Ludic Design for Accessibility in the Global South

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ABSTRACT

Technology solutions for accessibility have long been created using a narrow utilitarian lens, especially in the Global South due to multi-dimensional challenges and resource constraints: an emphasis on purely functional outcomes supported by sterile cost-benefit analysis that ignores the fact that people with disability are people first with their own aspirations for leisure and enjoyment in addition to skills and employment. We propose an alternate design methodology called the Ludic Design for Accessibility (LDA) that puts play and playfulness at the center of all assistive technology design and use. We then describe a seven-step framework for designers to apply this methodology to create impactful solutions. Though LDA is universally applicable, we highlight the factors that make it especially relevant in the context of accessibility in the Global South.

Keywords
Play, technologies for accessibility, HCI theory

> *Man only plays when in the full meaning of the word he is a man, and he is only completely a man when he plays*[1] (Friedreich Schiller)

1. INTRODUCTION

One rule that was clearly written out for the tech world as it watched Steve Jobs present new devices at one of Apple's mega events was that technology adoption was about the experience it provided (Grant and Sharma 2011). Without undermining the instrumental efficiency of achieving the ends that product sets out to enable, Apple's products decisively reframed the culture of usability – the value of the experience itself was brought to the center of design in technological devices (Burgess 2012). Play, as a conceptual framework in thinking about product experiences has been central to design of technical artifacts for several years, and while several frameworks have evolved, including participatory design, value-centric design, reflective design, or ludic design, the fundamental concept of creating enjoyable experiences has remained constant (Sengers et al. 2005).

Research and product development around accessibility on the other hand has traditionally been driven by a utilitarian ethic – approaching it from a 'greatest good' perspective that enables instrumental functions for individuals in their access to society around them. In this approach, which is often inherently ableist, technology is an offset for impairment. Through this lens, 'improving quality of life' has typically been equated moving toward functional parity with the non-disabled in the architectural or virtual worlds. This approach is pronounced in low-resource settings, such as in parts of the Global South, which have economic, infrastructural, and policy constraints. These constraints undermine the users experiences in two important ways – first, the mainstream market products that make it to users may be best set up for the infrastructural realities of where these products are designed – for instance, design artifacts may assume access to paved and safe sidewalks. Second, the lack of research and product development capacity of nation states in the global south may shortchange their ability to invest in the development of product experiences that are designed for the cultural and social preferences of their populations. For instance, screen readers, developed and optimized largely for Roman scripts and high computing power environments, are critical tools for making the digital world accessible to the blind community. A majority of the world's blind population is in the global south, and for the vast majority of this population, English is not their primary language. However, there is very little development in the text to speech technologies for most of the world's languages. For instance, there are about 20 Indian languages that have native speakers ranging from 20 million to 190 million. However, Hindi, with 190 million speakers, is the only language that has support for TTS services offered by Amazon and Google.

Since the living public environment around us is largely inaccessible, accessible technologies are often the essential bridge that makes most forms of architectural and communication access possible for people with disabilities. Thus, people with disabilities often find themselves in near ubiquitous proximity to such devices or environments. Consequently, the enjoyability of accessible experiences has important consequences for peoples' willingness to use them – and indeed a significant body of

work (Riemer-Reiss and Wacker 2000; Shinohara and Wobbrock 2011) has shown that awkward or non-pleasurable technology experiences have historically presented adoption challenges among populations of people with disabilities, even when the users clearly need and want to adopt to the new technology.

We propose that the design of new technologies for people with disabilities should neither be driven incrementally simply by the incorporation of accessibility features into mainstream technology, nor through a function-driven approach that ignores the experience of technology use. We argue for rethinking both the design process and the usage scenarios of accessibility technology around the notion of playfulness and exploration, rather than the received course of utility alone. We propose the notion of ludic design as a framework to rethink accessibility, specifically building on past work on play and enjoyment in the process of interaction with the world around oneself. We propose this as a framework to approach the usability of technology, but also the commercial logic of technology adoption, which is deeply tied to the former. We argue that irrespective of structural impediments to the end-to-end implementation, there are steps to thinking about playfulness in design that can incorporated both at the start of, or midway into the design process.

