in HCI and its sub-disciplines center around the technical means of making people able to use a technology. This body of research includes building accessible keypad for paralyzed people, interface for blind people, and input methods for illiterate people. Such research has a tremendous impact on making technology user-friendly for the people who were initially barred off by the designers. Voice can extend this line of research in HCI by advancing the case of autonomy and control for the users. Voice argues that "making people able to use" a technology should not be the end goal for designing a technology, rather we have to make sure that each person, regardless of their way of use, is enjoying equal service and autonomy in the system. Much of this challenge may not be purely technical, and we may need to focus on the policy, law, education, and social context for that. However, this is still an important issue that needs to be seriously considered in the accessibility-related research of HCI. For example, a few days ago, New York city installed a good number of road-side kiosks to provide free internet to homeless people and passers-bys. The objective of this design was to make internet freely available to the people who could not afford it due to its high cost. However, in practice, it was found that very few homeless people were using those kiosks for browsing the Internet or consuming any service. Rather, many people who already had other means of Internet were taking the advantage of the free wifi. A deeper investigation revealed that homeless people were not using Internet because they did not find anything interesting for them on the Internet (other than pornography in some cases). This incident has revealed why it is not always enough to make technology only technically accessible in order to get people participate. Users need their desired services, and they need

to know that their opinions are being heard and valued equally; and only then can we expect them to fully participate. This is how voice extends the work on accessible computing and thus democracy and participation. In short, voice aims to add important elements to the ongoing research in participatory design by offering a socio-technical framework that will allow more people to participate, increase the quality of their participation, and make people accountable for their actions.

A procedural problem in Participatory Design has been described by Andy Crabtree, that the distribution of work and mode of collaboration and participation is often dependent on the party that is designing the participation [68]. For example, if we consider democracy to be a participatory system, the way citizens participate in the making decisions in a democratic government needs to be designed by somebody. For example, in most countries in the world, voting is the mode of citizens' participation. However, citizens often elect their representatives and those representatives talk for them. So, participation is not always 'direct'. The process of electing representatives is also different in different countries. Citizens can only follow the suggested method of 'participation', which in many cases, does not represent the true essence of the idea of participation. Bodker and Iverson have opined that in most cases, 'participation' has hence become just a 'tag' to feed the fascination of scholars to involve people [46].

One aspect of this procedural challenge of participation is that, at some level, there should be some task of organization that needs to be agreed upon by the participants. A related challenge is to determine who those participants are. At this level, the design of participation again becomes a question of access

and voice. For example, in many participatory design processes, participation requires having a minimum level of education or skills (example, Wikipedia), which limits the participation by 'others'. Andy Crabtree has proposed ethnography as a way to address this problem [68]. According to Crabtree, ethnography does two important tasks for participatory design - a) offers a better understanding of participants' capability, values, and involvement with the problem, and b) makes designers a part of the community. As a result, instead of making participants enter into a 'third space' [203], the designer enters into the world of the participants. As a result, all the questions around 'who will participate' and 'how they will participate' eventually shifts position from the designer's end to the participants' end.

If we look closely at the proposal of Crabtree to approach the procedural challenge of participation, we find all three major components of our voice framework. For example, while handling the case of access, Crabtree cancels the idea of setting any standard by the designer. Instead, he advocates for allowing participants 'as they are'. Second, the mode of participation is determined by the values and practices of the participants, and not by the designer. This means the participants, as a community, design the method of participation. Third, the responsibility or accountability of the design is distributed between the designer and the participants according to the community's norm, because participation takes place according to the values of the community. However, Crabtree's model requires the community to be aware of the problem and the challenges of participation. Also, in many contexts, there is no defined 'designer', and the question of "who will participate in a project and be part of which community" becomes a complex question to answer. In such cases, there needs to be a polyvocal platform where the values of the designers and the com-

munity can co-exist. We believe that the concept of voice that we are advancing through this article should contribute to that kind of participatory system.

The framework of voice can further contribute to both understanding and improving participatory design. For example, although Crabtree has advocated to align its participation strategy with local practices, he has not taken into account prior discrimination and injustice embedded in the practices of the participants. As a result, participation may be hampered due to the bias embedded in the 'local process', but the broad framework of voice can handle that challenge through accountability. Thus, we believe that the framework of voice can significantly contribute to the research in participation in HCI by strengthening the idea of access, autonomy, and accountability.

3.2 Politics related work in HCI

The third paradigm of HCI has sought to go beyond designing systems that interact with individual persons, or a group of people who are the direct users of a system. Rather, this paradigm has called for thinking about the role of computing holistically in the society. At this point, various big concerns of today's world - including environmental injustice, gender inequality, poverty, climate change, and other aspects of social and political unrest - have started to enter the discussion. In such situations, HCI needs to develop a rich set of values, tools, and techniques to connect computing with these debates. Our definition of voice provides HCI with theories, methodologies, and technologies to advance these political agendas.

A significantly large portion of political research in HCI has recently been

conducted in the area of 'critical' or 'adversarial' design (see [272, 78, 79, 120, 159, 222, 87, 134, 29, 28, 82], for example). The term 'critical design' was first coined by the artists and designers, Anthony Dunne and Fionna Raby [89]. They took the idea of 'defamiliarization' from Literature, and used that in the design practice to offer an alternative meaning of a familiar object. For example, the very electric bulb that we use in our everyday life may have a very pleasant impression on our mind. However, the same bulb can be viewed as a way of burning energy and leading us toward a risky future, which often remains invisible to us. Now, exposing that 'unfamiliar' side of the electric bulb is the task of critical design. This design strategy is often considered to be an effective tool for creating 'consciousness' in people. So, the very essence of this design is the idea that defamiliarizing a taken-for-granted idea around us creates an alternative conceptualization of a problem in our mind. For example, an infographics of how much time we spend on Facebook may help us understand the negative side of Facebook, which may not be very apparent when we use it.

Sengers and her colleagues have considered critical design as a tool for creating contextual awareness, which includes 'political awareness' among people [272]. In their design recommendation, critical design provides users with both education and information about the politics that are often embedded in the world we live in. That way, critical design essentially creates a dialectic conversation between the designer and the user, and brings to the fore the political economy of 'use' through critical interpretations. The 'political' part of critical design is hence constructed (mostly) around the creation of awareness and equipping users with the information, network, and courage to raise their voice.

Later Shaowen and Jeff Bardzell and their colleagues advanced this idea of

critical design within HCI by widening the scope of interpretations for design [30, 26]. For example, taking the feminist standpoint of situated knowledge [29], they have challenged any single interpretation of a design that a) can be determined before use, and b) can be generalized among people. Their argument thus makes the objective of design a fluid and ever-changing agenda. This is a significant departure from Sengers, Dunne, and Raby's initial arguments where they hold designers responsible for the outcome of a particular design, and position critical design as a 'dialectic conversation' between the ideologies of the designers and the users (in most cases).

Bardzells and their colleagues have also put forth the argument that the objective of the design should be judged based on the intention of the designer, and not entirely on their outcomes [26]. Their argument is hence similar to what Rawls and Sen have argued in their definition of justice. While the design outcome may be interpreted differently by users in different ways, the designer should only be held responsible for the design intentions that they had while designing (Rawls), and should be judged based on the informed 'choices' that they had (Sen). For Bardzells, hence, the objective of critical design is to reject any ideological hegemony, and not to replace one with another. Their conversation with Sengers, Dourish, Paulos and some other early proponents of critical designers has focused on the question, 'whose design'? in HCI once again - which actually resembles a kind of debate that the disciplines of Art and Literature have been carrying for thousands of years now. However, we note here that, through these debates, all these scholars have shown us ways how people can challenge a value system that has been imposed upon them through design. This idea of resistance is essentially aligned with the spirit of voice.

Carl DiSalvo later defined the term 'Adversarial Design' to provide a broad umbrella to any design that attacks any value, norm, law, or rule [78]. DiSalvo's central thesis is based on Chantal Mouffe's work on 'agonistic politics' that we have discussed earlier. DiSalvo has argued that the multiplicity and polyvocality that is inherent in a liberal democratic practice cannot be executed without a fair platform for confrontation. Based on this assumption, DiSalvo concentrates on the design that is ideologically biased. As DiSalvo defines the function of 'adversarial design,' it 'paves the way for dissensus, contestational relations and experiences through made designed artefacts and its expression. It is therefore biased and takes divisive positions.'

Hence, any design that is critical to any ideological position, rules, or law can also be defined as adversarial design, but the umbrella of adversarial design goes much beyond that. DiSalvo sees agonism as the building block of politics, and agonism can be expressed through confrontation, satire, criticism, or even breakdown. While critical design follows a rational path of criticism, DiSalvo's adversarial design does not require that rational path. Instead, adversarial design is open to emotional or purely ideological points of view. Hence, the actions that can be taken under adversarial design are not always bounded by a rational boundary of criticism, or the procedural boundary of defamiliarization or reflection.

Besides these works on HCI design theory, there are many examples of political design that have demonstrated how people fought against discrimination and oppression with the help of technology. For instance, 'FireChat' [45] is a mobile phone application that became popular in Hong Kong during their pro-democracy protest in 2014. This mobile application circulated protest-related in-

formation, news, opinions, and instructions among the protesters. This app was also used for recruiting protesters and organizing demonstration. 'I am getting arrested' is another application that allows the protesters to quickly disseminate the news of their arrest among the fellow protesters and thus fuel the spirit of the protest [103]. 'iHollaback' [77] is a mobile phone application with which women can take pictures of a sexual harasser and shame them online. Besides these, some general applications are also used for organizing and strengthening the protests all around the world. For example, Twitter played a significant role in the Arab Spring [128]. Facebook and Twitter posts contributed a lot in engaging Bangladeshis to organize the Shahbag movement in 2013 [130]. UStream has also been playing a significant role in fueling up protests by live broadcasts of important events [70]. All these technologies are helping people to organize and fight against their opponents.

One notable feature of these political designs in HCI is that they have an assumption of liberal rights, autonomy of speech, and a minimum level of personal security. For example, the whole idea of criticism requires the security of the person(s) who is (are) criticizing. This assumption may not hold in many places outside the Western World. For example, in Saudi Arabia, China, and Zimbabwe [171, 182, 114], the average person is not allowed to criticize the government. In Bangladesh, India, or Pakistan, although people are technically allowed to criticize the government, they almost always have to pay for their criticism [287, 9]. In such circumstances, the whole idea of criticism and confrontation may not work at all. However, political design in HCI is not all about criticism either. A notable exception is 'persuasive design' (B. J. Fogg) that adopts different strategies to convince people to agree on one's argument. Although the most typical use of persuasive design is in 'habit building' [95], the

underlying idea of persuasion can be extended to change the emotional bias of a person through different mechanisms. In the Political Science and International Relations, we find persuasion to be an important political tool for countries to achieve their political and diplomatic goals [57]. So, politics does not only mean going into direct conflict or criticism, but also there are several other ways politics can be conceptualized and voices can be advanced. However, both the language of criticism and persuasion is very much dependent on the context, and these and many other political strategies need to be situated in their context. The objective of voice is to provide users with all such options to choose from and customize according to their contextual needs. Hence, the framework of voice advances the politics-related research in HCI by expanding its boundary beyond the the Western world, and incorporating different political contexts.

Another thread of politics-related work in HCI examines and exposes the politics embedded in different technologies. The idea here, in some sense, is similar to that of critical design which 'defamiliarizes' a technology by revealing internal politics. However, this thread of work in not always focused on designing a product, but often gets into direct criticism of the process, algorithms, technology, and policy related to a technology by exposing their biases. Much work in this line of research is often published under the banner of 'ethics in HCI'. HCI research in ethics has recently started getting much attention, mostly as a criticism of Artificial Intelligence, Big Data, Machine Learning, and International Development, among others (Irani, Sengers, Bruckman, Fiesler, Barocas, Burrell, Guha, Baumer, Brubaker). This thread of research has shown how computer technology often relies on the data or ideologies that are inherently biased toward some privileged group of people. For example, Solon Barocas, in his work has demonstrated how big data algorithms are destroying our privacy

[290]. Similarly, Lilly Irani has reported how the Western ideologies inscribed in computing technologies often have a negative impact on local people in the Global South [133]. Such studies are based on grounded data, observation, field studies, and case studies that reflect various biases in the computing systems, and these scholars have stood against such systematic discriminations.

This thread in HCI is also vocal about the morality of computing machines, like computers or robots. For example, researchers have been trying to find a way to answer the Trolley Problem in the context of driverless cars (Joshua Greene [105], following the earlier work of Ludwig Wittgenstein [72] on the impossibility of symbolic determinism). Some researchers are trying to get around this problem by 'crowd sourcing' morality. Iyad Rahwan of MIT Media Lab, for example, is asking the 'crowd' to answer whether the car should kill one fat person or five regular people. However, Nassim Jafarinaimi has recently shown how such a venture of making the machine 'moral' by solving a 'game' is both ethically problematic and dangerous. The base of Jafarinaimi's argument is the feminist idea of situated ethics [115]. She has argued that the answer is different for the person who is about to be killed (or their relatives) than the 'crowd' who are not supposed to be related with the victim. Considering a person as 'an unnamed individual' has turned the life-and-death question of moral ethics into a game for the computers, as Jafarinaimi has criticized. Her argument has clearly demonstrated why it is important to listen to the right voices when making moral decisions. Her argument has not made the task of deciding any easier, neither has she suggested any design interventions. But she has essentially pointed out reasons why we should be focusing on voice. In an hypothetical scenario with the Trolley Problem, if every stakeholder could put their judgment into the car's fair decision making system - the overall judgment could

be better. However, whether such cars should be allowed to run on the road is a question for a higher level discussion that may not be solved by this. So, our point here is not to support or criticize Jafarinaimi's argument regarding this case. We join with her in saying that the incorporation of all voices for all stakeholders is essential for making HCI more ethical.

Next, while criticisms like Jafarinaimi's have revealed the systematic biases in many computing systems, they do not suggest how we might design a fairer system. Even analyses of historical data demonstrate a paucity of data about underprivileged communities. Even in the contemporary world, it is hard to get data from people in these underserved communities. This absence of the voice of marginalized people has created a big challenge in making computational systems ethical. The objective of voice is to make those marginalized people heard by the public. That way, discrimination in a computing systems will not only be revealed, but the designers in HCI community will also get access to more knowledge in order to develop computing technologies into a fairer system.

Voice as a value encourages polyvocality, multiplicity, and fairness. Voice advocates for diminishing discrimination and treating everybody with equal respect. Voice stands against any singular standard, objective, or ideological method of judging a concern. Thus, voice provides HCI with a tool that can install justice in a technical system, which is especially important for people in disadvantaged communities. HCI and related disciplines have recently been interested in understanding the role of computing technologies in improving the quality of life for people in developing countries. The framework of voice can help this thread of HCI research in understanding not only the flaws in ex-

isting technologies in order to accommodate the needs of marginalized people there, but also the broader impact of technologies in the international development. Similarly, the concerns of different marginalized groups, including women, refugees, LGBT communities, and differently able people, are highlighted through voice. Voice not only addresses a particular aspect a person's political rights, but also ensures that they achieve complete political autonomy. Thus, voice provides HCI with a broad umbrella to bring together all its initiatives to end discrimination, support marginalized groups, and advance HCI's movement toward fairness, justice, equality, and sustainable development.

3.3 ICTD related work in HCI

The discipline of Information and Communication Technology and Development (ICTD) has long been advancing the agenda of voice with the help of technology. The discipline was started in 2006, inspired by the need to address the lack of voices from the Global South in the design and development of information and communication technology around the world. Since that time, this discipline has put forth an agenda of global access, open and free use of technology, social justice in historical and social contexts, and the politics in sustainable development - issues that sit at the core of the ides of voice. In the following paragraphs we will explore some of the major works in ICTD around these topics, and their relationship with voice.

First, access has been one of the central issues of ICTD research since its beginning. Research on access can be divided into two different subareas in ICTD - (a) building inexpensive technologies [183], and (b) building technologies for

low-literate people [185]. These two subareas address two major challenges in advancing digital technologies to most resource-scarce areas in the world. ICTD engineering research has advanced tremendously in the last decade, and the cost of mobile phones and other computing technologies has come down significantly [15]. More than 80% of the land areas in the world are now 'digitally connected' [158]. Networks have become cheaper [6]. Also, the basic feature phones have become very cheap. They, accompanied with secondhand and refurbished mobile phones, allow many poor people to access to mobile technologies [12]. While most use mobile phones for basic communication, other services are being popular, too. For example, transferring money through mobile phones is a now a very popular service in most countries [135]. People are also getting information about health, weather, agriculture, and government notices in different places in the world [6].

At the same time, Internet has also become very cheap in most areas in the world [62]. The burgeoning growth in the use of cheap smartphones around the world has enabled a large number of people to benefit from using Internet [62]. Today, more than 2 billion people are using Facebook around the world and majority of them are using Facebook on their mobile phones. Besides using social networks, people now use Internet for other services: to search for information, email communication, and entertainment [285].

The second subarea of ICTD works toward making technologies more accessible for low-literate people. Low-literacy is a common challenge in advancing the services of digital technologies to the Global South. ICTD researchers have approached this problem in two ways. First, a group of researchers in Microsoft Research India [cite] have used graphical user interface to replace the text on

the screens of mobile phones [288]. The idea is very simple: since low-literate users struggle to interact with text, their interface allows them to interact with pictures instead. However, it turns out, it is not very easy to convey all the information needed to operate a mobile phone via a small number of pictures that low literate users can memorize. Also, there are challenges in recalling information based on images. The second group of researchers [cite] have approached the same problem using audio commands [275]. They have tried to replace the text with audio. This interface is similar to an audio assistant like Siri, Cortana, Alexa or Google Home - but with limited capability. The problem here is that low-literate people still need to know what they need to say to get the phone do something. They also need to memorize some audio commands. Another challenge for the phone is to understand the accents of low-literate people, which are not always standard. Because of these challenges, making digital interfaces accessible has remained as a challenge till now.

Besides this, some research undertaken in developing countries has tried to make technology accessible for people with physical differences [216]. For example, Vashishtha et al. have developed an audio forum for the blind people in India [293]. Chakraborty et al. have built a digital braille system for blind people in Bangladesh [56]. Similar works have also been done in other developing countries. All these attempts have tried to make digital technologies more accessible to all.

If we look closely at these initiatives, we find two major issues. First, while these initiatives focus on the technical aspects of technology, they do not focus much on its social aspects. As a result, while technology is becoming functionally accessible, it is not often accessible by marginalized communities for many

social and cultural reasons. For example, in many places in the Indian subcontinent, women are not allowed to use mobile phones [85]. In some place, they are only allowed to use mobile phones if their parents or husbands allow it [284]. Also, several studies have reported that women's use of mobile phones and technologies are often under surveillance by their husbands and parents in many countries in the world [81]. In such situation, the functional accessibility may not be of much use if the technology fails to address the challenges of access in a social context.

Second, in many cases, the access offered to people in underserved communities is limited. They get access to only the information that other people want them to have. For example, rural farmers are often given access to information on weather, agriculture, health, and government notices - which assumes that they will only need that kind of information [220]. This assumption has often been proven wrong. For example, in 2015, Wikipedia was made freely accessible through a mobile network in Bangladesh, on the assumption that marginalized people would use Wikipedia to learn new things. However, it turned out that most of them used the free space of Wikimedia to upload movies to share with others. Similar examples have also been found in many other places around the world. The second problem is that in most places people are allowed to consume information, but they are seldom allowed to add their opinions or voices to the system. As a result, 'access' has often become a unidirectional channel of information flow.