Central to this approach to thinking about design artifacts is the notion of 'homo ludens' or a 'man of play', defined by Huizinga (1950) and used by Gaver (2002) in proposing ways of thinking about ludic design.

> In order to truly leave work behind, we need to embrace an open-ended, self-motivated form of play. This is an engagement that has no fixed path or end, but instead involves a wide-ranging conversation with the circumstances and situations that give it rise" (Gaver 2002; Pal and Chirumamilla 2013)

The notion of initially learning to use a technology through exploration, or continuing to get better at it over time the same way is commonplace in the predominant, mainstream experience of technology use, and builds on a body of work that shows that exploration is a superior means of learning to use new technology (Lazar and Norcio 2003). In contrast, while getting used to an accessible device also requires a significant amount of exploration, there is an important difference in the engineering of most accessible technologies. Typically, assistive technologies have either been custom designed for people with disabilities with very specific affordances (the abilities enabled by or suggested by the design of a technological artifact) in mind or end up adapted for people with disabilities from mainstream commercial products. There is often a further level of adaptation in moving these ATs to the global south, which too, is pegged to the functions they seek to enable. Gaze controlled interfacing, which has recently become a standard part of Windows 10, is a potential boon to people with severe muscular impairments or those who have lost the use of their hands, enabling them to have full access to the digital world. However, in the global south such technology is introduced invariably with very specific educational goals for children [Jeevithashree 2019, Wong and Lam 2017].

1.1 Role of Play

Playfulness within design does not simply relate to more usable or interactive functionality in a design artifact. It is a broader concept that relates to the healthy development of the learner or user of artifacts, starting from early childhood learning, continued into adulthood (Gordon 2014). There is also a significant body of work that links play to effective learning, both among children and adults (Van Vleet and Feeney 2015; Proyer 2011), and there are strong links between play and playfulness with creativity (Russ 2003) and innovation (Bateson 2014).
The value of play in learning extends to other domains of accessible technology such as rehabilitative learning: for instance, virtual reality play that results in positive learning in children with cerebral palsy is described by Reid (2002) while the use of a robots for therapy is illustrated by [Howard] and [Lathan]

The role of play in development and well-being synthesized from different fields is presented in (Gordon, 2014). For instance, in exploring the role of play in the first year of a child's development:

> Freedom to play without inhibition or constriction is a key ingredient for joy, interest, passion, and vitality later in life. (Marks-Tarlow 2012; Fredrickson 2001; Panksepp 2004). As psychologist Alan Schore put it, play creates a "positively-charged curiosity that fuels the burgeoning self's exploration of novel socio-emotional and physical environments" (Schore 1994).

Our research is based on the premise that play and playfulness are central to what makes us human, and that by separating playfulness and exploration from the design experience, we fail the intended end users of our products. Given the separation of a large number of marginalized identities, particularly individuals with disabilities, from the design process, we propose that a rethinking of the design of accessible technologies is needed. We propose that a ludic thinking approach can serve to more broadly understand the role of play across various learning experiences of people with disabilities, which can in turn be useful in approaching the design process.

The focus of our work is in regions where scalable deployment of technologies for accessibility face major challenges. Disability and poverty are tightly coupled – people with disabilities are likelier to experience poverty, and those who are poor and have disabilities are likely to face further marginalization and exclusion from access to social and economic resources (Pellegrini 1990; Yeo et Moore 2003; Grech 2016]. In addition, disabilities are also likely to be misdiagnosed or detected later than in the Global North, resulting is development delays, preventable disabilities, delayed interventions, and further exclusion from peers and from the mainstream.