As an example ICTD project in the last decade, let us take the celebrated project, 'Avaaj Otalo,' in India by Neil Patel, Tapan Parikh and their colleagues [220]. The objective of this project was to make agricultural information avail-

able to farmers. Indian farmers, in many places, were not introduced to various important knowledge about agriculture. They did not know which fertilizer would be the best for which crops, or which tweak in their agricultural methods would hugely increase production. They were also not aware of weather forecasting. In 'Avaaj Otalo', farmers could ask experts their questions (both agricultural researchers and experienced farmers), who would then directly answer their questions. At the same time, the platform would send them important information regarding crops and weather from time to time. This project was a huge success in India, and even now a lot of farmers in India are using this service.

The second example we take is from Bangladesh, a project called 'MAMA Bangladesh' launched by a NGO called DNet [14]. This project helped the pregnant women and new mothers to take care of themselves and their children. In Bangladesh, the rate of child mortality is high, and a big reason is that parents are often unaware of healthy childbirth processes and the proper health care for a child. To address this issue, this project would register pregnant women to their system who used mobile phones. The system would call the women routinely and ask them to do certain tasks like take medicine, attend a regular checkup, or exercise. The women could also call the system and ask questions. This system proved to be very effective in making women aware of healthy practices for childbirth and child rearing. This project is still operational in Bangladesh, and in some other countries around the world.

Both of these two aforementioned projects have had tremendous success in bringing positive changes in the lives of many people in the developing countries. They are addressing some of the most critical challenges of our time re-

garding health and foods. Technology is playing a vital role here by providing people with information. Yet while these are undoubtedly praiseworthy initiatives, they still lack the kind of voice we are concerned about. These projects support people in their functional needs, users re blindly trust the system, and they have little power to question or challenge the system or complain against it. Hence, these projects follow a 'paternalistic' approach, which is often problematic. These systems are only opening a one-directional channel of information and defining the marginalized users as potential 'consumers' of those services. Also, 'what is good for them' is being decided here by people outside their community. Padma Chirumamilla and Joyojeet Pal have called such projects into question from the perspective of autonomy [61]. They have questioned the right of technology developers to set the standard of good or bad through functional means. They have accused these kinds of systems of bringing in a foreign standard and thus disrupting local harmony. They have also seen such interventions as a way of imposing foreign values as 'better' than local ones. To combat this, they have proposed the idea of 'ludic design' where the objective of a system is not to provide some selective functional help to people, but to make all services available for them to either use or not use. They have built on Amartya Sen's 'development as freedom', and argued that development should not only be defined by material progress that can be measured through any standardized tools and techniques, but should also be conceptualized by the degree of freedom people enjoy.

In the same spirit, a couple of recent technologies built in developing regions, focus on enabling the general populace to raise their voices. For example, CGNet Swara [202] is a mobile based platform for India where everyday people can call a number and file a complaint. The list is then circulated among

other members of the same community for verification, up votes, down votes, and comments. This platform has opened a channel through which anyone can express their opinions about irregularities, corruption, propaganda, and other modes of oppression by the government. Despite several challenges from the Government and many other powerful institutions, this service is still successfully running in India, and has collected thousands of complaints from local people around local services [175]. Similar services are more aligned with the idea of community radio, which is also a form of circulating local information among local communities. In many cases, people share information, music, jokes, and stories on these platforms. Gram Vaani [195] is an example of one such voice platform.

While these technologies are notably different from the 'information only' platforms that we have mentioned before, and they are bringing grassroot voices to the fore, they also have a number of limitations. First, not everybody in a developing country has access to technology, nor is everyone allowed to use technology freely. As a result, not all voices come to the fore. Also, Ahmed et al. [10] have reported that women are not often allowed to talk about their problems publicly due to social stigma. As a result, although these platforms are technically allowing everybody to raise their voices, only a few privileged people in the community are taking the advantage of it. Second, such technologies are often under strict surveillance, which limits their functionality. For example, in Bangladesh the government now tracks citizens' use of mobile phones, using biometric markers [9]. As a result, if a person says something against the government, although the system will keep their identity anonymous, the government can easily track them down. Consequently, people are often less interested in sharing their original feelings on these platforms. Third, it is basi-

cally pointless to raise a voice if that is not heard. As seen in many developing countries, the opinions of the general populace are often ignored, and no appropriate measures are taken about their complaints. As a result, people are often less interested in raising their voice, and hence such platforms often become futile in the end.

So, we can see that the field of ICTD has made some significant progress in advancing the voice of marginalized population around the world, but their work has been challenged by several social, cultural, and political reasons. While the technical challenges around making computing 'technically' more accessible to people has made some notable advancements, technology is not yet free and welcoming to everybody's voice. Many people around the world are not free to raise their voice through or around technology. Furthermore, fake news and false propaganda are floating around, reminding us of the need for accountability for each voice. This is where a comprehensive framework for voice is required. People should have the technical and social autonomy to raise their voice against injustice and discrimination. Their voices need to be protected against any power. At the same time, people also have to take responsibility for the consequences of a voice they raise. This accountability also needs to be ensured through a sound integration of technology that accommodates different competing voices and allows them to coexist in the society.

To conclude, voice essentially provides a framework that connects HCI with political philosophies both through values and design. The objective of this connection is to make HCI more useful for underserved communities around the world by reducing discrimination and marginalization. Voice also contributes to strengthening the ethical aspects of HCI by bringing in different political frame-

works for multiplicity and polyvocality. Taken together, voice offers itself as a way for HCI to expand and extend its domain toward justice and fairness. In the following three chapters we will study three HCI studies that reveal different kinds of challenges when building a platform for voice.

CHAPTER 4

SUHRID: A COLLABORATIVE MOBILE PHONE INTERFACE FOR LOW LITERATE PEOPLE

(This project was done in collaboration with my colleagues in Bangladesh and the USA, and the results were published in ACM Symposium on Computing for Development (DEV), 2015 in London, UK. Full citation can be found here [7].)

4.1 Introduction

Making technologies accessible to low-literate users is a longstanding challenge for ICTD researchers and practitioners. The rapid growth of mobile phone penetration in the developing world in the last two decades has driven important change across many aspects of life, from education and health to political participation and the informal economy. However, low literacy has limited these impacts, especially among poor and marginal populations; therefore helping low-literate users reap the benefits of mobile devices is an increasingly important question in ICTD research. Previous work in this area has attempted to overcome this problem by using non-textual interfaces that incorporate graphic and audio based commands and content. While these efforts have shown benefit, they also face important limits, including the need for additional computational support from the device, which may not be available in low-resource environments, and the technical and cognitive abilities of users interacting with icons and audio commands. As a result, the design of an effective phone interface for low-literate people remains an ongoing challenge. Our work is built around a shift in perspective about the use of 'personal' devices like mobile phones from an individual model to a more communal model, in which users

figure not as atomized individuals, but as nodes within wider social networks that can be drawn on to overcome barriers that literacy poses to technology use. Prior studies in ICTD have shown that technology use in developing and low-resource contexts is frequently collective or distributed in nature, with the use of technologies like mobile phones shared among the user's family, friends, and other community members [53, 229]. Intermediate use of technologies is similarly prevalent; several studies have shown that low literate people often take help from digitally literate people close to them for operating their own mobile phones [218, 230].

At the center of intermediate use lies the practice of 'help" by able members of the community. We see an opportunity to leverage this practice through a community-sourced model that connects low-literate users to higher-literacy remote peers in their immediate network to both accomplish tasks and strengthen social bonds. In this chapter we present a design intervention that exploits the social values and practices of a community of rickshaw pullers in Dhaka and their intermediate use of technologies to provide low-literate members access to their basic mobile phone operations. Our previous ethnography on the same garage informed us of the intermediate use of mobile phones among this community. Based on that and an additional focus group study, we designed, developed, and deployed Suhrid, a phone application that allows the rickshaw pullers to remotely get help from their garage owner for placing phone calls and saving contacts. A six-week field deployment of Suhrid with 10 rickshaw pullers showed that it effectively helped low-literate users make better use of their phones. More generally, we argue that Suhrid shows the potential of designs that leverage shared and intermediate use in contexts where such use is common.

4.2 Related Works

Literacy has long posed important challenges to mobile phone use among poor and marginal populations. In their 2006 paper, Chipchase et al. documented various ways illiterate people used mobile phones [60]. Their study showed that some functions (e.g., turning the phone on or off, accepting incoming calls) were easy for the users, while other functions (e.g., sending text messages, finding contacts from the contact list) were more difficult. Furthermore, understanding and responding to basic information about the phone (e.g., remaining battery power, network connectivity, incoming text messages) was often challenging. These problems often led to confusion, mistakes, embarrassment, and non-use. A number of mobile handset vendors worked to address these problems by providing audio and visual clues for battery alerts, network connectivity, text messages, and so on [32]. However, problems related to operations like finding contacts from the address book and placing calls remain.

4.2.1 Designing for Individual Phone Use

A common design response to problems of literacy is to develop interfaces that use less text in order to reduce literacy requirements. For instance, icon-based interfaces have been used to support low-literate or illiterate populations of Indian village women [101], domestic laborers [187], and farmers [188], while audio interfaces have been developed for low-literate Pakistani health workers [274] and Indian farmers [220]. Color has also been used with some success to help low-literate users with address books [301] and phone contact lists [142]. A more detailed review of such design work can be found in Medhi [288]. These

approaches face a number of practical challenges. For iconbased interfaces, removing text doesn't necessarily remove usability problems. Besides the difficulty of finding icons that make sense to low-literate users across a range of social and cultural contexts, hierarchical presentation of icons may fail due to cognitive challenges stemming from unfamiliarity or misrecognition of hierarchical orderings of information [184]. For audio interfaces, the users still need to remember the audio commands and their hierarchy. Such speech interfaces are also more error-prone than touch or graphical interfaces [220]. A common characteristic across each of the abovementioned design strategies was the assumption that a single user would use the device. This assumption leads to designs focused on communicating with that single user through graphical signals or audio clues; such designs depend on the individual user's memory and skills.

4.2.2 Communal Model of Technology Use

Individual use is not the only use model; a growing body of ICTD work has demonstrated that social use is common in low-resource contexts. For example, Burrell's ethnography in Ghana revealed how technologies like land-phones, computers, and televisions were shared among the members of a community [53]. Rangaswamy et al. found a similar sort of shared model of technology use in Mumbai slums [229, 230]. In the case of phones, the devices are not only shared between people, but also often used with the help of others, especially in the case of low-literate individuals. Parikh and Ghosh have discovered that low-literate Indian women take help from field workers to communicate with microcredit providers [218, 219]. Sambasivan et al. have reported the practice

of helping in informal setting for operating mobile phones in India [29]. Kumar et al. have pointed to the network of actors beyond individual users supporting the consumption of mobile phone services in India [155]. Our previous work has shown how illiterate rickshawpullers in Dhaka, Bangladesh depend on literate social peers to support and access basic mobile phone operations [12]. This communal model extends to the systems of maintenance and repair by which devices and wider infrastructures are sustained in low-income environments. Work by Jackson et al. [136, 137] and Houston [126] with mobile phone repairers in Namibia, Bangladesh, and Uganda has shown the significance and extent of the local and global networks of materials and knowledge that sustain mobile phone use in many developing countries. These studies connect in turn to ideas from Mauss' classic anthropological work The Gift, which has shown the centrality of networks and rituals of gift-giving and mutual support as a central feature of social life across a wide range of cultural contexts [180]. Drawing on Mauss, we argue that the essence of gift embedded in technical help produces and reciprocates honor, respect, and trust among the members of a community. This spirit is often hidden under the layers of official technical support infrastructures in the developed Western world, revealed only once those supports fall short [226]. Without such infrastructure, that spirit is more visible in developing countries through the shared and intermediate practices around technologies. Thus, asking for help in these contexts may be less of a burden or something to be avoided and more an integral part of community practice that allows people to provide gifts and thus strengthen bonds. Collectively, these sources have led us to think differently about the site and nature of mobile phone 'use', forming the starting point for the collaborative use model that underpins our design intervention. In addition to collaborative use, we are also committed to

collaborative design with specific target communities, both practically and ethically. A body of ICTD literature has pointed out the limitations of designing technologies in developing countries due to the lack of material infrastructures and resources [6], and the challenges of setting up new ones [121]. Here, involving the existing social infrastructure and community practices may transfer some responsibilities from technologies to the communities. Further, working closely with communities can lead to new design opportunities; Bellotti et al. have argued that designs that leverage the altruistic nature of human behavior should not only facilitate an extended access to different services through a shared economy model, but also create fields for newer technologies [33]. However, long-term engagement with local communities through ethnographic techniques is required to understand the social infrastructure, cultural values, and community practices. This sort of long-term engagement points to another central challenge of ICTD research, which has a long history of short term research projects that have often failed to respect (and thus, meet) the needs of specific contexts [73].

4.3 Research Context

Our current study was done with a community of rickshaw pullers in Dhaka, Bangladesh whom we studied through a six-month ethnography [12]. Here, we review key elements of the context from that study to help situate the current work. We conducted our study in Kamrangirchar, a small area in Old Dhaka with many rickshaw garages. Usually the owners of the rickshaw garages buy the rickshaws and rent those to the rickshaw pullers on a half- or whole-day basis; the particular garage that we studied had 73 rickshaws, and Dhaka has a

huge number of people (almost all male) who earn their living through rickshawpulling. This livelihood is not a wealthy one: after paying rent to the garage owner the daily income of a rickshaw puller in a day ranged from 300 Taka (US $3.80) to 800 Taka (US $10), and this is in the lower tier of the society. On average, the rickshaw pullers are also in a lower educational range in society. Most of the rickshaw pullers dropped out of primary school, while the rest never went to a school; often this was because they had to help support their families [286]. None of them could read or write a complete sentence in any language. They were familiar with Bangla and English digits, but they could not read numbers when two or more digits were put together. Thus, these rickshaw drivers are a largely low literate population. Still, the use of mobile phones is very common among the rickshaw pullers, mirroring general trends of increased phone use among lower income residents of Dhaka over the last five years [58]. Our previous study revealed that all of the rickshaw pullers had their own mobile phones. Most of those mobile phones were Java-enabled China-made devices costing between 2,000 Taka (US $25) to 10,000 Taka (US $120). Many of them bought their mobile phones from second-hand markets or mobile repair shops at a savings of about the 50% of the original prices. The rickshaw pullers reported that they would spend around 20-30 Taka (25-35 US cents) per day using their phone. Basic functions such as making calls and saving contacts were not easy for the rickshaw pullers because reading and writing contact names and numbers requires literacy skills, and although they tried workarounds described in the design goals section below, these often led to frustration. In practice, they would often get help from their garage owner. Although the garage owner was not educated in formal schools, he had basic literacy skills, and as a tech-savvy person, owned several models of

smartphones and had used a variety of other phones. His literacy and technical knowledge, combined with the social and economic connections between him and the pullers, led the garage owner to be a primary support for the pullers in using their phones [12]. He also arranged for electric power supply, outlets, and phone adapters in the garage so that the rickshaw pullers could recharge their phones while resting. We chose this particular rickshaw puller community because of the fit with our condition of low-literacy, the use of phones, the social structure of help giving, and our convenience to reach and study them. All the members of our team who worked in the field were affiliated with a local university close to the garage. All of them were born and brought up in Bangladesh, and speak Bangla like the rickshaw pullers.

4.4 Surhrid

We turn now to the design of Suhrid (Bangla for 'a good friend'), an application to support the low-literate rickshaw pullers in getting help from their social connections for two basic operations on their mobile phones: 1) placing a phone call to a contact and 2) saving a contact. We first discuss the major design goals and constraints that arose from prior work and our own interactions with the garage owner and pullers, then how the design and implementation of Suhrid supports them.

4.4.1 Focus Group and Design Goals

We conducted four focus group discussions at the garage in the evening, when the rickshaw pullers were usually back from their work. The number and identity of participants were not the same in each discussion; rickshaw pullers who were present in the garage at those times and were interested in discussing joined, leaving in the middle if they had work to do. However, there were almost always at least six pullers present in these discussions, along with the garage owner. We discussed with the rickshaw pullers questions around the length, purpose, and patterns of their mobile phone use. Participants were not paid for their participation in this round of the study; however, food and drink were supplied during our discussions. The discussions were audio recorded with their permission, and later transcribed in Bangla and translated into English. Two members of our team coded the discussions independently; their findings were matched in a group discussion among the team and the main themes were extracted. All of our rickshaw puller participants reported that the two main tasks that they did with their mobile phones were placing and receiving phone calls.

They shared their difficulties in finding a contact from their contact list. They said they often tried to memorize the contact numbers by face, sometimes they tried to remember the position of a contact in their list, and so on. These processes often did not work well, and they ended up choosing the wrong person to call. Then they became embarrassed after talking to the wrong receiver, and sometimes they decided not to place a phone call to avoid this embarrassment. They also wasted money when they placed phone calls to wrong numbers. The rickshaw pullers also reported that they often struggled to find ways to save a

Figure 4.1:
A focus group discussion at the rickshaw garage. The garage owner (wearing a cap) participated with seven other rickshaw pullers in that session. (The picture is taken and shared with proper permission of the people in the picture. The faces are blurred for anonymity)

new contact on their phone. Sometimes they used punctuation symbols to remember the contact associated with a given number (e.g., "# is for Mr. Choudhuri; ## is for Mr. Mitra"), but then later forgot. They also found it difficult to save a number from their dialed, received, or missed call lists. They said they usually took help from their garage owner for these tasks. The garage owner also agreed that he often helped them for these. However, they informed us how they struggled when they were away from their garage. All the participants opined that a mobile phone application that could help the rickshaw pullers to remotely get that help from the garage owner would help them. An immediate design challenge was the functionality of the mobile phones that our participants were using. Since most of them were not using smartphones, and they used a variety of devices, it was difficult for us to design a single interface. However, one of the rickshaw pullers suggested that many of them were

thinking to buy smartphones soon. The rest agreed, sharing their experiences of using smartphones owned by friends or relatives. We shared that designing on a smartphone would be easier for us. We showed our own smartphones to them, and briefly gave them an idea about the interface. They all expressed their excitement about having an application for them in a smartphone. We asked them if smartphones would be affordable for them. They showed us the costs of some of the Java enabled phones that they were using, and some cheap Chinese-branded smartphones in the market, and argued that the differences would be minimal. They further argued that the better quality of the pictures and video on a smartphone would rationalize the additional cost they would bear. Based on their recommendation, we decided to design an Android phone application for helping the rickshaw pullers reach their helpers when they were away from them.

4.4.2 Interfaces

Suhrid has two interfaces, one for the low-literate users ('seekers') and one for the help providers ("helpers").

Based on our findings, we emphasized the two basic phone operations that the rickshaw pullers needed the most: placing calls and saving contacts. Both our own work and previous studies show that lowliterate people often get confused with too many icons in the interface [184]. Hence, on the seeker's side, Suhrid starts with an interface with only two icons (Figure 4.2, left). The top icon was for sending a request to place a call and the bottom icon was for sending a request to save a contact. The rickshaw pullers chose the icons during our group

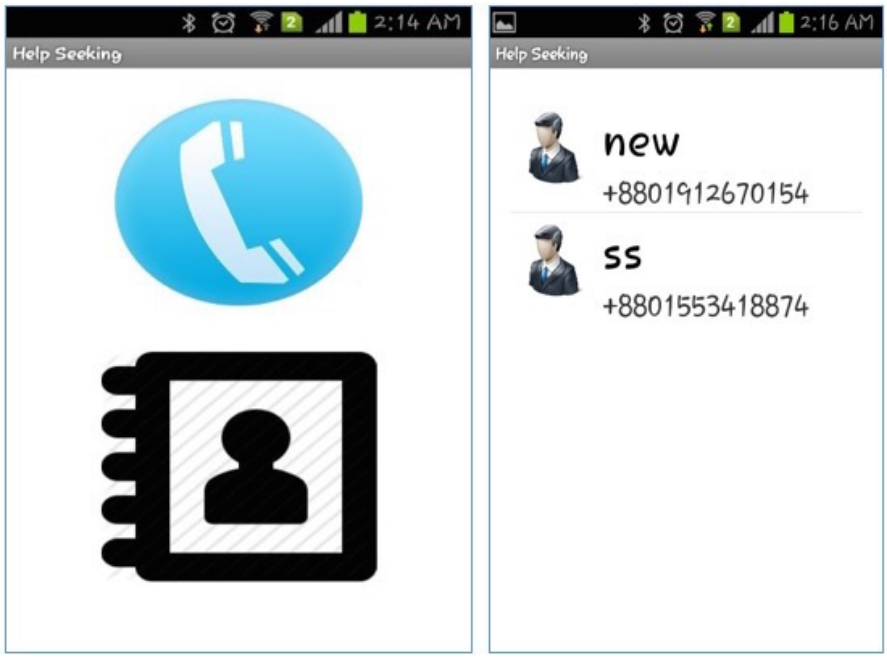

Figure 4.2:
The first version of UI for low-literate rickshaw pullers. (Left) The interface for selecting if they wanted to place a call or save a contact. (Right) The list of helpers. In both cases the goal was to minimize the number of elements on the screen and the need for literacy skills.

discussions. After choosing one of these two icons, the next screen appears with the list of helpers (Figure 4.2, right). We used comic fonts in that interface to give that an informal and friendly look. Touching a helper's name would place a call from the seeker's phone to that helper's phone through Suhrid. On the helper's side, Suhrid displayed the list of seekers subscribed to that helper (Figure 4.3, left). On choosing any seeker, Suhrid would show a list with five entries: a) contact list, b) missed calls, c) dialed numbers, d) received calls, and e) an option to add a new contact to the contact list (Figure 4.3, middle). If the helper chose any of these, he could see the corresponding list. However, our previous study showed that some rickshaw pullers were concerned about the privacy of their contacts [12]. It also reported that the rickshaw pullers would often re-

member the contacts by the last three digits of their phone numbers. So, we left the last two digits visible to facilitate referencing the correct phone numbers between the seekers and the helpers, but hid the rest of the number to increase the pullers' confidence that the numbers would be private (Figure 4.3, right).

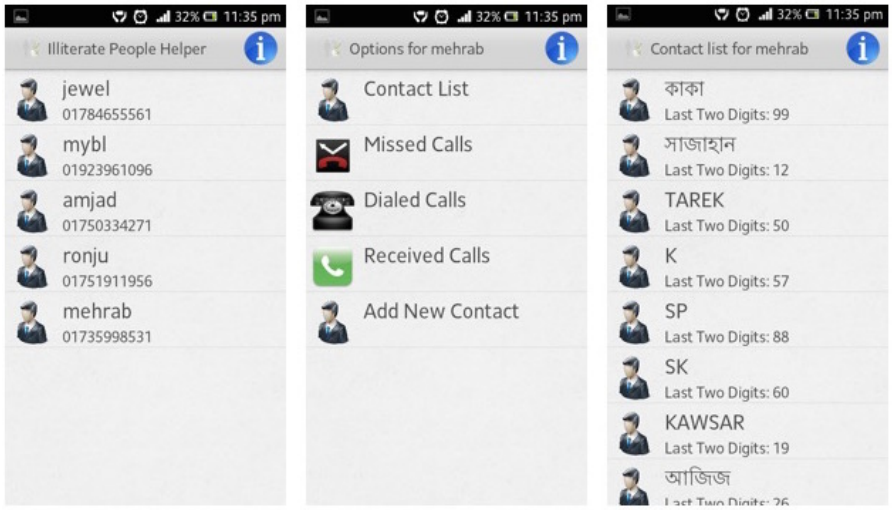

Figure 4.3:
Three screenshots of the helper side interface. On the left, the list of seekers subscribed to this helper. In the middle, the contact list, lists of missed, dialed, and received calls, and an option to add a new contact to the contact list. On the right, the contact list of one of the seekers, showing only the last two digits of the phone number to address privacy concerns.

4.4.3 Functions

Seeking help

We found in our field study that rickshaw pullers would only get help from the people they knew. The garage owner was also interested in helping the rickshaw pullers because he knew them. Hence, we chose a system that paired

people who knew each other (versus an anonymous crowdsourcing model). In Suhrid, the pairing up could be done by adding a helper on the seeker's interface and adding a seeker in the helper's interface. Since this task needed some competency with the mobile phone, we assumed that the helper would do this task when they were co-present with a seeker they agreed to pair up with. For seeking help, the low-literate user needed to open Suhrid on their mobile phone, select whether to place a call or save a contact, and choose the helper from the list. If it was the first time the seeker was calling the helper through this application, then the list of incoming, outgoing, and missed calls, and the contact list would be sent from the seeker's phone to the helper's phone. If it was not the first time, then the system only sent changes of these lists since the last time they contacted that helper.

Placing calls

If the seeker requested help for placing a call to somebody from their contact list or from dialed, received, or missed call logs, then the helper could easily find that on his interface and find the appropriate name. The helper would choose that contact and the application would send that number to the seeker's phone. The seeker's application would receive the number and place a phone call from his phone after getting a confirmation from the seeker. This way, the low-literate people could place a phone call to anybody they wanted.

Saving contacts

If the seeker asked help for saving a contact to their contact list that could also be done in a similar way. The seeker could request to save a number from their dialed, missed, or received calls' lists, or could just tell the helper a phone number to save with a particular name. The helper could find the number in one of the lists, or just simply type it on the software screen. After getting the number, the helper could save the contact with the appropriate name into their local copy of the helper's contact list. Suhrid would then send a message from the helper's phone to the seeker's, which the software would intercept and use to update the contact list on the seeker's phone. This way, the new contact would be saved in both phones.

4.4.4 Implementation

The application was built for Android-based smartphones using Java. To avoid the need for an Internet connection, communication between the mobile phones was done through text messages. For example, when the seeker's phone needed to send the contact list to the helper's phone, the application on the seeker's phone would compose a formatted text message putting the contacts' names and mobile phone numbers one after another. This message was often long, and the system needed to break the message down to several text messages for sending. On the helper's phone, the application would receive these messages one after another, and re-construct one single message. Then the application would parse that message to extract each contact and make a contact list for the seeker in the helper's phone.

4.5 Usability Evaluation

After developing Suhrid, we conducted one laboratory study and two field level user studies to understand the usability of this application. We made necessary changes to Suhrid based on our findings in these studies.

4.5.1 Laboratory Study

We invited the rickshaw pullers and the garage owner to visit our university in order to introduce them to our system formally and to see if they had any difficulties in using it in the lab. The session was two hours long, and each of them was paid 800 Taka (US $10), which was equivalent to a puller's earnings for their whole day and also satisfied the garage owner. There were three reasons behind this session. First, we had enough smartphones in our laboratory so everyone could use one. Second, they were interested to see the laboratory and how we work. Third, we believed that this session helped us develop a better relationship with our participants.

A total of 12 rickshaw pullers and the garage owner came to visit our laboratory. We also invited four undergraduate students to help in this session. The demonstration session was conducted in Bangla and lasted for three hours. We first lectured them about the use of a smart phone and then we showed them its basic features. To provide them first-hand experiences we divided our participants into four groups, each consisting of three rickshaw pullers and one undergraduate. Each group was given a smartphone to play with and the undergraduate, who was an expert smart phone user, helped them.

First we briefed them how to use the 'touch' action to operate the smartphones. Participants picked up the basic operations (touching instead of pressing buttons, turning a phone on or off, etc.) very quickly. We then demonstrated Suhrid. After that interactive session, the participants were allowed to practice the use of our application. To mimic the real-life scenario, their helper, i.e., the garage owner, was taken to another room so that he could not verbally communicate with the participants, but could communicate with them through our application.

All 12 rickshaw puller participants were told to ask the garage owner through Suhrid for help in placing a phone call and saving a contact. Five of them could perform both of the tasks in the first attempt without any help. The average time they took to place a call was 40 seconds, and the average time for saving a contact was 1 minute. Four of them forgot the process, so our team members helped them remember. Three of these four participants could complete both of these tasks after the reminder. The remaining person needed instruction one more time. The other three participants performed the calling task twice; apparently they misunderstood our instructions. However, when we explained the task again, they could perform both tasks in the first attempt.

After the tasks, we asked them about their general impression about Suhrid. All of them expressed their excitement around it. They said the reason why some of them had initial difficulties was because both smartphones and the application were new to them. We then asked the garage owner about his experience. He said that he enjoyed the whole process, and praised the software.

4.5.2 Field Level User Study, First Round

Although the rickshaw pullers and the garage owner performed satisfactorily in the lab, and expressed their satisfaction in using the application, we wanted to understand if that would be reflected in the context they spend most of their time. So, the next week, we conducted a field level user study at their garage with 10 of the 12 participants who attended our demonstration session. We tried to replicate a similar situation of help-seeking there. We made sure that the garage owner/helper couldn't communicate verbally with the participants and that other rickshaw pullers present in the garage did not help them either. As before, we paid each participant the average income of a whole day.

Call generation

Each participant was asked to generate three phone calls to numbers saved in their phonebook. Three of them hesitated in the beginning as they thought they might break the expensive smart phones by their inexperienced use. However, when we assured them that no such thing would happen, they started using the smartphone. Five rickshaw pullers succeeded in all three trials. The other five made mistakes in the first trial, but succeeded in the second two trials.

The first trial of call generation took on average 45-50 seconds including the time to press the call button, select the helper, talk to the helper over the voice call, and receive the response from the helper's application. Both the participants and we considered this time much longer than the usual time one takes to place a phone call to somebody. According to our observations and their feedback, inexperience with touchscreens, lack of confidence, and confusion of the

'save' icon with the "call" icon were the main reasons for this delay. The average time for successful call generation was eventually reduced to 30-35 seconds in the next two trials, which the rickshaw pullers considered good enough.

Contact saving

Next, we asked each of our participants to save a random contact number or any unsaved contact number from their call history using Suhrid. Like before each of them attempted the test thrice. This time, their confidence using the touch screen seemed to have improved. However, only three of them were successful in all three attempts. Two participants failed in all three attempts. After the test they explained that the low success rate in contrast to the call test was mainly due to their confusion with the two icons in the interface, struggling with differentiating the functions of two graphical objects, one for "calling" and the other for 'saving a contact'. This observation matches with Medhi et al.'s claim about the weakness of low-literate people in handling the cognitive load associated with graphics [288, 186].

Field Level User Study, Second Round

In our next round of design, we responded to these problems by removing the initial interface for choosing a service on the seeker's UI. Upon opening the app, the list of helpers would appear immediately (Figure 4.2, right). On selecting the helper, a call would be generated to the selected helper. The seeker would then tell the helper whether he was trying to call somebody or save a contact. The helper then would use the appropriate lists through Suhrid (Figure

4.3, middle) to find the number. Upon selecting the number, Suhrid would offer the helper an option for either making a phone call or saving that number in the contact list. We made the necessary changes in the application according to this design, and then conducted another round of field level user study at the rickshaw garage in Kamrangirchar two weeks after the first round. We used the same 10 participants, setup, payment, and task that we did in the first round.

Eight out of 10 participants were successful in all three attempts on both tasks this time. The other two failed in in one attempt each. One of them ran out of credit in the middle of the process while the other one asked the helper to help him call to a number that had not actually been saved in his phonebook. In one case the helper mistakenly saved a different number from the call log, so we repeated that test and the rickshaw puller succeeded. The overall remarks of the participants were overwhelmingly positive. One participant commented,

"Just one click and some other person does the job from another place! I don't have to do anything!! It will be a great help for me if I use this phone. Not only for me, but also for every low literate and illiterate people will be happy to use this application."

4.6 Deployments

After the success in the second round of field usability testing, we decided Suhrid was ready for a real deployment to understand better how Suhrid would help this rickshaw puller community. The rickshaw puller participants were chosen based on their interest to participate in our study, which lasted six weeks. Ten smartphones were given to the pullers and two other phones were given to the garage owner and his brother who would work as the helpers. All partic-

ipants kept the smartphone as compensation. The garage owner and the rickshaw pullers recommended the owner's brother as a second helper. He would often come to the garage and help them in operating their mobile phones the same way the garage owner did, and was willing to participate in the deployment and able to operate Suhrid. So, in the helpers' list on Suhrid, each of the rickshaw pullers had the number of the garage owner at the top followed by the number of his brother.

The lists also had a third number. We were curious about whether people would take help from strangers when their normal helpers weren't available, in the way that some crowdsourcing applications such as VizWiz [42] enable people to get help from strangers. To do this, we recruited two freelance workers, students of a local university from outside the rickshaw puller community. After talking to both the rickshaw pullers and the freelance workers, it was decided that the rickshaw pullers would pay 2 Taka (3 cents) each time they asked the freelancers for help. The rickshaw pullers were clearly informed that they would have to pay when they would seek help from these freelancers. Each freelancer was assigned to be the third and final helper for half of the rickshaw pullers.

To evaluate Suhrid, we collected three main sources of data. First, we collected usage data through a text message Suhrid sent each time a rickshaw puller asked for help that included the seeker, helper, and the time. We received permission from our participants to collect these data. Second, at the end of six weeks, we went to the garage and interviewed each of our participants about their experiences throughout the deployment period. These interviews were audio recorded with the participant's permission and conducted in

Bangla. The average length of the interviews was 30 minutes and participants were given 200 Taka (US $2.5) each as compensation. Finally, we invited the rickshaw pullers to our university guest room one more time. This was both a focus group discussion and a formal conclusion of the study. All of the participants were paid 800 Taka (US $10) for this two-hour session. We did not invite the garage owner and his friend this time to allow the rickshaw pullers to express their experiences freely. Instead, we had a separate group discussion with the garage owner and his brother at the garage.

In both of the focus group discussions we asked them about their experiences of using Suhrid. Those questions included if they had any difficulties in using Suhrid, in which situations they used Suhrid, if they got help whenever they needed, what their experiences were around the freelance workers, why their usage of Suhrid declined over time, and if they had any other issues with Suhrid. The transcription, translation, coding, and resolution processes were the same in this round as before.

4.6.1 Results

The interviews and focus group discussions revealed a number of important aspects around the use of Suhrid. Participants described the ease of using the software, its value and availability, and the appreciation it gave them for the giving of help between them. They also expressed concerns about privacy and reluctance to take help from the freelance workers, as well as the gradual decline of their usage of Suhrid over time.

Ease

All seekers were satisfied with the ease of using Suhrid. One of them said,

"This software is very easy to use. I didn't find any difficulty while using it. See? Here is the icon I had to press to call the Mahajan. And if the Mahajan is not available I press the second number." [Mahajan means the "The big person". Here he referred to the garage owner. The second number was his brother's.]

The helpers also found Suhrid easy to use. The garage owner said, *"When you first gave me the software I understood the full functionality. Here is the list and I can select any of them and see the list of the missed call, received call and their phone book. It's very easy to use."*

Availability

Suhrid also provided the seekers valuable services and help, sometimes at critical times. As one participant said,

"I was at the hospital for a checkup of my father and I needed to call a doctor. Another person saved the number, I remembered the name by which he saved it but couldn't find it. It was an emergency. I called the Mahajan and asked him to dial the number for me. He did and I talked with the doctor."

The seekers shared how Suhrid helped them by making the helper available in the contexts they needed. One participant said,

"Normally when I get out of home to go to Mahajan I forget by the time for which reason I went there. So, most of the time that doesn't help me. But with this software

I can easily call him and ask him to save a contact for me. Sometimes it takes time but work gets done."

Seekers almost always got help from their helpers, first trying to get help from their garage owner, then the owner's brother. In only five cases, they could not get help from either of them. In three such cases, they took help from the freelance workers. In the remaining two cases, they stopped trying.

Reluctance to Take Help from Freelancers

The seekers expressed their lack of interest in receiving help from the freelance workers. All of them said that they did not need to call the freelancers because they had almost always got help from their garage owner. Also, they reiterated that help should come from people they knew. One of them said,

"I don't feel comfortable asking help to somebody I do not know."

Once he said that, the rest of the participants agreed, saying, "yes". One seeker who took help from one of our freelance workers said,

"Although I took help from him, I never asked him how he was doing. It was only regarding help. I only called him for help nothing else. He was always my last option for help."

Improving Communal Bonds

In contrast to their experience with freelancers, both the seekers and the helpers reported that using Suhrid with people they knew strengthened their commu-

nity feelings. The concentration of help requests on the garage owner and the brother was not a concern to them; both reported that they had enjoyed their task. We asked them if the number of incoming helping requests ever bothered them. The garage owner said that he always had his mobile phone with him, and the time and efforts it needed to help one was not overwhelming to him. However, he also mentioned that he could not respond to couple of calls as he was busy in saying prayers.

All of the rickshaw pullers reported that the availability of their garage owner all the time helped them realize how much care the garage owner had for them. One rickshaw puller said,

"Now I realize how caring he (the garage owner) is. You cannot help somebody like this if you do not care for them a lot."

The garage owner said that the relationship between him and the rickshaw pullers improved because of Suhrid because now they were taking help even after leaving the garage. He said,

"It is great to come closer, and to make them understand how a well-wisher should be. Now they know better how much I care for them. You can see the added respect in their words these days."

Gradual Decline of Usage

Despite the value people drew from using Suhrid, its use declined over time. In total, it was used 63 times over the span of six weeks (Figure 4.4). The number of requests sought for placing a call was much higher (41) than for saving a

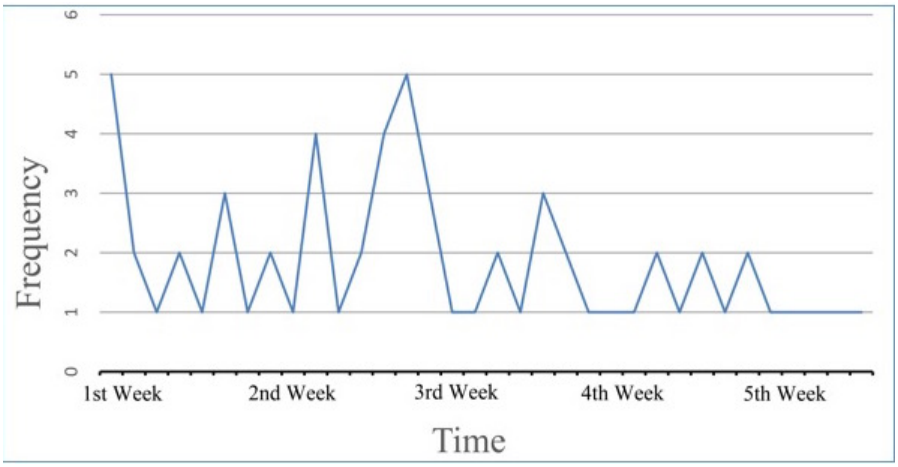

Figure 4.4:
Daily usage of Suhrid during field deployment. Use of Suhrid was higher in the first few weeks, then declined.

number (22). Among the 63 requests, the garage owner received 46, his brother received 14, and the freelancers received 3.

Participants informed us that usage declined because initially they had to take more help to save the new contacts, so the number of requests was high. Also, they often call the same numbers, which they learned to call themselves after taking help once or twice. Then they would only take help whenever they had to call a new number or a save a new contact. Furthermore, they still often took help from the garage owner in person when both were in the garage together; Suhrid was mainly useful when the puller and owner were not in the same place.

Concerns

The seekers also shared several concerns around Suhrid. One of them complained that our software damaged his mobile balance. He said,

"I had 50 taka in my mobile when I called Mahajan but when I finished talking to him, I noticed after some time that my balance is zero. I was confused." (50 Taka is approx. US $0.6)

Later, we discovered he had not turned off his mobile phone after calling, and that caused a big deduction from his balance. Another seeker wondered about the privacy of the contacts saying,

"I didn't understand how the garage owner was able to call my wife through my phone. And how did he save contact numbers in my phone remotely Was the number saved in his phone too?"