Cultural attitudes towards disability, including stigma that leads to the invisibility of people with disabilities from the public, are an additional factor that both undermines peoples' ability to participate in society, but also is a barrier against the state being proactive in ensuring accessible spaces and infrastructure. The formal education system, which provides both a space for learning and socializing about the world around, and the health care system that provides for quality of life, are both inaccessible for a vast majority of people with various disabilities [1]

The poverty or exclusion of people with disabilities from the mainstream has major implications for the deployment of technologies for accessibility. Adults with disabilities in these settings have a compounded deficit, lack of specialized education, and a lack of access to accessible technologies in one's extended social circles. These can come together to make the adaptation of assistive technologies additionally challenging. Disability rights and capacity building have been championed by strong groups of Disabled Peoples' Organizations (DPOs) in various parts of the Global South. However, the corresponding skill development work and introduction of assistive technologies for people with disabilities has been excessively focused on channeling people to livelihoods and employability rather than enabling individual's aptitude based long-term self-realization. This, in development contexts, is often justified pointing to the reality of constrained resources and, infrastructure. This has the potential of directing the learning experiences of people with disabilities towards strict instrumental goals, channeling people towards sustenance-level assistance for subsistence-level livelihoods, perpetuating this cycle. Thus, the utilitarian lens of accessible technology deployment can have long-term negative consequences.

Ludic design as a framework for thinking about accessible technologies is particularly relevant to technology use by children. For children, this includes introducing technology that is both fun to use and cognizant of their play practices. Indeed, play practices of children have long been considered central to their long-term development, and are even enshrined in international law. Accessibility professionals have argued that earlier introduction to technology has better longer-term impacts and increases peoples' ability to adapt to new technology.

2. LUDIC DESIGN FOR ACCESSIBILITY

Researchers and developers working on accessibility seek positive impact on technology adoption by people with disabilities. While customization for the needs of the few, who may not be served by off the shelf solutions, is a central tenet of quality accessibility work (Kintsch and DePaula 2002; Hurst and Tobias 2011), the overall goal is always to maximize the number of people whose interactions with society can be enabled by better technologies (Plos et al. 2012). Our proposition of ludic design for accessibility contends that play and an enjoyable experience need to be considered as part of a technological interaction irrespective of whether the use case is of a single or small number of users, or of a mass manufactured scenario.

An outcome of an artifact or solution from a ludic design approach will have two mutually synergizing aspects:

- At a minimum the end users will have an enjoyable experience with the technology, making the artifact or system desirable to use
- The goal of design should be to enable various forms of skill acquisition and long-term learning as a side-effect of extended play by the users

2.1 Framework for Ludic Design

The challenge for researchers using the LDA approach is to ensure that the use-case goals they have in mind are not undercut by the intent to enable play, and vice versa. To this end, we propose LDA as a five-point framework that helps to think about and to create artifacts for accessibility. We build on the characterization of play as described by Huizinga (1950) and propose these as underpinning attributes of any LDA.

- Free Activity: A free activity standing quite consciously outside "ordinary" life as being "not serious", but at the same time absorbing the player intensely and utterly and where the player has the complete freedom to engage with the activity or not
- Interest agnostic: An activity not necessarily connected with material interest, and no profit is necessarily to be gained by it
- Bounded: An activity that proceeds within it own proper boundaries of space and time

[1]

- Social: An activity that promotes the formation of social groupings
- Desired Side-Effect: The activity delivers some benefit or skill development to the end users of the artifact or activity, without detracting from the above elements

The first four steps are Huizinga's formal description of pure play, while the fifth is the aspect that enables the delivery of the intended benefit to the target audience.

The notion of pure play is illustrated by the game called Calvinball in the comic strip Calvin and Hobbes by Bill Watterson. In the game the players make up rules as they go and however bizarre the rules may be, both the players abide by them. And as Calvin says, "the only permanent rule in Calvinball is that you can't play it the same way twice" [Watterson, 1990]. Calvinball presents an analogy for a kind of play that is central to most peoples' lived experiences – things that are purely play, without the structure of sport – whether rolling tires down a street, or blowing balloons, where the inherent pleasure is in the process.