We explained to him why it would not be possible for the garage owner either to know the phone number or to place a call to his wife. He seemed to be satisfied with our explanation.

4.7 Discussion

The design, development, and deployment of Suhrid generate a number of immediate lessons for better designing a UI for lowliterate people, and some larger lessons pertinent to problems of design in the context of developing countries.

First, our study supports previous findings around the struggle of lowliterate users with hierarchical presentation of information on graphical interfaces [184]. The confusion that arose in the first field study with the selection interface went away with the removal of that screen, suggesting the value of minimizing hierarchy in the interface. The fact that the rickshaw pullers struggled with even two icons on the selection screen, but were able to sequentially

navigate through the list of three helpers, may indicate that low-literate users might be better at memorizing the relative positions of contacts than the interpretation of symbolic icons.

Second, our study suggests that privacy management is important in designing shared-use interfaces. Contact information can be confidential and the privacy associated with different parts of contact information is dependent on the users' interpretation. The fact that rickshaw pullers used the last three digits of phone numbers to identify contacts had to be respected in our design: showing only two digits balanced the needs for communicating between helpers and seekers while respecting seekers' perceptions of privacy. A related sensitivity concerned asking for help from people outside the community. We found our participants preferred to get help from another person in their own community over somebody from outside. This particular finding may suggest limits to more generic crowd-sourced solutions, and encourage future researchers to weigh local sensitivities before advancing crowd-based responses to local use challenges in such contexts.

Third, like many other technologies for developing countries, Suhrid demonstrates how cost influences design choices. The community, according to their cost-benefit analysis, rationalized the choices of the Android platform and text-based communication. The credit in the balance that was spent for a typical use of Suhrid, including both the call itself and the text messages sent in the background, was around 70 to 90 paisa, or about one US cent, for the seeker and 30 to 40 paisa for the helper. Although we reimbursed participants in the end for all the text messages Suhrid generated during the deployment, in general participants would need to pay for Suhrid themselves. Thus, we asked our

participants if this expenditure would be heavy for them. They all considered this expenditure justified for the service. One participant said,

"A rickshaw puller is not as poor as you think. I usually spend 500-600 Taka for my mobile phone every month. And I would be happy to spend 1-2 Taka if I could get my purpose served with remote collaboration." (500-600 Taka is approx. $6-$7, and 1-2 Taka is approx. 2 to 3 US cents)

Fourth, we observed that the low-literate rickshaw pullers started learning the contacts while taking help from Suhrid. While explaining the gradual decline of the usage, they mentioned how they could recognize the old contacts from their memory and they only needed help for the new contacts. They said they could recognize the faces of the contact names or numbers. This finding suggests that such a help system might also eventually educate and empower individual users over time. This gradual decline in help-seeking also suggests that their cost for using Suhrid would likely decline over time as well.

Beyond the lessons for immediate design, our study indicates a number of bigger concerns for ICTD. First, our study showed that extending the reach of help strengthened the relationship between the rickshaw pullers and the garage owner. The garage owner expressed his satisfaction to be able to come closer to the rickshaw pullers because of Suhrid. Likewise, the rickshaw pullers praised the garage owner for helping them in important times through Suhrid. Thus, beyond its immediately instrumental effects in extending effective use among low-literate populations, Suhrid performed a secondary but no less important role in strengthening and reinforcing local social relations, notably relations of respect and trust between the garage owner and rickshaw pullers. This finding echoes in modest form Mauss' classic finding around the importance of mu-

tual aid and gift giving as a central and indeed constitutive moment of social life [180]. If the goal of ICTD work is to empower and support not only users but also the wider networks and communities of which they are a part, design options that leverage and extend core features and principles of sociality itself ought to figure more prominently in the field.

Second, our study demonstrates the importance of anchoring design interventions in longer-term programs of ethnography and community engagement. Unlike emphasizing scaling up "one size fits all" technologies, we ground our designs in the values, norms, and practices of a particular community through our engaged field work. This helped us address many nuances of design that would be otherwise difficult to find out. For example, decisions like using the Android platform, remote help, revealing only two digits of phone numbers, or communicating through text messages came out of the users' values and practice.

Third, our deep engagement with the community helped relax the power differences between the designers and users, and opened up opportunities for designing technologies with their participation. The rickshaw pullers often discussed with us other problems of their life, along with a range of ideas towards solutions. For example, some rickshaw pullers joined a co-operative society where they needed to pay regularly, and they needed help to determine and remember saving from their everyday income. We are now working with them towards technology solutions that may help with this goal. While such long-term and locally responsive models of community engagement may limit the 'scaling up' of single technologies to wider social and cultural contexts, they suggest new opportunities to design multiple, appropriate technologies for the

same community–opportunities that may extend the depth, impact, and responsibility of ICTD work. They also demonstrate the kind of long-term commitment to places and individuals that may serve as a partial antidote to the kinds of "research tourism" [73] long identified and criticized in ICTD work.

4.8 Conclusion

In this chapter, we have described the design, development and deployment of our community sourced mobile phone interface for a low literate rickshaw puller community in Dhaka. Building on our ongoing ethnographic work, Suhrid seeks to leverage and extend existing distributed practices of technology use to overcome literacy-based barriers to mobile phone use within our target population. We involved the members of the community in each step of our design process, and conducted two rounds of field level user studies to refine our design. Finally, we deployed Suhrid for 6 weeks and conducted a post-deployment user study through interviews and focus group discussions to understand its successes and limitations. Our study generates a number of lessons the use of icons, privacy, and cost-benefit negotiation in designing such collaborative interfaces in developing countries. Furthermore, we present our arguments supporting the potential of gift-based design and long-term engagement in ICTD works.

CHAPTER 5

PROTIBADI: A PLATFORM FOR FIGHTING SEXUAL HARASSMENT IN URBAN BANGLADESH

(This project was done in collaboration with my colleagues in Bangladesh and the USA, and the results were published in ACM Conference on Human Factors in Computing (CHI), 2014 in Canada. Full citation can be found here [10].)

5.1 Inroduction

The sexual harassment of women is an extensively investigated and intensively treated social problem around the globe [221, 227]. It occurs in multiple forms and locations, from domestic violence inside the home to more generalized patterns of harassment in public places. Street harassment constitutes a form of sexual discrimination and violence that includes verbal and nonverbal behaviors ranging from whistles, leers, and winks to unwanted physical contact, catcalls, and sexually suggestive remarks [143, 213]. The experience of street harassment undermines women's security and well-being along with freedoms of choice, action, and participation in public life that are core to the basic civil and political rights of every human being [48]. It also has potentially important group-level effects: by limiting or discouraging access to public space, street harassment can serve as an additional mechanism by which women's voices and participation are silenced. While much literature and media attention has focused on more extreme forms of sexual violence (rape, domestic abuse, etc.), a growing body of work [92, 143, 194] suggests that the chronic and pervasive effects of street harassment can be just as damaging to women's security, freedom, and participation in public life.

Because the causes, effects, and basic cultural understandings of street harassment differ radically around the world, it is hard to reliably estimate its prevalence or effects. This is particularly true in locations like urban Bangladesh, where interpretations of sexual harassment are diverse and highly contested, and where few reliable mechanisms for the reporting of street harassment exist. According to local crime reports, 4,853 incidents of violence against women took place in Dhaka from October 2011 to September 2012, including 993 recorded incidents of rape. This almost certainly vastly understates the problem however, as anecdotal evidence from local newspapers [12], international media reports [36], comparative experience and our own ethnographic work suggests that incidents of sexual violence are routinely underreported, perhaps especially in the pervasive culture of shame that surrounds such incidents in Bangladesh. Indeed, many of the forms of street harassment targeted here are not considered crimes and reportable to Police in the Bangladeshi context. But these incidents can make a very deep psychological and social impact upon the victims, and can lead to isolation, depression, and even suicide, as found in a recent study by Nahar et al. [204]

Designing technology-based interventions services for a developing country like Bangladesh is often challenged by limited public access to electronic devices and the Internet, as previously reported in the ICTD literature [50, 172]. In recent years however Bangladesh has seen one of the fastest growing cellular networks in the world, with more than 96% of the population now under mobile coverage. The number of Internet users is also growing fast, the largest portion of whom use cell phones to access the Internet [2]. This suggests that mobile phone based applications might contribute to ameliorate deep-seated problems of gender violence, discrimination, and inequality in Bangladesh today. In this

chapter, we report our experience in designing and developing mobile phone and web-based applications to support women experiencing and fighting street harassment in urban Bangladesh. We also reflect on broader challenges confronting HCI efforts to understand and design around difficult and culturally sensitive problems in the gender and ICT for development space.

5.2 Background and Literature Review

A growing body of HCI work has explored the nature of computational practice and design in non-western and postcolonial contexts. Much of this work – identified sometimes under the HCI for Development (HCI4D) or Information and Communication Technology for Development (ICT4D) labels – has followed an interventionist and design-oriented agenda, seeking to apply new computational tools and approaches to a series of social problems (poverty, hunger, inequality, governance, public health, etc.) confronting targeted programs of social and economic change, often in "developing country" contexts. In many instances, such interventions target widely shared and relatively uncontroversial collective goals (even where preferred avenues to change may vary). As a low cost and increasingly prevalent system of communication, mobile phone technologies have been central and promising players in many of these interventions, supporting a wide and growing range of design interventions targeted at the problems of vulnerable individuals and communities, ranging from urban sex workers and taxi drivers, to homeless young people and farmers [75, 221, 220, 119, 250, 303].

But these early forays have also revealed, sometimes by tripping on them, a

number of distinct challenges facing design-based HCI work in this space. "Universal" principles of design may turn out to be anything but conflicting with locally held aesthetics, metaphors, and assumptions [176]. Taken for granted infrastructures ranging from reliable power supply to stable systems of law and governance may be absent, undermining design or project-level efforts [78]. Expectations around user or community engagement may differ, dictating new modes of engaging local actors. And the fault lines and divisions of local culture and power may be misunderstood, leading to non-adoption, suspicion, or simple indifference to HCI design and system-building efforts [133].

These complexities only multiply when the matters of collective concern at the heart of HCI interventions are themselves unsettled and subject to ongoing processes of cultural negotiation, contestation, and dissent. Under such conditions, HCI work confronts a deeply agonistic field in which basic cultural propositions are being worked out in conjunction with the design and use of tools and systems themselves, and the deeply value-laden nature of HCI intervention emerges with particular force and clarity. As discussed later, this complicates the process while raising the stakes of ethnographic fieldwork and design, and poses challenging questions around the positionality of HCI research and researchers vis--vis the worlds they engage.

Such insights are central to a growing body of theoretical work in the feminist [3, 6, 18] and post-colonial [133] HCI space, along with several of the specific design methodologies (e.g., adversarial design [78]) meant to reflect and accommodate these principles. As this work makes clear, design and ethnographic interventions often (always?) occur against the backdrop of cultural currents that run deeper than our typical instruments for producing understanding and

explanations of the world we engage can plumb. This fact becomes all the more true as we move towards interventionist modes of engagement, and towards spaces of deep cultural contestation and dissent. Responsibility in this space cannot be discharged or avoided behind a simple instrumentalist stance. Nor can it be decided by reassuring reference to a world of user or system needs decided "out there," according to reliable and uncontroversial social processes from which we remain somehow disconnected. Rather, the fields of feminist and critical HCI4D are likely to occupy fundamentally agonistic spaces, in which HCI researchers are necessarily implicated. In such a world, the principles of pluralism, participation, advocacy, embodiment, self-disclosure and ecological awareness characterizing feminist and many post-colonial research stances become simultaneously more important and more complicated to practice [28, 133, 143].

Beyond such theoretical insights, our project also learned from design-based HCI interventions that have sought to deal with problems of gender violence and discrimination through the development of systems and applications designed to improve women's safety, security, and freedom of movement in public space. Work by Satchell et al., for example, has investigated the potential for mobile technology to help users manage their personal safety concerns in the city at night [253, 252]. They found that mobile devices may provide users with a sense of security and real time protection via connectivity to closely colocated persons, and that mobile social networking systems are not only integral for bringing people together, they can help in the process of users safely dispersing as well.

Other works have sought to raise awareness around problems of public sex-

ual harassment similar to the ones tackled here. One such initiative is "Hollaback!" [16], an initiative to raise awareness through grassroots photoblogging and public documentation of harassment (and harassers). Through the system, now operating in 25 countries and in 12 different languages, users post photographs and narrative accounts of individual encounters with offenders. Another noteworthy initiative is "Harassmap" [14], a volunteer-based initiative with a mission to end the social acceptability of sexual harassment in Egypt. In this system, women can report of any harassment they experience or observe around them through mobile phones or the website. There are still other mobile applications that have been built to offer support to victims or potential victims of sexual harassment. For example, the app "Circle of Six" [63], allows women to call friends with pre-programmed texts, which can alert them in real-time to problems or incidents that may be occurring. "On Watch" [25] forwards a GPS coordinate to friends if a situation goes bad.

Our study builds on these insights and design approaches while extending them to problems of public sexual harassment in Bangladesh. The texts that follows describes our efforts to understand the forms, prevalence, and experiences of public sexual harassment in urban Bangladesh. We communicated with university-aged women through written and online questionnaires and face-to-face interviews and focus groups in order to better understand the prevalence and impact of public sexual harassment, and source the women's own ideas about possible systems and applications that might help. On the basis of this input, we designed "Protibadi" (a Bangla word meaning "one who protests"), a system that allows women to quickly inform emergency contacts when situations of harassment occur, document the location and nature of incidents, and enter descriptive blogs and narratives that share the experience of sexual harass-

ment in a collective way. We conclude with reflections on distinctive challenges confronting HCI research and design interventions around culturally sensitive problems in the gender and ICT for development space.

5.3 Field Study

We began our work with a three-part field study designed to develop a better understanding of the prevalence, severity, and consequences of sexual harassment among female university students in Dhaka. Our choice of university women was dictated by three basic factors. First, most of them had access to technology like mobile phones and Internet, and so were more obvious first targets for an experimental system that made use of such tools. Second, in large part because of their education and socioeconomic standing, university women in Dhaka are often more attuned to problems of gender discrimination and sexual harassment, and more receptive to systems that combat it. Finally, as the inclusion of university-educated women in public life is often identified as a step towards gender participation and equality more generally, their exclusion from public space and participation through instances of harassment may be particularly insidious and damaging to the broader goals of gender equity and participation in public life. The decision to focus the study in this way poses obvious limits to the generalizability of the findings and designs that result. We hope to address these through additional study and future iterations of the system.

5.3.1 Online Survey

At the outset of our study, we wanted to develop a broad understanding of the forms and prevalence of sexual harassment as experienced by our target group. We made and circulated a small online questionnaire for university students asking if they had any direct or indirect experience of being harassed in a public place, and if they had witnessed such events. The participants could respond to this survey anonymously. We shared the link to this survey through the Facebook groups of three different universities and requested students to participate in the survey. We received 121 responses, including from 51 women and 42 men (the remainder did not disclose their gender). Following the survey, 7 women and 2 men contacted the investigators individually and shared additional information via email, telephone conversation, or face-to-face meetings. Every female respondent reported direct or indirect experience of being harassed in public places, with 32 saying they had experienced such harassment more than once. All of the participants said that they had seen women harassed before them in public places. Broken down by location, 72 participants reported incidents of harassment that took place in public vehicles (e.g., buses), 21 reported harassment while walking on public streets, and 30 reported incidents that took place in public gatherings such as rallies or concerts. All of the respondents identified public sexual harassment as a common and damaging experience of contemporary life in urban Bangladesh. As one woman wrote,

"You will hardly find any Bangladeshi girl who traveled on the streets and has not experienced sexual harassment. Some women are brave enough to talk about it, while others remain silent for many reasons."

Another respondent explained the impact of such activities:

"Everyday I walk in the park. My mother often comes with me but at a much slower pace. When I am alone, some boys at the park laugh at me, tease me. I say nothing. I want to keep walking. Sometimes I can ignore them, sometimes I cry alone at my room. It's not my dress? I wear a hijab (Islamic head scarf), it's just me being a female."

5.3.2 Focus Group Discussion

Next we arranged a focus group discussion conducted by a female faculty member at one of our three participating universities. To organize this, we sought help from a volunteer organization named "Community Action", which issued invitations to female students at the three universities to participate. The discussion took place in a closed room in one of these three universities. Thirteen women participated in the focus group, which lasted for about three hours.

The women in the discussion shared their difficulties and deep feelings of anger and vulnerability around sexual harassment, and identified three public situations in which they found themselves most vulnerable: i) public buses, ii) crowds in markets and concerts, and 3) lonely or isolated places after dark. Although it was an oral discussion, some women found it too difficult to speak about these experiences, and preferred instead to write them down, which were then handed to the female faculty member who was conducting the discussion. One of the women, for example, shared the following experience:

"The more I was moving towards the window in a public bus, the more that man beside me was pushing me with his legs and then he put his hand on my lap. I asked him to behave several times. He was not listening to me and was pushing me more and at that point, I slapped him."

The women described not only how badly they were treated in public places, but also spoke about painful incidents in which relatives or friends had harassed them. This brought out strong feelings of shame, sadness, and regret, but also defiance, anger, and a strong resolve towards change. As one participant explained,

"My mother taught me to stay quiet. But I will ask my daughter to carry a knife."

5.3.3 One-on-One Interviews

Next we conducted semi-structured interviews of women at the three universities. Due to participant sensitivity, the interviews were conducted in private in the offices of female faculty members associated with the study. The interviewers asked the women about their understandings and experiences of sexual harassment, and their priorities for any design intervention that might address such problems. Participants were invited through paper flyers posted on university notice boards, and through advertisements at different student groups on Facebook. A total of 11 women responded, 9 opting to speak with the faculty member at their own university and 2 requesting an interviewer from a university other than their own.

Ten women participated from two of the three universities, five from each. Only one woman participated from the third university before the study was halted there for reasons described below. In general, however, participation was low across all three universities. Many women responded and set up a time for the interviews, but did not show up. In some cases, the women came and started talking to the interviewers, but then became uncomfortable and left

in the middle of the interview. In such instances and at the request of the participants, notes and recordings were destroyed and no further record was retained. In one case, two women came together and one helped the other to tell her story. In some instances, participants refused to be audio-recorded, so the interviewers took hand-notes. In one case, a participant agreed to be interviewed and recorded, but asked that recordings and notes from the session not be shared with male members of the study team. All such requests were honored, and recorded interviews were subsequently translated, transcribed and analyzed by two independent coders, both of them native Bangla speakers.

Our participants offered different definitions of sexual harassment, some very broad and others more precise. One participant explained for example that

"By "Sexual Harassment" I understand any sort of activities or words that force me to feel that I am a girl even before I am a human being. It can also be true for boys, too. In these cases, we get a stronger feeling of being "boys" or "women" than being human beings. When these feelings are created inside me in a negative way – that is sexual harassment."

In contrast, another participant defined sexual harassment simply as, *Physically abusing someone without permission.*

The participants shared stories of harassment that they had either experienced themselves or had directly witnessed. The public places where such incidents had occurred included public buses, crowded concerts, crowded market places, lonely streets, and while riding on rickshaws. The harassments ranged in form from catcalls, leering, staring, ridiculing, and making faces, to incidents

of following, stalking, and touching. All of the participants said that there was no single time or place that they could mark as absolutely safe, though eight of them mentioned feeling more insecure in dark and isolated places. However, they all said that harassments are very common at crowded places.

Many participants described both immediate and enduring sense of fear associated with experiences of public harassment. One woman, for example, shared the following story:

"The incident happened while I was returning home. A boy blocked my way. He then started talking about some big brother who liked me. So, he was not letting me go. Then, I slapped him in the face. He also raised his hand on me. It was near the Penaung restaurant. I quickly left the place and returned home. I almost ran half of the way. Later I made a General Report at the police station about this incident. But I didn't see those guys afterwards. After this incident, I always took rickshaw on that route, as I had to cross that place to reach my university. So, I stopped walking and always took a rickshaw after that incident."