2.2 Disability, Play, and the Global South

Play is recognized by scholarship and practice as highly valuable for children's cognitive and social development (Tarantino 2018). Children have a high capacity for gaining competence in novel endeavors and creative expansion on those [NSCDC 2007]

However, there has been less discussion on play as enabling a creative and overall positive state of being for adults, despite the case being made [Milteer, 2012]. We argue that the cases of playful participation in successful design artifacts derive from a deeper reality of the human experience, in that play is a natural state of being. There are many examples of this in the technological artifacts we use as adults. Casually-engaged browsing of video content, such as Instagram, with no clear goal other than momentary pleasure, or non-competitive gaming are areas where this is evident.

The notion of ludic design for accessibility is of particular importance, as well as of unique challenge, because of the role of play in the lives of people with disabilities. Growing up, children with disabilities may be left out of both the structured and unstructured play (Bateson 2013) for a complicated mix of reasons related to the ways in which formal learning occurs. This can have significant consequences for cognitive development [Holt 2007], including the long-term dissuasion from the idea of learning through play.

> Play forms an important foundation for the development of skills in all children. Unfortunately, for infants and children with disabilities, real play may be absent or diminished, replaced by therapies and/or special instruction. Infants and young children with disabilities experience barriers to play that are created by the nature of their disability. Parents of these children may feel they do not have time to play, given the demands of intervention and education. Alternatively, they may not know how to facilitate play with a child with a disability. [Lane and Shelly 1996)

People with disabilities are disadvantaged in access play-based learning also partly because of the nature of care, where needed. There is a high correlation of disability with poverty, and there is typically care involved, which may not be available through the state. A child with disability is primarily cared for by the parents and immediate family, who fall further into poverty because of the disability in the family (Dalal and Pande 1999). Resources are consequently focused on survival and sustenance from childhood, often turning into a vicious cycle of exclusion in school due to their 'being different' (which is compounded by their lack of play experiences that other children have), eventually into an adult life that is likewise focused on livelihood and employability skills, rather than leisure or play.

Thus, we need to be cognizant that the process and outcomes of ludic design for people with disabilities in a Global South setting is likely to present a vastly different set of challenges and opportunities than parts of the west where play-based, exploratory technology use is already the norm. Ludic design has the potential to enable people with disabilities in the global south to indulge in play, and while that in and of itself is valuable, the play may result in the eventual acquisition of important skills. The nature of play, that of inducing formation of social groupings is also appropriate in many parts of the global south that still rely on community-based living experience where the units of support are neighbors or villages, rather than families arranged into nuclear units (Ghai 2015).

There are two challenges facing the ludic-designer: first is to create accessible play that meets the first four aspects – something that is a free activity, interest agnostic, has boundaries, and is social, this itself is a major challenge. However, the inherent goal of LDA is to have a desired side-effect of some benefit. This in some sense turns design on its head. It means that the overarching end goal of the design needs to be conceptualized from the start as an outcome of the larger intent of the experience being an enjoyable one.

2.3 Ludic Design, Gaming, and Gamification

Ludic design has similarities to gamification but as will be clear, it is distinctly different: Gamification has two key components, a task to be completed or worked on and elements of game mechanics creatively added around the task to incentivize people to engage with the task with the goal of maximizing completion of the task or improving the quality of the task.

By intent, gamification seeks to achieve a material end goal with incentives for players who participate, in the form of money, badges, or some other form of recognition. These incentives along with a strong element of competition drives participation of people in such efforts. We subscribe to the distinction between play and competitive games as articulated by Gray (2009) and keep play central to our efforts. Another big difference is while play is often characterized as competitive or agnostic, this view is also inherently ableist.

> *In my theory, contest is a morphing of play with something that is close to the opposite of play–a drive to beat and dominate others. When we combine these two opposites, play becomes more serious (and thereby more acceptable to contemporary adults) and domination becomes more playful–not entirely a bad thing, but not the same as pure play*.

The difference between gamification and the ludic design approach can be captured with an example. Modern health apps encourage people to exercise and often do with some comparative metric in mind (against other individuals, against a median for their age, or against their own past performance). These are play, in a sense, since they appeal to an individual's sense of enjoying a certain activity. One could interpret some of the key attributes of LDA as being present - it is a free activity, it has boundaries, and is social. But it is arguably not interest-agnostic, and the benefit is not the side effect.