Others spoke of the feelings of powerlessness that harassment produced. As one participant recounted,

"My parents used to escort me to my school. So, I didn't notice any particular teasing or harassing incident when my parents were around. But then I started going to college by myself. Sometimes, I noticed some boys were singing at me. The songs were intended to me in a bad way. But there was nothing I could gain by challenging them. Noticing them would only give them more importance."

Beyond the immediate pain and difficulty caused by these experiences, women also reported direct and negative consequences on ability or willing-

ness to navigate public spaces following the incident, whether self-chosen or imposed by family members. As one participant explained to us,

"It definitely causes confinement. If something happens to you then you will want to avoid those places afterwards. Like the incident that happened to me during shopping ... I do not want to go there again in order to avoid those incidents happening again. Besides, it is really very irritating to take the local buses. And going outside after 9pm/10pm is really impossible."

While all of the participants reported feeling better after having shared their experiences with others, they also described deep embarrassment, anguish, and senses of shame attached to the telling of their stories (including with family members and sometimes friends); this sense of shame and embarrassment was indeed described as one of the most serious and pervasive consequences of the sexual harassment experience (and contributes directly to public silence and underreporting of the issue as described above and returned to in the discussion section below). One participant told us that;

"I shared these stories with my family only a long time after the incident. After one and half year ... I could not share that much with friends either because I was not sure how they would think about me after hearing these. But finally I had to share these with one of my friends, because I wanted to live my life."

5.4 Design and Development

From the online survey, interviews, and focus group discussions, we came to understand that incidents of sexual harassment are a widespread and conse-

quential problem in contemporary Dhaka. Although many women experience harassment every day, these incidents remain generally silenced within the social context of Bangladesh. However, the impacts of harassment may be severe and painfully felt, both by individual women and for the wider problem of women's participation in public space and the public sphere. To address these problems, informants in individual interviews and focus group discussions identified three potential features or attributes of any prospective design intervention in this space.

Help on the spot: In many cases, women pointed to the need for on-the-spot help to avoid, escape, or reduce the severity of harassment. All the women in our study reported feeling insecure in public places, and noted that the ability to alert bystanders to current incidents would make them more secure. One participant reported an incident in which her struggle with a perpetrator went unnoticed by bystanders at some distance away. Another reported an incident in which the perpetrator disappeared after seeing other people coming to the spot. These informants argued for some sort of alarm function that could call on help from nearby strangers when situations of harassment emerged. Others, however, spoke against this kind functionality, arguing that they would feel ashamed and embarrassed to become the center of attention in this way. As one explained,

"If you call people, they will start making fun of it. They will start asking you questions like...How did that happen?...Where exactly did he touch?, and so on. It is even more embarrassing. It is like being harassed for the second time. This is why most of the women do not want to share their harassment experiences."

Reaching friends when needed: All of the women said that they would feel

better if they could reach their friends when they were in trouble. Although all of the participants had mobile phones, it was hard to make phone calls from the spot to all friends and seek help. Six of our participants said that they would not like it if their family members knew about their current location, but would feel better if their friends could be alerted to their location. As one participant explained this preference,

"I do not want my mom to know where I am going all the time. I am a grown-up woman and I do not like my parents tracking me. I know I can face danger on the street, and I have my friends to help me. If needed, they can inform my family."

Sharing Experiences with Others: All of our participants emphasized the need for a platform where they could share their experiences with others anonymously and get support. Participants described a double benefit to such a platform. First, victims could get support from other women and feel better. Second, by sharing experiences other women could learn about the incidents and make strategic choices to take precautions. As one participant explained,

"I could avoid these incidents if I knew boys always wait in that street to harass women. I would have my friends with me."

Others connected the sharing of stories to wider problems of public visibility. As one explained,

"I would definitely say that all women should know about these incidents. They would understand that being harassed is not their fault, but it is a crime and the perpetrators should be punished. In our country the victims hide themselves from the society while the perpetrators move around proudly in the broad daylight."

These three needs became the central design principles guiding our subsequent development of the Protibadi system, a web and mobile-phone based platform designed to provide timely support, access to friends and contacts, and the sharing and public visibility of harassment experiences.

The Mobile Phone Application: The mobile phone application is built for android supported devices, and contains three basic tabs. The first tab has the 'save Me' button that serves the purpose of a Panic Button. The women can use this button whenever they feel uncomfortable in a public place. Upon pressing this button a loud sound is emitted from the mobile phone's speakers to draw the attention of other people around. At the same time, a text message will be sent to each of the emergency contacts of the user's profile. The text message contains the location of the user (if available through GPS) and allows the receiver to know that the user is in trouble. In the second tab, the user can add, delete, or edit the emergency contact details. In the third tab, the user can report incidents of harassment that she experiences or observes.

The Website: The website consists of several components. A user can issue a request to register on the "Protibadi" system, which is subsequently reviewed and approved by the administrators of the website. Once registered, users can enter reports and blogs, and comment on the (anonymized) reports entered by other users. All reports are open for viewing to non-registered users. When creating a new report, users are required to enter time and location data. This can be entered manually on the website, or sent directly from the mobile phone application entering the area or "Thana" (district) in which the incident occurred. The system supports reporting in both English and Bangla. More generalized commentary blogs can be entered in similar ways, but don't require time and

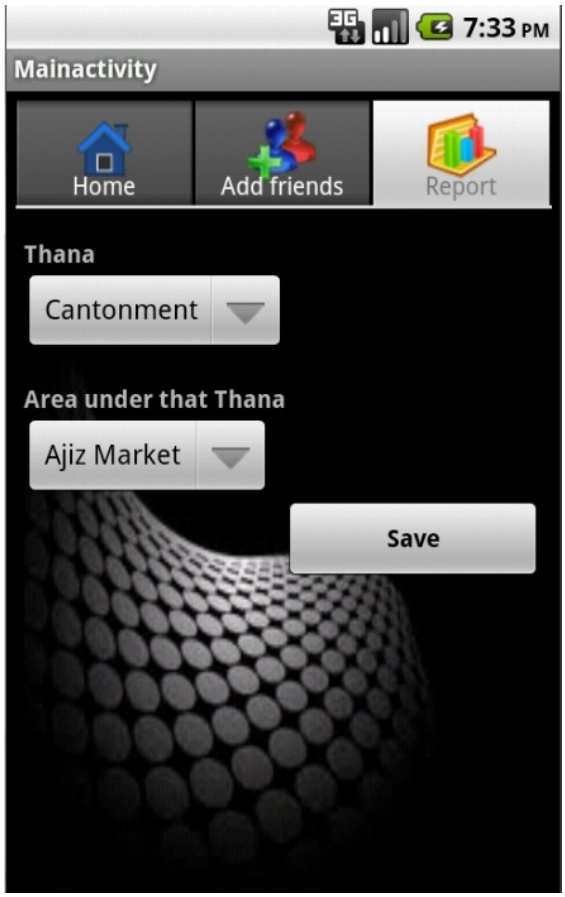

Figure 5.1:
Screenshot of the reporting tab of mobile phone application. Such reports are then stored in the system's webserver, and displayed on the "Protibadi" website described below.

place information. Users can also mark a report as 'serious' or 'suspicious' by clicking the corresponding buttons added to that post. The system then superimposes reports and associated comments on a periodically refreshed map of the Dhaka urban area, as shown in Figure 5.2.

The Protibadi website (www.protibadi.com) and mobile application were launched publicly in August 2013, and advertised via the Facebook pages of student groups at local universities. A corresponding Facebook page (https://www.facebook.com/protibadi) was subsequently created which sys-

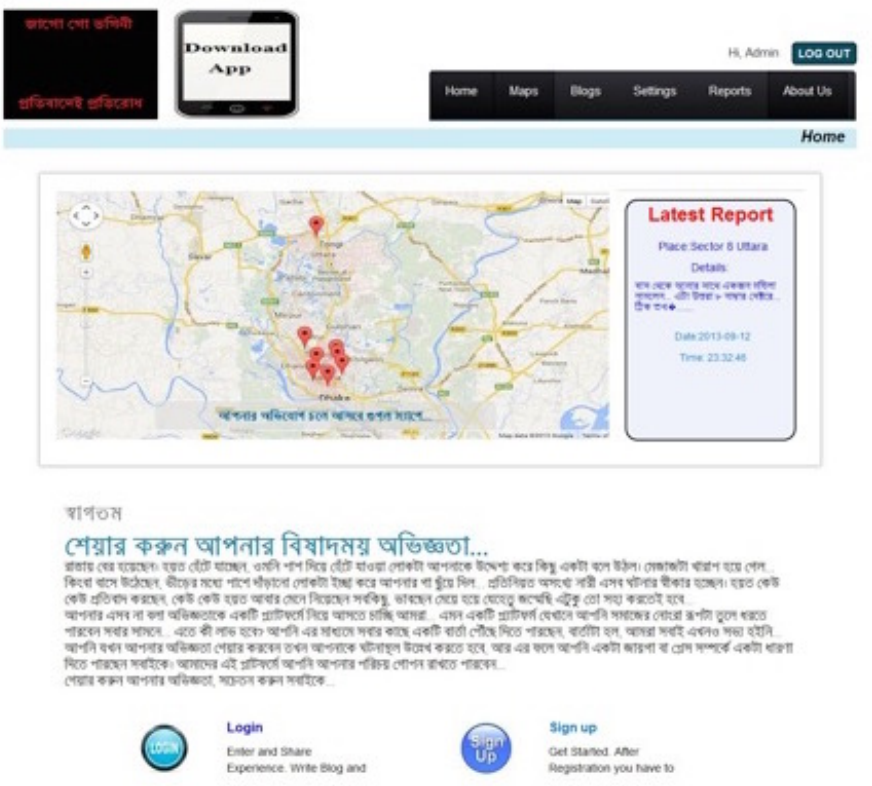

Figure 5.2:Screenshot of the homepage of the website.

tem administrators periodically update with reports and blogs generated by Protibadi users. While the system described above draws ideas and inspiration from past HCI applications in the sexual harassment space, there are also important differences between these systems and our own. Hollaback [16], Harassmap [14], ComfortZones, and Safetipin allow users to share experiences of harassment with friends, neighbors, family or social media, but contain no support for emergency help at the spot. CircleOf6 [63] and Fightback [12] offer emergency help, but do not provide opportunities to share and report on incidents of harassment. Based on needs identified through our ethnographic fieldwork, Protibadi combines these functions in a single unified platform. Additionally, because we wanted to produce a system built with community participation and input from the ground up, it was important not to simply import

systems developed elsewhere (though we learned from those systems in developing our own).

5.5 Usage, Feedback, and Public Responses

Three months after releasing the website, there were 110 registered users on the site, 20 self-identified as men and the rest women. Users had entered 24 reports from different parts of Dhaka city, and a total of 618 people subscribed to the Facebook page, with posts viewed by more than 350 users on average. Reports described a range of harassment experiences shared by users of the system, with the following a fairly typical example:

"yesterday i was going by rickshaw. it was going through a crowdy road. because of the crowd the rickshaw was going slowly. suddenly i felt that someone grabbed my thigh. i was shocked, i tried to find out who it was, then i saw a figure rushing towards the crowd. it was totally unexpected and really horrible..it happened near shyamoli area."

Users had also made 12 blog posts, many of which spoke about issues of harassment in a more general sense (rather than reporting or describing a specific incident). For example, one user posted a blog titled, "Eve Teasing-Primal Instincts Coming to Surface," where she wrote,

"Bangladesh is a society in transition where centuries old cultures, practices, and social beliefs are undergoing transformation. It is a tumultuous time, a stormy phase. Yet despite these changes, one fact remains consistent and true: Sexual violence and harassment of women exists, and it is rampant as a disease even in our current times."

User studies: To understand early experiences and responses to the system beyond content and basic usage data, we conducted semi-structured interviews with 10 Protibadi users (contacted by site administrators via Facebook messages and conducted by female interviewers) regarding their experience of using the website and the mobile phone application. General responses to the system were positive, with several respondents noting the deep need and value for such a system (though also noting that it represented a small and limited intervention in relation to the pervasive problem of public sexual harassment). Six of the ten respondents cited the value and comfort provided by the instant messaging system, and the sense of security provided by one-touch access to emergency contacts. As one participant explained,

"The SMS system is very useful, because your information along with your location is instantly sent to an emergency contact person. Now you know you can get help anytime you are in trouble."

Participants also praised the reporting function, and mentioned the blog entries of other users as important sources of learning, sharing, and publicizing incidents of harassment. Users reported being generally happy with the overall aesthetics and usability of both the mobile phone and web-based system components.

Other of our design interventions were less successful or received more mixed reviews. None of our participants for example had used the 'save me' button at the time we conducted the interviews. Six of them said that they would have used this if they faced any such situation, while four of them (echoing findings in the earlier focus group and interview studies) said that they would never use this since it would only attract public attention and embarrass-

ment. One respondent criticized the lack of integration of the site into systems of Police crime reporting, arguing that better integration with systems of enforcement would enhance women's motivation and willingness to contribute. Another argued that the site's primary focus on incidents of street harassment should be expanded to address other forms of sexual harassment, including the growing problems of stalking and harassment through social media. As this user explained,

"Eve teasing is not limited to the physical level anymore. It has started even virtually. There are pages on Facebook, where bad comments and pictures about women are posted. Often times one's pictures are being used in a very abusive manner without one's permission. So, events like this should also be reported on the website and awareness about it should be made."

Still another participant urged us to integrate the site more directly with Facebook (as opposed to manually porting system content to Facebook as described above), as this was the one social media site that she and her friends routinely and actively engaged.

This user feedback suggests a number of immediate design recommendations moving forward. First, though interested in and supportive of our system in general, users were reluctant to add yet another site to their regular social media routine. Accordingly, users were more responsive in reading and commenting on reports and blog posts when shared over Facebook than when on the original website.

Second, while supporting the system's general information sharing and awareness functions, users also described wanting to see some kind of imme-

diate reaction to their posts. Especially in case of reporting, the victims often wanted to get support, or see the offender punished through their action. Mere sharing of the information was not always a strong motivation for users to report. Connecting the system to law-enforcement agencies or human-rights groups might therefore extend functionality and enhance motivation for site users (though we note that many of the harassment incidents reported through the site do not meet existing categories of offense under Bangladeshi law).

Third, users reported not wanting to limit themselves to reporting only sexual harassment in public places, and preferred instead a platform where they could talk about any sort of harassment or discrimination in general. This indicates the fact that this system is actually supporting an emotion of the users that is spread across a wide range of feelings they have. Hence, the users should be given the liberty to disclose all those feelings here and the users will not appreciate any restriction applied to that.

Public controversies: Beyond the confines of our user study, some deeper issues around our design were reflected in a series of more public reactions to the site, including a number of controversies and debates that played out through the project's associated Facebook page. In one case, a user reported that she felt bad when an unknown man on the street asked her and her friend to cover their heads during the holy month of Ramadan. When this report was picked up on the Facebook page, a number of subscribers to the page reacted. They argued that the man did the right thing by asking two Muslim women to cover their heads, because that was what Islam suggested. One member said in his comment,

"... Any person can say to another woman to wear hijab and veil becoz it's farz for

women. If you don't admit it, then it's your mental problem." ['farz' means 'must do' in Islam]

Other followers responded to defend the original post, and the debate continued across a total of 34 comments, some defending the man and his actions, and others the original commenter's position.

In another example, the user expressed her frustration around the way staff and male passengers had behaved on a public bus, demanding full fare from the female students but only half from the male students. She also discussed situations in which male passengers took advantage of crowded buses to touch women inappropriately in public. In response, one member commented,

"Islam says there must be a place preserved for women in any kinda vehicle where men aren't allowed. there must be a rigid partition to separate males and females. and all the fair must be collected from her mahram male companion (as women aren't allowed to go to and fro freely without mahram males) or in special case if the girl is alone, fare must be taken outside of the partition. so why r u fussing around with your so called faminism without rules of Shari'ah?" ['mahram' to a girl means the person who is not allowed to marry her]

In a third more sympathetic but also challenging example, a commenter pointed out that:

"This is a great initiative, but there is a weakness in their intention. They are making this so that women can avoid the places where eve teasing takes place. If this continues we have to keep the women inside an almirah after a few days. They should instead post the pictures and profiles of the perpetrators."

Next steps and future directions: At the time of writing, the Protibadi system remains a work in progress. The site retains a small but active group of users, with a somewhat larger and more mixed audience through its associated Facebook page. The design team is working to weigh and incorporate some of the design considerations stemming from early stage usage and user feedback. Responsibility for long-term maintenance and development of the system is also in process of being transitioned to a local women's rights organization who have approached the research team to support and maintain the site over time, and potential interest in expanding it to support forms of harassment reporting among female workers in the textiles industry – a dominant and reputedly problematic employer in this regard. A second nongovernmental organization has initiated discussions around modifying the system to support forms of harassment reporting in rural parts of the country (possibly building on Grameen Bank-inspired models of local system contacts after the 'village phone lady' model). In December 2013, the Protibadi system was featured in a report on national television and has attracted growing levels of attention since then.

5.6 Discussion

But these immediate questions of system design and immediate project trajectory represent only a part (and arguably the smaller part) of potential lessons and implications that can be drawn from the wider Protibadi experience. At the most immediate level, ethnographic portions of our study make clear the seriousness and consequences of sexual harassment in Dhaka today. While our study can make no claim to statistical representativeness (and there are obvious

selection effects that may shape people's elective participation and nonparticipation in the study), it was striking to us the ease with which experiences of harassment could be called up by all members of our survey, interview, and focus group studies. As our participants accounts made clear, experiences of harassment as detailed here are part of the real and regular experience of university-aged women in Dhaka today.

This is important because many of the public and academic debates around gender violence and discrimination in contemporary Bangladesh have tended to focus on rural parts of the country, have addressed the effects of social or cultural institutions like marriage, economy or the state, or have been built around the more "extreme" forms of gender violence (rape, incest, etc.) that women also sometimes face [16]. As our study shows, forms of violence and discrimination can also be rooted in the conditions of everyday life, can be just as real and insidious in their effects, and are powerfully present even within the relatively cosmopolitan areas of Dhaka and among the comparatively empowered group that constitutes university women. These effects are both personal and political. Incidents of sexual harassment as reported by our informants can produce powerful experiences of fear, shame, and isolation (all the more so since it can be difficult or dangerous to share these experiences with friends and family members). But they also cause women to navigate the city differently, limiting or curtailing access to public space (markets, buses, etc.) and enforcing forms of conduct and expression that may further limit effective participation in public life. In this way, 'small' incidents of harassment may produce –large cultural consequences: mechanisms, as well as effects, of larger systems of gender discrimination and inequality.

Methodologically, our study raises important questions around the challenges of doing HCI design and ethnographic work around socially and culturally sensitive issues – a topic relevant to work in "HCI4D" or "postcolonial computing," but also the field more broadly. This showed up in painful and immediate form in challenges experienced in both the ethnographic and system building portions of our work. As noted earlier, it was difficult to get participants for focus group discussions and face-to-face interviews. Even after posting the flyers repeatedly in different places in the university campuses and inviting people on Facebook, participation remained low. By the same token, adoption of the system remained comparatively low, even where current and potential users spoke to the need and many positives of the system arrived at. This stands in stark contrast to the professed need and potential contribution of design interventions in this space.

Some of these effects may no doubt be attributed to limits in design, both of the ethnographic work and the subsequent system design. Others may be attributed to the relative newness of the system (an interpretation bolstered by recent signs of interest stemming from NGO and local media engagement). A more complete and challenging explanation however? and one offered by several of the participants in our study – may be found in the deep and long-standing culture of shame and fear surrounding sexual harassment in Bangladesh, whose weight (like all matters of deep cultural concern) will inevitably dwarf the comparatively brief and light interventions that HCI researchers are likely to make in this space.