Instead, the example of a child rolling a tire with a stick is an example of a playful activity that ends up contributing to dexterity, athleticism and control. However, arguably unlike 'gaming' the activity is fulfilling in and of itself, requiring no scores, no audience, no comparison. This is play in its purest form incorporating all the critical elements of play. Thus, LDA is not gamification.

LDA is also not accessible gaming but, as seen in the illustrative example, could be an important component in situations where an existing game or play is being appropriated by the ludic designer. There are significant efforts around the world to bring the joy of games and sports to people with disabilities, recognizing the benefits as well as the negative impacts of exclusion from games (Chakraborty 2017). Many of the common competitive sports in the world have now have digital game versions that are accessible for people with disabilities.

While gaming, as defined by digital games played for recreational purposes, have important elements of non-utilitarian benefit for their consumers, they are generally defined as being the end in and of themselves. There have been many efforts to make digital gaming accessible (XboxAC, Swaminathan et al. 2018; Zhao et al. 2018)

These do indeed extend the possibility of playful appreciation of technological artifacts, and fulfil most of the key attributes of LDA. However, there needs to be a more conscious effort to enable the side effect in a more constructive way rather than as expertise related to the skills one can acquire through a technological artifact.

2.4 LDA, an Illustration

We use an illustrative example to clarify the framework of ludic design for accessibility. Suppose the intended side-effect is to inculcate numeracy to young children who are blind or low vision. Sighted children pick up concepts of big and small, one, many or absence of things, ordering of things by size etc., as part of growing up from infancy to childhood by visual experiences around them. Children who are born blind may have a harder time picking up these concepts which are typically visually communicated and may be disadvantaged when they start primary schooling. Hence enhancing numeracy is a desirable end goal of a ludic designer.

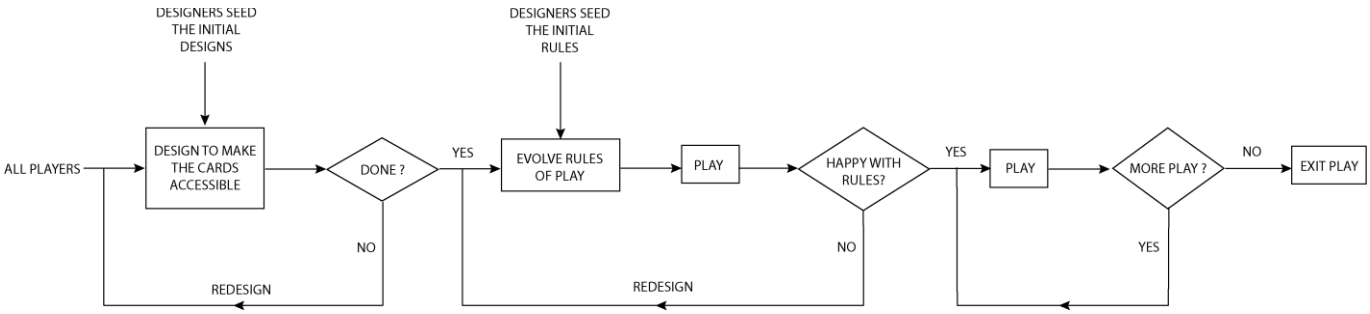

Figure 1. Ludic Design process for the numeracy example.

Figure 1 shows the LDA process with enhancing numeracy of blind children as the intended side effect. The figure shows the flow of activities around the use of playing cards, chosen as the instrument by the Ludic designer (from a set of possible others, including for instance Ludo, snakes and ladders etc.). The designer and the players, including both children with vision impairments and sighted, enter the play and go through three iterative processes: collaborative redesign of the cards to make them accessible with the designer playing a lead role, evolving and agreeing to the rules of play, again seeded with some rules by the designer, and repeated play. At every stage all the aspects of pure play are maintained. As the children enjoy the play and play it often, an evaluator can join the play and in the process of playing evaluate the numeracy skills attained by the players, without breaking the fourth wall of play.