As these examples make clear, public perceptions and even basic definitions of sexual harassment (what constitutes it, why it happens, etc.) live

within a large and shifting field of cultural politics, which is no more settled in Bangladesh than anywhere else. In such a space, design interventions are likely to share and absorb the controversies of the topics they touch, with no obvious or irrefutable standpoint of truth. This brings to the fore the inevitably "agonistic" character of HCI design [78], in particular as it moves outwards from narrowly instrumental or functional concerns towards the larger interventionist ambitions that often characterize the HCI4D and feminist HCI space. Such circumstances open up ethnographic and design work to a series of ambivalences and unintended consequences, including the very real concern noted by our third commenter that calling out spaces of harassment may in fact exacerbate tendencies to avoid places marked as dangerous, and so further restrict women's navigation of public space (even while giving them new informational tools to make these judgments on a case-by-case basis). Given the depth and complexity of the cultural politics at play here, such ambivalences and unintended consequences may be a regular feature of ethnographic and design interventions around difficult, contested, and culturally sensitive problems of the sort addressed here.

They also necessarily implicate the positionality and security of HCI researchers themselves. Beyond the challenges faced by our study participants, the study also raised challenges and occasionally threats for female members of the research team. As mentioned earlier, research activities in one of our study sites was suspended after the interviewer, a faculty member at the university, started being harassed herself on the basis of her participation in the study. The faculty member was ridiculed by a number of office assistants while posting the flyers. She also received emails from unknown people who told her to advise the women to cover themselves according to the rules of Islam in order to avoid

sexual harassment. At that point, the interviewer felt unsafe and the study at that university was suspended. Under such conditions, it becomes difficult to conduct research at all.

5.7 Conclusion

In this chapter, we described an ethnographic study designed to understand the problem of sexual harassment in the public places of Dhaka city. We developed a specific design intervention, 'Protibadi', intended to support women experiencing and fighting harassment. And we described initial responses to our system, as gathered through preliminary user studies and more public responses to our system.

We also discussed problems of HCI intervention more generally, including as the field engages deeply contested and unsettled cultural issues of the sort addressed here. Such complexities are likely only to intensify as the feminist and HCI4D projects within HCI grow and mature. More and careful work in this space, of both theoretical and empirical varieties, may cast further light on the dynamics and challenges described here. Such work may also enhance the impact and responsibility of the field.

CHAPTER 6

PRIVACY, SECURITY, AND SURVEILLANCE IN THE GLOBAL SOUTH: A STUDY OF BIOMETRIC MOBILE SIM REGISTRATION IN BANGLADESH

(This project was done in collaboration with my colleagues in Bangladesh and the USA, and the results were published in ACM Conference on Human Factors in Computing (CHI), 2017 in the USA. Full citation can be found here [9].)

6.1 Introduction

Information and Communication Technologies (ICTs) have often been considered a major vehicle for socioeconomic development in low-resource countries. Today, more than 4.6 billion people around the world have mobile phones, and 52.7% of them browse Internet with their phones [62]. Although mobile technologies have the potential to positively contribute to a range of different development initiatives in the Global South, crimes that make use of these technologies have also become a big concern for these countries. Cybercrimes, including hacking, identity theft, harassment, stalking, and revenge porn, are increasing day by day [153]. At the same time, mobile phones are used by terrorists and other criminal groups to communicate and organize crimes [248]. To combat these crimes, many countries, including Bangladesh, have created surveillance programs that monitor citizens' mobile phone usage [167]. In addition, Bangladesh is the second country in the world (after Pakistan) to deploy nationwide surveillance that relies on citizens' biometric identities: their fingerprints. The collection, storage, and usage of this biometric data has resulted a new set of privacy, security, and safety concerns that are not yet well understood.

The Bangladeshi government initiated this surveillance program in the context of a sudden rise of hate crimes coupled with an alarming rate of terrorism inside and outside the country. The trials of several political leaders for war crimes had created a nation-wide debate [11,57], and caused various political and religious tensions. In addition, militant groups, inter alia, ISIS, JMB, and Ansarullah Bangla announced their violent missions that threatened law and order in the country [8]. Since 2013, extremist groups have killed more than ten progressive writers, bloggers, and publishers in the country [56]. These murders were further punctuated by several violent attacks on religious minorities. When investigating these attacks, the government found that many extremist groups were spreading anti-government news and propaganda, and communicating using the Internet and mobile phones. In August 2013, the government passed an ICT law that enabled them to arrest individuals based on their online activities, which many people considered to be a threat to citizens' freedom of speech [1], and which has since been used to arrest several political activists. In addition to terrorism, other kinds of crimes including political killings, gender violence, corruption, and robbery have also been increasing substantially throughout the country

Against this backdrop, at a press conference in September 2015, the State Minister of Post and Telecommunication in Bangladesh said,

"We have found that mobile connections Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page."

According to the government, in August 2015 more than 130 million of

Bangladesh's 160 million people had mobile phone SIM cards, and the Minister announced the launch of a mandatory, nationwide biometric mobile SIM registration program. In 2008, the election commission in Bangladesh created a database of citizens' fingerprints as a part of a project to issue a National ID to every citizen. The new biometric registration program stipulated that mobile phone operators were required to collect the fingerprints of every customer who owned a mobile SIM that connected to their network. This fingerprint data is then sent to the existing database for verification, after which the customer's registration is considered validated. The biometric SIM registration program formally began in December, 2015 [61].

The Minister later explained the objective of biometric SIM registration,

"The biometric verification of the mobile phone SIM has created an opportunity to verify the real owner of the mobile SIM with the information of his own National Identity (NID) and the system would help law enforcement to unearth the real crime perpetrators" [69].

This statement suggests that the biometric data will enable law enforcement to track down individuals based on their use of mobile phones. However, almost immediately after the launch of the program, it became clear that people were confused and suspicious of the registration process, and protests began to take place across the country. Citizen groups also voiced concerns surrounding the impact that the program had on people's privacy rights [291]. In March 2016, the High Court challenged the legality of biometric SIM registration [241] and, in response, the mobile operators explained that although they were extracting data from people's fingerprints, they were not actually storing the fingerprints themselves. Following this legal challenge, the High Court cleared the way for

mobile operators to continue biometric registration of SIM cards [240]. The registration process was scheduled to be completed by April 30, 2016, after which all unregistered SIMs would become non-functional. However, this deadline was subsequently extended for one month since, on the day of the deadline, the majority of SIM cards were still not registered [2].

The main contribution of this chapter is to describe findings from a three-month long ethnographic study and online survey that show the tensions, complexities, and challenges surrounding the biometric SIM registration program in Bangladesh. Our findings highlight important nuances in people's conceptual understanding of ownership and identity that further the situated understanding of privacy in Bangladesh. We also show the infrastructural, social, and cultural challenges that impact biometric-based surveillance of mobile phone usage and reveal the political implications of such surveillance for the Bangladeshi people. Taken together, our findings yield valuable new insights that further existing knowledge of digital privacy, safety, and surveillance in the Global South.

6.2 Related Work

6.2.1 Privacy, Ownership, and Culture

With the proliferation of computing technologies around the globe, people in all countries are increasingly exposed to risks associated with digital privacy. There have been numerous efforts to understand and mitigate these risks, including password construction and use [59], inferring preferences from social network behavior [106], supporting privacy through design [164], and understanding

privacy on mobile devices [246]. However, the majority of these studies focus on the Western world and are based on Western ideas of privacy. In an effort to incorporate other contexts, Nissenbaum [208] argues that notions of privacy change with place, people, culture, and context. Her argument explains why findings of studies done in the West cannot necessarily be extended to non-Western contexts and points out a lack of HCI scholarship investigating privacy outside the West.

Recently, a small amount of HCI research has started looking at privacy in the Global South. Abokhodair et al. [4, 5] reported that privacy in the Middle East is dominated by religious practices around intimacy and freedom of speech. Kumaraguru et al. described notions of privacy among Indian populations using communication media [156]. Ahmed et al. reported on notions of privacy in mobile repair markets in Bangladesh [8]. Our work builds on this nascent literature by examining concepts of ownership and identity, two of the core components of privacy [297].

Existing notions of identity and ownership are based primarily on an individualistic Western value system that often conflicts with the values of many collectivist societies in the Global South [124]. Several studies have demonstrated how technologies that are considered to be 'personal' in the West have shared and intermediated usage models in collectivist societies that challenge Western notions of 'personal computing' [53, 101, 155, 229, 250]. In addition, the prevalence of informal second-hand markets further complicates the one-to-one relationship between a user and a device [8, 11, 136, 138]. Thus the concepts of identity and ownership often take on a different meaning in the Global South. This chapter contributes to this literature by developing a nuanced understand-

ing of identity and ownership in Bangladesh, and their impact on digital privacy and safety.

6.2.2 Surveillance, Voice, and Democracy

Lyon [168, 32] defines surveillance as a 'focused, systematic and routine attention to personal details for purposes of influence, management, protection or direction'. Our focus in this chapter is on government-imposed mass surveillance. In recent years, these kind of surveillance programs have focused primarily on monitoring communication media to track suspicious activities. China, Russia, Germany, Australia, the United Kingdom, the United States, India, and many other countries have dedicated projects for eavesdropping on their citizens' Internet traffic and mobile communication [70]. To be effective, many of these programs need to collect and monitor citizens' private information. Biometric identifiers are one of the most effective ways to uniquely identify a person. For example, fingerprints and retina have been used to track individuals crossing national borders or to register people for citizenship [19]. At least 25 countries in sub-Saharan Africa and South Asia have already held elections that use biometric voter IDs [84]. However, biometric surveillance of mobile phone usage is fairly new. Only Pakistan, Bangladesh, Nigeria, UAE, and a few other countries have recently launched these programs, and there has thus far been little work that seeks to understand their impact.

Regardless of how important surveillance is for national security, from the citizens' point of view these programs can be interpreted as being authoritarian or exploitative [97, 102, 278, 305]. In addition, surveillance programs can

be used to diminish political voice [102]. A person develops a political opinion through their social values, observations, readings, discussions, and debates. Surveillance can curtail the freedom with which people are able to share their ideas and opinions and reduce the diversity of public opinion and competing voices [97]. Thus, privacy is considered important in most democratic theories [37, 109, 174], suggesting that democratic governments need to draw and maintain a line between what data should or should not be collected. In many Western countries, constitutions have also been established that protect certain privacy rights [15]. Similarly, different citizen groups monitor and criticize government surveillance programs [52]. However, many countries in the Global South are struggling to maintain a stable democracy and are embarking on mass surveillance programs with little external oversight.

Aadhar, India's biometric identification project, is one of the most studied biometric identification schemes in the Global South. From the inception of this project, it received harsh criticism from activists who pointed out the potential risks regarding security, privacy, and corruption [100, 150, 208]. Johri et al. reported how Aadhar's narrow focus on data forcefully aligned technology and people and ignored many important broader aspects of identity by 'viewing citizens as numbers' [141]. Jacobson reported that the Indian government is more interested in controlling citizens than ensuring their security [139]. Despite these concerns, Aadhar's data has not (yet) been used by the Indian government to track citizens' communications. Our study on the biometric mobile phone registration program in Bangladesh contributes to the growing amount of research that focuses on biometric data and further adds important elements of privacy and security in the context of the Global South.

6.3 Methods

We conducted a three-month ethnographic study in Dhaka, Bangladesh to study the biometric mobile registration program. The first author was born and raised in Dhaka and is a fluent speaker of Bengali. From March to June 2016, he visited 30 biometric registration points in a variety of Dhaka neighborhoods. Although the neighborhoods were chosen based in part on convenience and the ethnographer's familiarity with the area, we ensured that we covered a wide variety of registration points, including formal service centers, local shops, and temporary booths, that serviced a diverse range of people. At each of the registration points, the researcher conducted two hours of observation, resulting in a total of 60 hours of observational data. The researcher also conducted semi-structured interviews with people in charge of the registration points and in situ interviews with customers who were willing to participate in the study. In total, we performed 30 interviews with registration operators and 34 interviews with customers. All interviews were voluntary, roughly 15 minutes long, and audio recorded. Observational data was recorded in the researcher's notebook. We also took over 200 photos during our observations.

The first and second authors (both of whom are Bangladeshi) also visited the homes of 30 families in Dhaka and conducted semi-structured interviews with 52 participants at these homes. We used snowball sampling, starting with a set of families that we knew, and expanding based on suggestions for participants, stopping when we reached theoretical saturation. We tried to visit families from different socioeconomic classes to achieve diverse viewpoints. Ten families were selected from each of low, middle, and high income ranges (low-income is <10,000 Taka/month, middle-income is 10,000-20,000 Taka/month, and high-

income is >20,000 Taka/month) [1]. Each of the home visits lasted approximately one hour and discussed the participants' backgrounds, mobile phone use, their experience with the biometric registration process (if any), and their thoughts on the program. Finally, we also posted flyers at three local universities and invited interested students to participant in interviews. A total of 30 students (15 males, 15 females) were recruited through this process. All interviews were voluntary, 10 to 15 minutes long, audio-recorded, and they were conducted in Bengali. All interview data was later translated into English, and transcribed by two different coders, both of whom have bilingual expertise in Bengali and English.

In addition to our ethnographic and interview data, we also conducted an anonymous online survey. The survey was in Bengali and asked questions regarding participants' demographic information, biometric registration, and their opinions about the registration program. Although most of the questions were structured checkboxes or multiple- choice questions, the survey also included an optional open- ended textbox where participants could freely express their opinions, concerns, or suggestions about the biometric SIM registration. The survey was publicized through two public posts on the ethnographer's Facebook page between March 1st and 10th 2016. The survey was left open until April 30, 2016. A total of 606 participants completed the survey. In total, our ethnography produced 60 hours of observational data and over 150 hours of interview data. The data was separately translated to English by two native Bengali speaking researchers and cross-checked for validation. The translated data was then coded by the team following the Grounded Theory method [66], and labeled with emerging themes. The survey data was processed similarly

[1] 80 Bangladeshi taka is roughly equivalent to 1.00 USD

but separately from the ethnography data.

6.4 The Biometric Registration Process

The biometric SIM registration process took place in three main settings: a) formal service centers, b) informal shops, and c) temporary registration booths. We discuss each of these contexts before describing the registration process.

6.4.1 Formal Service Centers

The formal service centers were usually located in shopping malls and were owned and operators by large mobile phone companies. The primary goal of the centers was to provide customer service and assistance to people who were experiencing issues or having trouble with their mobile phone service. Since SIM card registration was not their main function, we found that staff at the service centers would only help people to register their SIM cards if the SIM cards were from the network of that operator. All of the staff at the service center were highly educated (possessing at least a college degree) and well-trained on the registration process. They were also experienced with technology and capable of using computers, laptops, and tablets. They were dressed in uniforms and communicated with customers in accordance with established rules laid out by their employers. These staff reported that the majority of the customers they served were from middle or upper class communities, with one telling us:

"Everybody knows that these places are for gentlemen. Also, people who come here...they don't want to take risk by going to a roadside shop and doing their registra-

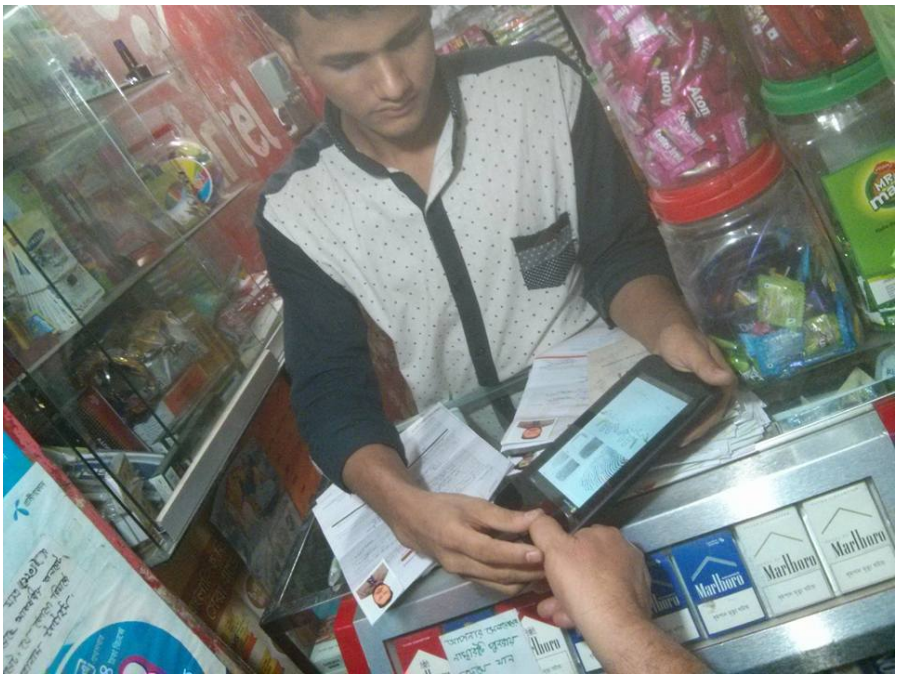

Figure 6.1:
A grocery shopkeeper is helping a customer with biometric SIM registration.

tion in a sloppy fashion. They want confirmation from a reliable authority." (Formal Service Provider, male, 32 years)

The customers at the service centers shared similar views, with one saying,

"Here you don't have to encounter foul people. Also, I don't want to risk my registration, my business is relying on this." (Businessman, male, 45 years)

6.4.2 Informal Shops

In contrast to the formal service centers, the informal shops were typically local, road-side shops that were frequented by a diverse range of people from a variety of backgrounds. These shops, which included grocery stores, laundromats,

hair dressers, pharmacies, and CD/DVD shops, offered SIM card registration service in addition to their usual business. Nine out of the ten shopkeepers that we interviewed had low levels of education, with four completing elementary school and five not finishing elementary school. Only one shopkeeper was currently studying at a local university for an undergraduate degree in accounting. None of the shopkeepers were familiar with computers or the Internet. However, they all used mobile phones for sending money. The shops were chosen to be biometric registration points by agents who worked for the mobile phone operators, often based on their existing relationship with the agents or following a previous contract with the operators for mobile- money transfers. The shopkeepers were given the equipment necessary to do the registration and received one day of training at the operator's office. Since the device used to do the registration was different for each operator, a shopkeeper could only register customers for the specific operators that had trained them. The shopkeepers would often post flyers that indicated the operators that they were authorized to serve. For each registration, the shopkeepers would receive 1.80 Taka (approx. 0.01 USD) before tax.

6.4.3 Temporary Registration Booths

Temporary registration booths took a variety of different forms. Some of these booths consisted simply of a colorful umbrella on the side of the road under which a person would sit with a chair and table offering a registration service. Frequently, these booths would be located in a public place, like a road-crossing or the corner of a market. The mobile phone operators employed temporary staff to provide the registration service at these booths, with the length of the

employment contract ranging from two to six months. All the staff employed had a minimum of high school education and were trained on registration process by the operators. These temporary booths aimed to serve customers from a variety of socioeconomic backgrounds. The booths would open as early as 7am and stay open until 10pm, with the staff taking only short breaks for meals.

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6.4.5 Completing the registration process

Completing the registration process would typically take about 10 minutes. Although different mobile phone operators used different equipment for the registration, they were all tablet-based systems. Some operators provided a separate

fingerprint reading device that needed to be connected by wires to the tablet, while others augmented the tablet with fingerprint reading capabilities. Figure 6.1 shows how a customer providing his fingerprints on a tablet device for biometric SIM registration at an informal grocery shop in Dhaka.