There are Braille playing cards available off the shelf (Figure 2a), but these use a combination of two Braille characters to identify each of the 52 cards. But it requires the players to be literate in Braille. One can make other tactile markings to make the cards accessible to both sighted and Braille non-literate children who are blind. Figure 2b shows an example of an inclusive design evolved during play with children.

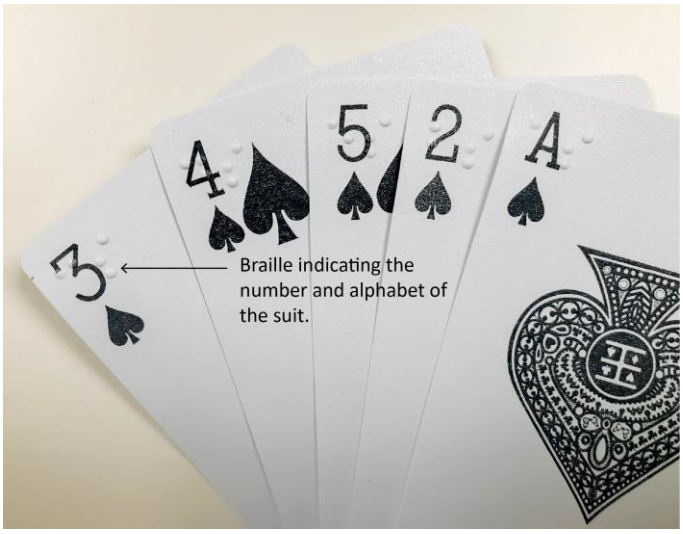

Figure 2a. Off the shelf Braille playing cards.

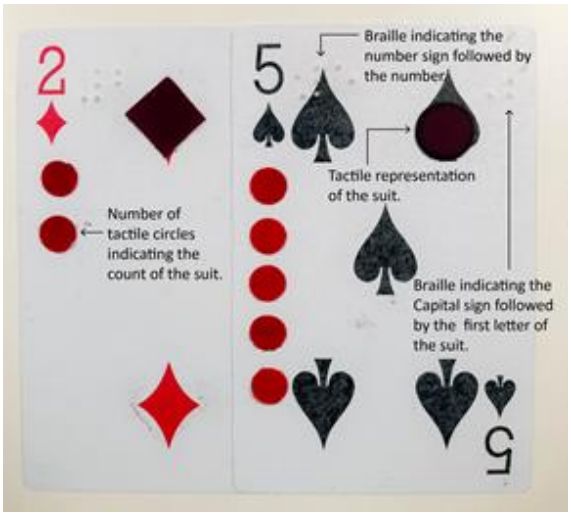

Figure 2b. An accessible design for Braille learners

3. LDA in Practice

Though we articulate ludic design for accessibility here for the first time, there have been some projects that have independently, though not explicitly, followed the LDA framework presented in Section 2. The use of Minecraft for autism is one such illustrative example.

Minecraft is the second best-selling video game of all time, behind Tetris and has as of mid-2018, 91 million active monthly users across all platforms. One can surmise that the huge popularity of Minecraft could be due to the fact that it closely exhibits

the four attributes of pure play: Minecraft is a free activity, with kids and adults indulging in it for countless hours on their own volition, with no material gain as goals. It has well defined boundaries, being the archetypal sandbox world with well-defined rules and a virtual day-night cycle. One of the key reasons for Minecraft's popularity is the fact that diverse communities spontaneously form around activities in the Minecraft world.

The fifth element of the ludic design approach is illustrated by how Minecraft has been appropriated by the community to support young adults with autism spectrum disorder to engage better with each and other inside the clearly artificial world of Minecraft (built out of unit-sized blocks made of different materials mined by the players) and eventually with the real world. Individuals can create 'mods' to Minecraft and this feature has been utilized to create Autcraft, a Minecraft server that is a safe environment for children and adults with autism and their families to play Minecraft (Ringland et. Al, 2016)

Figure 3: A calming quiet garden in Minecraft (https://katerinegland.com)

Autcraft is an excellent example of appropriation of a mainstream artifact into an assistive technology with many documented benefits to the user community. The use of Minecraft to help socialize individuals with ASD is described in (Riordan and Scarf 2017) which also describes how prosocial behavior can be encouraged even outside the game world.

3.1 Seven Steps to Ludic design for Accessibility

We propose a seven-step process to facilitate a more systematic incorporation of an LDA approach to thinking about design. Each of these steps involves conscious thinking by the design team to incorporate ways of weaving play closer into the end output of their work. These steps are the same, irrespective of whether the LDA is for an existing design artifact being reconceptualized or for a new product altogether. Likewise, the steps and processes remain the same irrespective of whether the design thinking is for a mainstream use scenario or for something to be used very specifically by a single or small number of users. Along the way we highlight some of the exciting research questions that need to be addressed.

- INVOLVE members of the community of users as the first step in the design process. Perhaps the greatest disservice a designer can do for the design process is imagine that they have answers for what how a population of users may appropriate a technology, without the active participation of the community in the design process. This is especially true in operationalizing LDA since it involves being able to understand what is joyful and pleasurable to the likely end user, not just what is usable for a defined end goal.

- EXAMINE play in the lives of the intended users of a technology, not just as part of the instrumental use case scenario - ie, "how may one enjoy the live process of engaging in this technology" but rather put an effort into examining what people understand as play in interactions similar to the ones that the technology aims to enable. In this, designers are asked not just to be contextual examiners, but to do so specifically with play as a central concept of examination during their work with users.

- IDEATE on the pitfalls of design decisions, and ways in which play may be undermined by the design artifact. What are the assumptions with each element of the design? How can these impact the use experience? What are comparable products or technological settings that can be used to examine the potential pitfalls of the use cases?

- LIBERATE the use case from a strict orientation of rules. Designers should allow for flexibility for people to adapt the technology to the ways of use they see best fit for themselves; to adapt specific elements of a product that may be playful and valuable to one user, but not to another. This does not mean that the design needs to be entirely open-ended, designers should have a vision for how the technology may be used, but also be open to the idea that people may use their own imagination to appropriate the technology as they see best fit.

- ENABLE collaborative use of the technological device, even where it is intended primarily for use by individual users. The ability to collaborate is central to the social elements of play that are part of LDA, thus using a technological milieu as a means of interpersonal connection is a central tenet of the LDA process.

- EVALUATE how, by intense engagement in the play, the intended goals of the design are being met or not. This requires devising means to measure a trait or a skill that is the goal before and after extended engagement with the play and to be able to establish the benefit of such play. The challenge is to design these measurements to be part of the play and not break the fourth wall of the play.

- ITERATE on the process with different play scenarios. Designers should assume that LDA is not a goal unto itself, but that like accessibility, it is only something to aspire to, not something that is achievable in its entirety. Designers must constantly rethink the design as time goes by, imagining new ways in which users can play with or enjoy elements of an experience.

Like in all human centered design activity, these seven steps are not meant to be followed strictly linearly, but will have forward and reverse loops among all the steps and hence the iteration is a continuous process of going forward and backward.

3.2 LDA and the Global South

We believe that the Ludic Design framework and process is universally applicable. However, we also believe that the Global South and Ludic Design are ideally matched for many reasons highlighted throughout this paper. In the following we point out, with reference to the seven step process, the suitability of this approach and challenges specific to the global south as well as how lessons learnt may be transported to the global north.

Involve and Examine:

The voices of people with disabilities in the Global South are rarely heard in any national or international fora (Grech, 2012) and critical studies and understanding of the lived reality of people with disabilities is the essential first step in any efforts to creating technology solutions. As discussed in (Rembis 2016).