To begin the registration process, the customer had to provide their mobile phone number and national ID document. The registration person would then give the customer a paper form to fill out that required them to provide their name, age, gender, date of birth, etc. The customer filled out the form and gave it to the registration person, who then entered relevant information into an app running on the tablet and set up the fingerprint equipment. Next, the customer had to provide fingerprints of their thumb and index finger of each hand. The device provided a notification that indicated when each fingerprint was successfully captured, prompting the customer to move on to the next fingerprint. After the fingerprints had been captured, the device would send, via text message, a unique passcode to the customer's phone. The customer then needed to enter the passcode into the system (or the registration person would help them to enter the passcode). If the passcode was correct, the registration was complete and the customer would receive confirmation that they had completed the registration process. However, after completing the registration process, the customer had to wait up to two days to know whether the registration was actually successful. During this time, the customer's data was transmitted to a central database and analyzed. The customer would then receive a text message that informed them if the registration was successful.

Although the cost of registration process was borne by the mobile phone operators and was supposed to be free for customers, during the last week of

mandatory SIM registration, we found 5 informal and temporary registration centers who were illegally charging customers 20 Taka (0.25 USD) to complete the registration process.

6.5 Tensions Surrounding Biometric Registration

This section discusses several major themes, challenges, and complexities associated with the biometric registration process that emerged during our analysis of our data.

6.5.1 Ownership

Our findings reveal that the concept of ownership of the mobile phone and the SIM card was complex and not well- aligned with the 'one SIM card, one owner' model that the registration process assumed. In addition, there were many occasions where tensions surrounding ownership resulted in additional challenges for both customers and registration booth staff. For example, the separate identity of the phone and the SIM card was not clear to many customers. Seven of the people that we talked to at the registration booths said that they had come to register their 'mobile phone', which they had bought somewhere else. However, it turned out that their SIM card was already registered to another person that the customer usually did not know. One told us:

"I bought this phone 2 months ago...in exchange for my own money, my hard-earned money. You can ask my fellow rickshaw drivers in the garage about this. They all know I bought this. Now, this registration guy is saying that this is not my phone. Why?

Because I am poor?" (Rickshaw driver, male, 40 years).

Another of our interview participants, who worked as a domestic helper, explained how she would always buy phones from other people or from the second-hand mobile phone market. She knew about the difference between the body of the mobile phone and the SIM card, but said that her husband and son did not understand this difference. She had to explain the difference to them before they went for the biometric registration. Moreover, since the SIM card in her mobile phone was not originally registered in her name, she had to buy a new SIM card, which cost her 50 Taka (approx. 0.7 USD). She said,

"I find this a new kind of business by the phone company. All they want is to drink our blood." (Domestic helper, female, 45 years).

It quickly became clear to us that the majority of mobile phone users in Bangladesh depend on the second-hand mobile phone market, where they not only trade their old phone, but also their SIM cards. As a result, associating one' identity with a SIM card is challenging. One of our participants asked us,

"What will happen when I will sell this phone to someone else, and buy a new phone?" (Night Guard, male, 35 years)

Further tension concerning ownership arose due to the hierarchical power structure of the society, and our findings showed that in many communities the ownership of mobile phones (and SIMs) is determined by power relationships. For example, we encountered nine cases, where the senior male person of a family came to register all the SIMs for his family members in his name. One of these participants said: *"I am the person who earns money and buys things for my family. I am responsible for anything that happens with these phones. So, who else do*

you think will register the SIMs?" (Service holder, male, 52 years).

Further tension concerning ownership arose due to the hierarchical power structure of the society, and our findings showed that in many communities the ownership of mobile phones (and SIMs) is determined by power relationships. For example, we encountered nine cases, where the senior male person of a family came to register all the SIMs for his family members in his name. One of these participants said:

"I am the person who earns money and buys things for my family. I am responsible for anything that happens with these phones. So, who else do you think will register the SIMs?" (Service holder, male, 52 years).

"When you are a grown up man and you have a family, you need to know what your responsibilities are. Whenever you buy something, that may cause legal trouble at some point, and you may need to run here and there. It is always safe that men take that responsibility?" (Pharmacist, male, 68).

Beyond families, we also encountered issues of ownership in informal business settings. For example, one customer that we spoke to at a registration booth had brought about 70 mobile phones with him, wanting to register all the phones in his name. However, the national rules say that each person can only register a maximum of 20 SIM cards. This scenario resulted in a big discussion between the customer and the registration person. The customer described himself as the owner of a rickshaw garage who had bought the mobile phones for the rickshaw drivers that worked under him. He argued that the registration needed to be in his name because he was the one who had paid for the phones. He further said that he often discharged his workers and needed to keep the

phones for the new workers. The registration person argued that the situation could only be handled under 'corporate registration' of the garage, which the customer did not have since the garage was his informal family business. Finally, they decided that the customer would bring his wife, brother, and son to the booth the next day and have them register 20 SIM cards each. Similar issues of ownership arose in several other cases, including owners of other informal businesses, leaders of religious institutions, or leaders of local sports teams that wanted to register SIM cards for the people working under them. In general, the power hierarchy associated with these informal organizations was not well aligned with the concept of 'ownership' that the registration process assumed.

6.5.2 Identity and Identification

Another major set of challenges that were revealed by our analysis concerned the concept of identity and the process of identification. For example, the registration system required that the owner of a SIM card identify themselves with a valid ID, which could be their national ID card or passport. However, in several cases we found that people came to the registration booth with the ID of another person, and the registration person had to explain them that they should bring their own ID. One such customer told us:

"I do not remember if I ever had an ID. Some people came to our village before the election and gave us some cards. That happened several years ago. Now I have moved to Dhaka and I do not know where those are." (Rickshaw Driver, male, 25 years)

Since he did not have his own ID, he brought the ID of his aunt who lived nearby, arguing,

"This is a genuine ID. Why doesn't he use this for registration? I took my aunt's permission. She considers me as her son. What is the problem?"

In addition to this participant, we found 15 other people at different booths who did not have their own IDs. Unable to register these customers, the registration person suggested that they go and talk to their Ward Commissioners [2] to obtain new IDs. However, several people reported that they had already talked to their Ward Commissioners but had failed to get new ID cards since they were not originally registered in their current Wards. Instead, they were told to travel to their villages to collect their new IDs, which they were unable to do at that time of the year. Five people said that they had never received an ID card. All of these stories highlight the challenges associated with requiring that people possess valid ID cards before they are able to register their SIM cards.

A serious challenge associated with the identification and registration process arose when several customers did not have clear lines on their fingerprints. We observed four cases where, even though the registration agents were forcefully pressing the thumbs of the customers against the machine's surface, no fingerprint lines were being captured. At one point, the agent had to apologize to the customers. When we checked the fingers of the customers in question, we found that the lines were not very clearly visible on their fingers. All four of the people that this happened to were day laborers. One explained that he did not have lines on his fingers because he regularly used hard hammers to break bricks. Another said that he burnt his hand working with hot oil. We also found one participant who had lost his thumb in an accident, and the lack of a thumb made it impossible for him to complete the registration.

[2]Commissioners are elected public representatives in Wards, the smallest administrative units in Bangladeshi cities.

Finally, we encountered a number of issues associated with identity and gender. For example, many women were concerned that the registration process would allow them to be identified as women. In one of these cases, a woman showed us her earlier registration papers, that had a man's name written on the form that did not match her name on her ID card. She argued that she had preferred to use a male name to avoid being harassed over the phone. She asked,

"Why do I have to tell them if I am a man or a woman? So that they can arrange harassments for me?" (University student, female, 23 years).

In another case, one woman came with her husband's ID and refused to show her own ID for the SIM registration, saying,

"I do not trust these people with my information." - (House wife, female, 30 years).

Many more of our interview participants reported that the registration booths were operated by male staff members who would need to touch the customers' hands to take their fingerprints. However, the women did not like to be touched by an unknown male person, which prevented many female participants from doing the registration.

6.5.3 Exploitation

Many of our participants were concerned that the biometric registration system would be used to facilitate exploitation of people by the Government and mobile phone operators. For example, several participants expressed that the justification for the biometric registration process – to enable the Government

to track criminal behavior – was a farce. One participant described:

"Do you think police do not know who the criminals are in a neighborhood? Of course, they know! Everybody knows. Even the children of the neighborhood know. But they will never arrest the criminals, because they take bribes from them. And now they have made this excuse of identifying the criminals for taking our fingerprints?!" (Retired Banker, male, 68 years).

The concern that the system would be used to exploit people was reinforced when many participants were forced to purchase new SIM cards because the SIM cards that they had bought on the second-hand market turned out to already be registered to other people. Moreover, although it was illegal, we found several registration people who were charging customers extra money to perform the registration. When we asked the customers why they paid this extra money, all of them replied that they did it because they felt that they had no other option.

The decision by the informal registration staff to risk punishment by charging extra money for the registration process [68] stemmed in part from the fact that the staff also felt exploited by the system. In particular, the staff felt that the amount of money that they earned from registering people was not sufficient to justify the amount of work that they were doing. The minimum commission that the staff were paid was 1.80 Taka excluding tax (approx. 0.016 USD) for each biometric SIM registration. Since each SIM registration took them approximately 15 minutes, if they worked solidly for 8 hours in a day, they would only be able to register about 33 SIMs for which they would earn a total of about 66 Taka (approx. 0.8 USD), which they claimed was exploitative. In response to these concerns, Bangladesh Tele Recharge and Mobile Banking Business Asso-

ciation held a press conference in April 2016 to present their case for increasing the commission paid for each biometric registration. They stated that they were strictly opposed to the minimum commission paid by mobile phone operators for biometric SIM registration.

6.5.4 Security, Safety, and Resistance

Our analysis also revealed a wide variety of concerns and issues surrounding the safety and security of the biometric SIM registration process. For example, the security of the biometric data relied heavily on the integrity and honesty of the registration staff. However, the registration staff in the informal shops were chosen based on their relationship with the mobile phone operators, which resulted in a potential threat to the system. Although the software that they were using for data entry was not necessarily compromised, a dishonest registration person could run separate software in the background to surreptitiously capture the fingerprint data that could then be used to register duplicate SIM cards in a customer's name without informing them. Although not part of our study, such an incident was reported in June 2016 in Mymensingh, a large city in Bangladesh. A registration person was arrested with two thousand illegal duplicate sims [66]. Similarly, in May 2015 the police arrested two people who had been collecting duplicate copies of other people's SIM cards from retailers, saying that they had lost their original ones [67]. In reality, they had been collecting mobile money sent to those numbers.

In addition to the potential threat posed by the registration staff, many of our participants expressed confusion and suspicion regarding the registration

process, and our conversations with participants revealed that this lack of trust was in part due to a scarcity of information that explained the process. Many participants were concerned about where their fingerprint data would be stored and how it might be used in the future. One participant said:

"Once the Government said that the fingerprints would not be saved anywhere. Now they are saying that they will fine the mobile phone operators if they leak the fingerprints. This means, our fingerprints are being saved somewhere by the mobile phone operators. This is very unfortunate." - (Businessman, male, 42)

Another participant was concerned about the technical knowledge of the Government saying:

"I don't think our Government is aware of the technical flaws that may occur. I even don't think that any system is safe to keep those biometric data. Government is overconfident, but they don't even know any of the technical aspect of biometric data collection and its safety. It's undoubtedly a violation of human rights." (Service holder, female, 38 years)

These suspicions were accompanied by people's fear that their stolen fingerprints could be used to harm them. One participant said,

"If you have somebody's fingerprints, you can basically make papers to grab all their properties." (Night Guard, male, 40 years).

However, other participants were less concerned about this, with one describing:

"I know that it is possible to snatch away one's properties with their fingerprints, but I am not afraid. Because, I am a poor man and I do not have anything to lose. The

rich people should be bothered about this." (Rickshaw Driver, male, 35 years).

In addition to theft of property, several participants raised concerns regarding their responsibility for whatever their phone might be used for. One housewife explained,

"My husband uses my phone all the time. If he does something wrong, or talks to a criminal over my phone, why should I be responsible for that?" - (Housewife, 55 years)

A local rickshaw garage owner expressed a similar fear concerning the phones that he provided to his drivers,

"Look, I give my phones to the rickshaw drivers so that they can communicate with me while they are out to work. How do I know why else they are using those phones? Now, if police arrest me for that, is this justice?" (Rickshaw Garage owner, male, 40 years)

A total of seven participants reported that they did not feel comfortable sharing their personal data with the government, and felt pressured to do so, with one saying, *"I feel pressurized to share my personal information, because if I don't give away my biometric data, I have to stop using mobile phones."* (Student, male, 22 years)

Another participant called the program a breach of privacy saying,

"Why do I have to tell them everything anyway? Then where is my privacy?" (Housewife, female, 40 years)

In general, the security concerns, suspicions, and fears associated with the

process often led people to resist the requirement to participate in the biometric registration system. Ten of our participants said that they would not register their sim, believing that the project would finally fail. Eleven participants said they would wait until the end of the deadline to see what happened to other people who did not register. They all believed that it would be impossible for the Government to register all mobile phone users in Bangladesh, and hoped that the project would fail so that they would not have to register their information.

6.6 Findings From the Online Survey

Our online survey was designed specifically to further the understanding of our ethnographic findings. Our anonymous online survey asked participants about their demographic data and whether they supported the biometric SIM registration [71]. In addition, we provided an optional, open-ended comment box that enabled participants to share their opinions. We received 606 survey responses, from which a number of themes arose.

First, the majority (77%) of our survey participants said that they did not like the biometric SIM registration system. Only 15% supported the program and 4% said they did not care (the rest preferred not to comment). The survey asked participants why they were dissatisfied with the biometric registration, and three answers stood out. 62% participants said they were not happy with the biometric registration because they believed that they were going to lose their personal security through this process. 55% participants said that they did not like the fact that they were being forced to give away their fingerprints.

15% thought the system could probably improve national security, but they still did not like the process of registration. Out of our 606 survey responses, 172 participants chose to use the open- ended comment box to tell us their personal opinions regarding biometric registration. We summarize the main findings from these responses below.

6.6.1 Support for the Biometric Registration System

A total of 36 people (20.9% of comments in the open-ended box) said that they supported the biometric registration program. They acknowledged the infrastructural challenges associated with implementing the program but said that such systems were necessary to reduce crime. One participant wrote:

"If you go to USA, you don't mind giving your fingerprints to the embassy, but here you don't want to give those to your own Government. This is hypocrisy." (businessman, male, 30 years).

Another participant said,

"The Government already has our fingerprints. We gave those to them when they made the voter registration cards. If they wanted to do any harm to us, they could do that by now." - (student, female, 22 years).

Some people who supported the registration process not only defended the biometric registration system, but also attacked the people who were protesting the program. For example, one comment said,

"some people do not like the Government, and they will protest any Government

initiative. To be honest, only the people who do illegal things will be concerned of such a surveillance system." (software engineer, male, 32 years).

6.6.2 Concern about Government or Political Exploitation

Of the 172 comments that we received, 73 (42.4%) did not support the biometric registration system because they thought that the Government would exploit this system later for their own political interest. One participant connected biometric surveillance with the Section 57 of ICT Law that the Bangladesh Government had imposed a few years ago to control people's online behavior. According to the rule, the Government has the power to punish a citizen for their online activities if they are deemed to be threatening to the Government, and the Government have arrested a number of political activists in last few years through that rule [129]. The participant wrote:

"The Government just does not want us to criticize them. The ICT law suppressed our voice online, and now this biometric surveillance will suppress our voice even over day-to-day communication. We are slowly moving to a police state." (University professor, male, 54).

Many other participants also expressed fear that the system could be used for political exploitation. Some participants believed that the Government would be able to listen to their conversations and track who they talked to, saying:

"Now you have to be careful whenever you talk to somebody through your mobile phone. Because if the (Government) don't like him, you are going to jail." (University student, male, 23 years).

Another participant pointed out that even if the current Government did not exploit the system, future Governments would still be able to do so:

"Even if this Government is so good that they are not going to exploit this information, how do you know the next Government will not do that? This system is going to exist forever. The Government has just given birth to a monster." (University professor, male, 42 years)

6.6.3 Exploitation by the Mobile Phone Operators

Of the 172 comments that we received, 28 (16.3%) said that they did not like the biometric registration process because the mobile phone operators would be able to obtain and keep their fingerprint data. One participant wrote,

"What is the point of giving our fingerprints to some commercial company? So that they can make a business out of those." (Housewife, female, 31 years).

Other participants mentioned how their fingerprints could be potentially be exploited for profit-making purposes and described how companies would be able to exercise power over them by having their fingerprint data. Eight participants were further concerned because five out of six mobile phone operators in Bangladesh are actually foreign companies, with one participant commenting,

"This means we are basically selling our fingerprints to other nations. No sane person can support this." (Software engineer, male, 30 years)

6.6.4 Concerns about Privacy Rights

Finally, 41 out of our 172 comments (23.8%) did not like the biometric registration system because they thought that it was violating their right to privacy. Participants in this group described how they viewed their fingerprints as their personal property, that the Government had no right to force them to give that away. Several participants expressed grief, frustration, and fear regarding this issue. One participant wrote,

"This is my fingerprint, and I do not want to give this to anyone. This is my right." (College student, female, 20 years).

Another participant said,

"I am just not comfortable sharing my personal information with some people I do not know. I don't want to hear whether they are good or bad, I just don't like this." -(Businessman, male, 54 years).

Several participants also did not like the fact that they were being forced to participate in the process. One of them said,

"I just don't like to be forced. Is this why we live in an independent country?" -(Banker, male, 38 years).

6.7 Discussion

The sections above present a qualitative analysis of our ethnographic findings and key observations from our online survey. In addition to developing a rich,

field-level understanding regarding the implementation of the biometric SIM registration program in Bangladesh, our ethnography has demonstrated how the local and situated values and practices around ownership, identity, exploitation, and security and safety concerns challenged the biometric registration program. Furthermore, our online survey revealed substantial dissatisfaction with the biometric SIM registration process. Our participants expressed their fear of political exploitation, commercial use, and invasion into their privacy. These findings help us conceptualize some of the core challenges associated with imposing a biometric surveillance in Bangladesh.

However, before synthesizing our findings into a set of key takeaways, we want to acknowledge that there are a number of limitations to our study. The biometric SIM registration program is a nation-wide campaign in Bangladesh, and our research only reveals a subset of the challenges encountered in part of the capital city, Dhaka. The registration points and the families that were studied were chosen based on convenience and participant availability. Hence, the findings of our study should not be generalized over the entire country. Instead, our study relies on the strength of ethnography that, instead of capturing a general picture, reveals rich nuances and a deep understanding of situated practices. In addition, the participants in our online survey represent only a small portion of the Bangladeshi population, and those that have Internet access. As such, the survey should be viewed as collecting data to validate findings from our ethnography and to accumulate a diverse set of opinions. Combining two different kinds of data (ethnography and an online survey) was also a methodological challenge that we confronted in this study. However, we decided that both kinds of data were important in explicating the nuances associated with the biometric registration program. Despite these limitations, our research of-

fers several key insights and takeaways that will be beneficial for the HCI community at large.

First, the core idea of biometric SIM registration was based on an assumption of individual ownership and personal use of mobile phones, which conflicted with local practices in several ways. Our ethnography revealed how mobile SIM cards frequently changed owners over time without any formal records, how the ownership of a phone in a family or group was dominated by power relationships rather than use, and how a single device was shared among multiple people in a variety of settings. Those practices not only complicated the process of biometric SIM registration, but also challenged its main objective: that the person who 'owns' a SIM is responsible for its use. Furthermore, the mismatch between the assumptions of the registration system and local practices also created fear among the people who were being forced to register their SIM cards. Our findings suggest that a more successful registration model might focus more on actual use of the SIM card rather than relying on ownership of a SIM.