“Disability and poverty, and 'the interactions between these are constantly renegotiated across space, time and people, including by disabled people themselves' (p. 61). It is crucial for Grech that theorists and other researchers and scholars not only recognize, but vigorously engage with the notion that disabled people actively make their own meanings and affect their own lived experiences, even in the most constraining environments.”

Second, designers and technologists working to build assistive technologies need to involve closely with the community that they are seeking to help. This broadens and deepens the nature of solutions that can be arrived at (Bennet 2018).

Our personal experience has been that every person with a disability that we have asked about their play-life, what do they play, whom do they play, etc., have been uniformly delighted and surprised and say that it is the first time anyone has asked them about their play and proceed to share their personal stories with great warmth, a great start for collaboration.

Ideate and Liberate

The diversity of individuals, their peers and family, the chronic shortcomings of the infrastructure, the constraints on every kind of resource needed, all make it impossible for any artifact with a fixed set of rules and requirements to be deployed in the global south. However, the tenets of pure play, that of the players deciding on the rules of time and space on the fly, the flexibility of the rules, give us the best chance of arriving at any practical solutions. Ludic design aims to transfer agency to the end users, where it rightly belongs.

Enable

Culturally, in the global North, the quest is for solutions that cater to independence. As (Holmes and Maeda 2018) describes it

"In the United States, there is a deep attachment to the idea of a rugged, lone pioneer... venturing out into the great unknown to make their way in the world.... These stories of independence rarely reflect the truth of our lives, which are full of dependencies.... Interdependence is about matching complementary skills and matching contributions."

This is the lived reality of people with disabilities across the world. Thus, designing for interdependence is key to successful utilization of the solutions. Interdependence as a frame for assistive technology design has recently be introduced by [Bennet] to complement the traditional emphasis on independence. By emphasizing the importance of social groups Ludic design intends to mesh with the reality of the lives of people with disability and leverage existing interdependence by co-opting the participation of the immediate family and support groups into the design process and in the use of the end artifact.

Evaluate and Iterate

This is the toughest challenge to be faced in the Global South. Without clear demonstration of the benefits of Ludic Design it is difficult to direct scarce resources of the community, including the time and efforts of the persons with disabilities and their immediate community, as well as the material resources needed to build out the solutions. This is a major research challenge as well.

We suggest that the designer be open to measures of success that may be evolved and articulated by the community during the course of the Ludic Design process and not be tied to any pre-conceived metric that the project could have started out with. A good measure of the effectiveness of the Ludic designed artifact is the willingness and enthusiasm for the community to continue to engage with the artifact for reasons and benefits that they believe is important to them. For example, a solution intended to enable a child with low vision to become proficient in screen reader usage may transform the child from a socially isolated child to becoming the gregarious and sought after storyteller of the neighborhood. The designer has to apply the principle of pure play even in the evaluation steps and be willing to change the rules of the game in consultation with others in play.

There are populations in countries like the US (people with disabilities in inner-city neighborhoods, people experiencing homelessness, undocumented migrants etc.) who can be clearly classified as the Global South in terms of their lived realities and lessons learnt in the Global South can be applied with suitable modifications. In the Global North, the rights-based model for supporting people with disabilities has taken strong roots and is supported by the resources and infrastructure in most communities. We might learn that designing for interdependence and with the involvement of social groups might result in better outcomes than the current approach to assistive technologies.

4. SUMMARY

We have argued for rethinking both the design process and the usage scenarios of accessibility around the notion of playfulness and exploration rather than on utility alone. We have proposed a ludic design framework for accessibility with five key attributes building on top of past work on play. To enable designers to put these attributes in practice we have provided a seven-step design process.

While our goal is to present LDA as a means to rethink the design process, it is equally valuable to use LDA or play as a critical toolset to examine accessibility as it relates to peoples' life experiences. For this, we need to deeply examine play in the lives of people with disabilities. How does one understand play or leisure as part of one's daily live? What are examples of playful activities in one's day? How do these relate to learning? How does one remember play growing up? How does play influence interpersonal relationships with both people with and without similar disabilities. These questions can in turn be used to examine ways in which play is part of or excluded from the daily technology use of people.

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