Second, the success of creating and implementing a surveillance system like Bangladesh's biometric registration program largely depends on having a functioning and robust infrastructure that is difficult to guarantee in a developing country. As we have seen in our ethnography, the informal registration points were vulnerable to data leaking, corruption, and exploitation. There were gender and economic concerns that affected the success of the registration system. In light of these concerns, we observe that securely collecting, transmitting, and storing large amounts of sensitive biometric data requires infrastructural strength that may quickly become a burden for a Government in a low-resource

country. The complications that arose during the implementation of the biometric registration system suggest that biometric surveillance is resource-hungry, and without having proper infrastructural support, launching such a program should not be recommended.

Third, the success of a surveillance program may be heavily dependent on the extent to which people trust the entity responsible for the surveillance. Our ethnography and online survey both demonstrate that many people were suspicious of the motives of the Government and mobile phone operators. Although people's political beliefs undoubtedly shape part of this suspicion, it is undeniable that such a surveillance tool provides the Government with substantial power that could be used to exploit people. Many developing countries suffer from poor governance, and such surveillance tools have the potential to make the situation worse. We suggest that any action based on surveillance be made transparent to the country's citizens, so that the government cannot lie or misuse people's data. This would require that every access to the biometric database be publicly logged and justified. At the same time, an autonomous and unbiased civil society needs to be developed that will monitor and sanction access to the biometric database.

Beyond these implementation-level challenges, there are also several broader lessons from this study that are important to HCI scholarship in the 'developing world'. The growing enthusiasm for ICT-based 'development' programs around the globe often ignores the potential negative consequences of introducing ICTs in low-resource settings. However, the prevalence of ICT-based crimes has already been a big concern for many countries, including Bangladesh, and these countries are now taking steps launch costly monitor-

ing and surveillance systems that, due to technical, cultural, and infrastructural challenges, are likely to fail. Although we are not advocating that ICT- based solutions in these countries be discouraged, we do highlight the need for carefully considered policies, laws, and robust security infrastructure before embarking on large-scale, public ICT initiatives. Although recent HCI scholarship has critically analyzed ICT-based development programs through the lenses of postcolonial computing [133], residuality [13, 283], and sustainability [79], we suggest that HCI and ICTD scholars consider the issues of infrastructural breakdown, and potentially negative consequences as important aspects for evaluating technology in development contexts. At the same time, our study highlights a need for innovations in low-cost technologies to fight ICT-based crimes in the Global South.

Another key issue that our work raises is the need for notions of privacy that better fit the contexts, values, and local practices that are prevalent in the Global South. Our data shows that the situated idea of privacy among participants often made them resist the biometric registration program. However, the origin, nature, and characteristics of privacy in the Bangladeshi context has not been studied enough to explicate this resistance. The challenges in aligning the Western notion of privacy with notions of shared use, complex ownership, and communal identity, as reported in this chapter demonstrate the dearth of knowledge in this area. With the rapid adoption of technologies worldwide, people of different cultures are exposed to technologies that are embedded with Western privacy values [94] and this issue is becoming increasingly important. Our study reveals tensions between the shared use of mobile phones and individual privacy, and between ownership and gender – both of which are culturally constructed but technology mediated. Several studies on technology and gender

in the Global South have shown how the relationship between technology and women is affected by the male-dominated cultural norms [3,5,36]. However, we know little about their impact on the notion of privacy and implications for biometric identification. Hence, the gender, power, and economic dynamics that we reveal in this chapter open a new space in which HCI designers can create mechanisms that preserve privacy in contexts outside the West.

Finally, our analysis reveals a tension between notions of voice and surveillance in Bangladesh. The historical conflict between surveillance and privacy in the Western world has been shaped by laws that preserve an individual's privacy rights [21, 168, 300, 32]. However, many countries in the Global South, including Bangladesh, do not have these privacy rights protected by their constitutions. As a result, enactment of a surveillance law carries the risk of suppressing individuals' voices, and may eventually destroy the democratic environment in a country. Hence, an individual's right to privacy is inevitably associated with the democratic development of a country. This broad conceptualization of privacy allows us to perceive how the design of different privacy features in our day-to-day devices actually "function" in the Western world because of the stable democratic environment. However, when the devices leave these stable environments, a whole new set of designs and policies are required to understand "privacy" in different scenarios. As a result, in addition to understanding privacy as it relates to different social and cultural norms, it also needs to be studied in a diverse range of political environments and settings.

CHAPTER 7

CONCLUSION

In this dissertation, I have defined voice as a procedural and practical framework, and presented three of my projects that I conducted during my Ph.D.. at Cornell University to explain the ideas of three important qualities of voice - access, autonomy, and accountability. The first project, "Suhrid" focused on the problem of "access", challenged the "individualistic" notion of access, and provided an alternative "social" way of understanding it. The second project, "Protibadi" had a particular focus on the idea of "autonomy", which is situated in the context of women in Bangladesh, who are exposed to the severe threat of public sexual harassment. The third project, "Biometric SIM registration", has focused on the right of the to privacy for citizens of Bangladesh, which came to the surface when the government of Bangladesh enforced a mandatory biometric registration of mobile SIM cards.

The definition of voice that I have presented in Chapter 2 incorporates two conceptualizations: a) voice as a value, and b) voice as a process. These two ideas are based on two rich sets of scholarship in social and political science, namely justice and democracy. The idea of voice as a value is, in particular, represents a core contribution to literature. It provides us with a broad set of tools and techniques to analyze whether a system is supporting voice, in addition to giving it a philosophical underpinning. On the other hand, the idea of voice as a process provides us with a procedural framework to think about building a platform to support voice. This procedural path can heavily contribute to designing technology, policy, and laws to protect the right of marginalized communities across the world. Before diving into the discussion of each of these projects

and their broad takeaways, let me first spend some time on the methodological aspect of them. My research has leveraged a variety of methodological tools and techniques for understanding people and designing technologies for them. However, there is a clear focus on an ethnographically-centered understanding of people, place, actions, and reactions. All three of my projects had ethnography at the heart of them, and other methods revolved around the lessons learned from ethnography. There are three main reasons why I have chosen ethnography to underpin my findings and theories around voice.

First, my starting definition of voice emphasizes the multiplicity and context-dependent nature of justice. This means that we need to understand a person's action from their cultural and historical context in order to better interpret their actions. This urge to understand people from their cultural practices naturally fits with the established anthropological tool for studying a culture - ethnography. There are different kinds of ethnographies and they have also evolved significantly over time, but it is beyond the scope of this dissertation to discuss this. However, I want to emphasize the epistemological alignment of ethnography and voice to advance this line of scholarship in the future. Like ethnography, voice also builds on developing knowledge through situated actions. In my project with rickshaw drivers, the core design idea came from from a deep ethnographic understanding of access from the situated practice of gift-giving in the rickshaw driver communities. I posit that such culturally situated understandings of access, autonomy, and accountability are needed to understand voice and design around it.

Second, ethnography warrants the researcher's involvement in the field, with people. In some sense, researchers become a mouthpiece for the local

people and act as a vehicle for their voice. Hence, ethnography itself can be imagined as one way that we hear the voice of marginalized populations. This particular understanding is important as the idea of 'voice as a value' largely depends on the idea of justice, and like Rawls and Sen, I emphasize the necessity of the listener having a thorough understanding of the speaker. Rawls, for example, has invited us to imagine ourselves in a position of the most marginalized person in the community. I argue that such an imagination practice can only come close to Rawls' ideal if we really reach out to the most marginalized populations, spend our time with them, and develop the worldview they have. Such a positioning of the researcher provides them with a very important and useful tool to see technology, policy, and design from a totally different perspective, and to root out any injustice embedded in them. Researchers' attachment to those communities thus advances their voices. At the same time, this vested commitment and long-term relationship with marginalized communities is integral to research in voice itself, which stands on the ground of multiplicity and polyvocality. The alternative voice that an ethnographer brings from the field does not only challenges any idealistic hegemony, but also contributes to the constitution of the idea of voice around a particular issue.

Third, ethnography can inform many pragmatic actions toward the advancement of voice in a unique and useful way. The nuanced understanding of culture, place, and practices can help design technology, policy, and law to support the voice of marginalized people. Such a nuanced understanding is not possible without a thorough understanding of the cultural components of a society. However, this does not make it imperative for ethnographers to feed the design with necessary information. I argue that a deep level of sensitivity can be built through ethnography that can significantly contribute to design. For example,

in my project on designing technology for Bangladeshi women to help them fight sexual harassment, the interview, survey, and FGD data could only tell us very few things about what we might do. However, being in the field, being refused by so many women for the interviews, and observing the public reaction to the harassment posts over social media gave me a deeper understanding of the problem with lack of voice. That understanding later drove me toward an open-ended design of a technology. Hence, I believe that ethnography can work as a great tool when we see voice as a process, too.

It should also be noted that I have used other methodological tools and techniques in my research besides ethnography. For example, in a couple of my projects, I have used online surveys. The first case was with Bangladeshi women who were reluctant to talk about harassment with their identity disclosed. So, I designed an anonymous online survey for collecting responses. In the second case, I conducted an online survey of Bangladeshi citizens to find out their responses to government-imposed biometric SIM registration. In this case, I suspected that people would not be feeling safe and comfortable sharing their negative views about this registration process. So, I used online survey tools as a mechanism to channel their voices anonymously. I believe that such anonymity is often important in research around voice, especially in sensitive issues, to allow the participant a free space to express their opinions.

I have also used 'design' as a way to understand people. In couple of our projects, Suhrid and Protibadi, I built mobile phone applications and deployed those in the field with real users in their day to day life. I conducted user studies after the deployment and asked people about their experiences using those applications. Here, my objective was not to 'solve' the problem with a mo-

bile phone application, which I believed would not be a realistic goal. Instead, I tried to have a deeper understanding of people and their practices through this design, which might not be understood otherwise. For example, when we deployed Protibadi in public, and women started reporting harassment, I also could see how conservative Bangladeshi society reacted to them– the harsh comments to the victims, even coming from the other women in the society. Similarly, only after deploying Suhrid with rickshaw drivers could we know to what extent the garage owner was happy to provide help. The politics of help and other associated tricks were revealed though this design intervention. This is why I believe that my 'research through design' approach can be very helpful for future researchers to advance interventionist research in voice. However, I also acknowledge the limitations and shortcomings of interventionist approaches in the ICTD context, and I believe that a context-specific decision needs to be made by researchers to justify their course of action for all their methodological tools and techniques.

Next, I turn to my projects, discuss the broad takeaways from each of them, and explain how they connect to the idea of voice that we have put forth in this dissertation. I start my discussion with Suhrid. This project emphasizes 'access'. One of the central messages of this project is that thinking about access from a social and communal perspective offers us better ways to approach them. This is very important when we think about the role of access in voice. If one person in a community is barred from getting access to some services, often times we consider this as a problem surrounding that person. However, voice invokes a conceptualization of this problem that involves the whole community. In more concrete examples, if a vision-impaired person is barred from getting access to information online, the community should consider this as a challenge for ev-

eryone. The communal mechanism of support, cooperation, and collaboration is hence needed to approach this problem. The community must realize that such inaccessibility is not confined to a person, but that it essentially reduces the voice of the whole community. This realization is not only needed for designing supportive environment for people with differences, but also for better representation. When a person becomes a part of a community and raises their voice, they are no longer represented by their differences. Instead, they become one of many people who together fight for their rights.

Moreover, this project also highlights the necessity of access to go deeper than the surface, which I have discussed in detail in Chapter 2. Suhrid, the mobile phone application, that we deployed in the field was actually a manifestation of this message. On the surface this interface did allow rickshaw drivers to call their friends and family when needed. However, many important things that the rickshaw drivers needed in their lives could not be done through mobile phones. Many of their contacts did not have their own mobile phones, and were unreachable, for example. So, rickshaw drivers could not talk to those relatives and friends even after owning a mobile phone and being able to call a number. The accessible mobile phone interface allowed them to watch any video content. However, there were really very few videos made relevant to their life and culture that they would love to see. Such infrastructural challenges are deep, and go far beyond designing an accessible interface, which actually just touches the surface of the challenge with "access". Since I used my design as a way to understand people, I posit that Suhrid helped me understand how the problem of access to technology has a deep root in the social and cultural infrastructure of a community.

In my second project, "Protibadi", I discussed the challenges in designing a technology for women to help them combat sexual harassment. This project highlights the concept of autonomy, which is another important aspect of voice. There are a couple of core lessons that I learned from this project. For example, the methodological challenge that is inherent in any way of learning about "others" came to the fore in this project. In my earlier discussion on voice in Chapter 2, I have mentioned how this problem also sits at the core of the scholarship in justice and democracy. For example, both Rawls and Sen questioned the legitimacy of the utilitarianism view of justice because it attempts to measure all against an objective scale. Rawls addressed this problem by proposing the veil of ignorance, which is, in essence, an effort to understand others by placing ourselves in their shoes. Similarly, Sen has also focused on understanding choices from a person's social context. While understanding others is thus important for establishing justice, there are significant challenges associated with it. Edward Said, for example, in his celebrated book, "Orientalism", argued that it is fundamentally impossible for a person from a different knowledge system to learn and understand a local phenomenon [249]. He has focused on the ontological differences that makes this task impossible. Gayatri Spivak, in her renowned article, "Can the subaltern speak"? [282], added another important layer to this issue by saying how it is impossible to convey a message through a language that has been historically developed by "others". Because of this ontological and methodological difference, knowing about others is challenging, and judgment is hard for a person who is not a part of the same community to do. As a result, the evaluation and analysis of a voice must be situated in the local knowledge system, and should be put into the context of the people who are expressing their voices.

Additionally, Protibadi also highlights the challenge associated with intersectional voice, which is both difficult to understand and challenging to design around. For example, for a woman in Bangladesh, it is not only problematic to raise voice because they are women, but they also carry a long colonial history that has inherently taken away privileges from the whole community including the men and women of Bangladesh. As a result, fighting against the misogyny is more challenging if it is wrapped in local cultural values. Women fear to leave their community because they know that the community is probably the only way for them to raise the voice for their other, essential daily needs. This kind of multiple impositioning of constraints make it very difficult for them raise their voice. These problems are very complex, have very long historical and cultural roots, and cannot be solved overnight by a technology. Such problems need to addressed through a series of comprehensive actions involving technology, policy, law, and education to reform the society.

Finally, the project with biometric SIM registration in Bangladesh focuses on the idea of privacy and accountability. This project highlights the tension between privacy and accountability, which is central to the debate in democracy, and hence to voice. While anonymity and privacy are important to develop voice, political participation, and democracy, it is also true that people often misuse this opportunity by harming others. The idea of biometric mobile SIM registration in Bangladesh was underpinned by a broader call for the security of citizens. The question of security came to the fore in the public discussion after a series of terrorists attacks in the country. The police found that the miscreants often used mobile phones to communicate among themselves. Hence, they thought it would be important to surveil mobile phone communication in the country. While the necessity of security is undeniable, this solution has in

fact caused more fear. Also, this tension then calls for investigation around alternative design and policy interventions. For example, 'how can we design a technology that can both ensure privacy and voice" is one question that surfaced through this project. However, I want to emphasize that the necessity of voice must not be undermined, even in the face of such a security threat. This is why I believe it is important to bring in the idea of accountability to the discussion on voice. Drawing from our previous analysis on accountability, we know that a person or a community must need to take responsibility for any consequence of their voice. Technologies like mobile phones, which have been historically designed as a "personal device", often ignore accountability in their design. As a result, a person's action with their phone is not properly associated with the interest of their community. As a result, the community cannot ensure that a person does not do any kind of harm through their phones, neither can they take measures to reduce the chance of such cases. I posit that stripping privacy down to individual level and inscribing that liberal private values to mobile technology contributed much to the the misuse of mobile phones. Efforts to maintain privacy in a way that respects the community's values and image could reduce such a problem in the first place.

The whole idea of designing a single communication technology may not be a right approach for promoting the idea of voice. For example, mobile phones have now become accessible to many low-income communities around the world due to the reduction of its cost and widening of cellular networks. However, the benefits of mobile phone are not equally enjoyed by people with different privileges. People in marginalized communities do not get as much information and support through mobile phones as a person from a privileged community does. Similarly, the use of mobile phones is different for a well-

intentioned person than a person with evil intent. When mobile phones are designed, it is not inscribed with any ethical values that can reduce the chance of a person misusing the phone to damage another person's voice. Designing such a thing requires putting the technology within a whole movement, and incorporating a set of values from the local economy, history, culture, and politics. We must question, what does it mean to give everybody access to a mobile phone in Bangladesh? Will it really support the voice of marginalized people in the country, or will it only accentuate the voices of privileged people? How can we reduce this digital divide? A meta-story of this project tells us how the use of mobile phone by general public is controlled by the will of the government and other powerful entities. These phones were introduced in Bangladesh a couple of decades ago with a promise of social development. The government has undertaken the gigantic project of making a "Digital Bangladesh" lately and has made significant improvement in mobile and internet connections in the country. These all assume that "technology-led development" will give the government a better image. It is also undeniable that these actions were in tune with the global attention to development through computing. I agree that many people in Bangladesh have also benefited by this advancement of computing technologies in the country. However, later when government felt threatened, they attributed a negative narrative to the use of mobile phone and called it the root of most criminal acts in the country. They also imposed surveillance on the use of mobile phones. These subsequent actions affected the life of everyday people in a way described in Chapter 6. These descriptions tell us that the voices of regular people did not come into play when the government made this important, national decision. Furthermore, the scope of people's voice has been further reduced through this surveillance.

Next, I summarize my whole discussion around voice in this dissertation by making a three key points. This points are gleaned from the the theory I built and the lessons I have learned through my projects. These key points are important to advance my research around voice in future, which I believe I could only start through my Ph.D. research at Cornell. First, the idea of voice is closely tied with the idea of justice. Thus, it requires careful attention to build a system for voice so that justice is not interrupted. In fact, any system for voice should be considered as a support to the justice system. The call for integrating voice into a system is inseparable from a call to integrate justice into it. Furthermore, this invocation for voice should be situated within a specific context, and should follow that context's commonly shared and accepted idea of justice. Voice is hence both a manifestation of justice and a demonstration of value-multiplicity and polyvocality. The justice that we associate with voice in a system should not be alienated from contextual integrity and multiplicity or moral standpoints. Thus, voice is an initiative to widen the scope of justice and an initiative to create more fairness.

Second, designing for voice should be considered as a component of a holistic and comprehensive social movement, and not a single technical intervention. Any initiative toward making voice possible should incorporate a broad and deep understanding of the historical, social, cultural, and political contexts of the society. Voice is not possible just by making an intervention at one layer, leaving the others unaddressed. However, it is also not the responsibility of voice to offer criticism to an alienated technical intervention for creating access to a service for a group of individuals. Instead, voice puts such initiatives in the broader context of justice, provides analytical tools to evaluate them, and suggests ways to improve and advance them. Hence, voice promotes and joins

a social movement toward equity, fairness, and justice.

Third, voice is also essentially a resistance against all kinds of marginalizations, exploitation, and deprivation. The objective of voice is to allow people to protect themselves, resisting any unjust power practiced against them, protecting their identities, improving their representations, and making their presence stronger in politics. Voice suggests these movements coming out of the people themselves. This means that voice is critical to all kinds of paternalistic and colonial approach of "development", and advances the idea of "development within". In this light, voice is also aligned with the idea of local means of sustainable development through sustainable cultural practices.

Finally, this dissertation has defined voice as socio-technical tool for defending human rights, laid out a foundation for understanding marginalization is a broad sense, provided analytical tools to evaluate voice, and supplied theoretical materials to take pragmatic initiatives toward advancing voice. I believe that these contributions will play an essential role in literature around justice, democracy, ethics, and development, especially in this era when these all are inseparable from digital and communication technologies. I hope that the contribution of this dissertation will help researchers develop impactful ideas, theories, design interventions, policies, and laws to support the voice of marginalized people all around the world.

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