Digitally Disabled: Accessibility and Inclusion in Video Games and Virtual Worlds
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A. Introduction

Depending on what dataset you examine, between 12 percent[1] and 19 percent[2] of people in the United States have disabilities; similarly, the World Health Organization reports that around 15 percent[3] of the global population are people with disabilities. While we have a long way to go, our societies have become increasingly aware of the need for accessibility in many realms; this has resulted in a focus on universal design in architecture, for instance.

However, in addition to increasing the accessibility of physical space, we also need to consider accessibility in the virtual realm. People are spending more and more time in video games and social virtual worlds; for instance, recent surveys estimate that over half of adults in the United States play video games.[4] For our society to be truly inclusive of disabled people, we are morally obliged to attend to these virtual spaces as well.

There are a number of types of virtual spaces that people can access; I will be focusing here on virtual worlds and video games. A virtual world has three main aspects. First, it is a computer-implemented simulation of an environment. Second, at least some of the entities contained in it are controlled by individual people; moreover, multiple people can affect the environment at the same time. In other words, it is a shared environment which responds to the actions of its users. Third, the world is persistent, which is to say that it exists even when no people are interacting with it (unlike, say, a single-player video game.)[5] The most famous virtual world is likely *Second Life*.[6]

Some video games are also virtual worlds, such as the massively multiplayer online role-playing game *World of Warcraft*.[7] In general, online multiplayer games tend to also be virtual worlds, whereas single-player and/or offline games are not (because they have no persistent existence.) Moreover, many virtual worlds are not games; they do not have any specific objectives to achieve. Thus while video games and virtual worlds overlap, they have distinct identities.

The concept of disability is similarly complicated. Frequently there is a distinction made between an impairment that a person has and being disabled; the former is taken to be a fact about biological capabilities and the latter is taken to be due to one's social context. Thus one may be visually-impaired, but one is disabled if society has been designed in such a way that this impairment makes it difficult to participate in that society. Disability is thus conceived of as a social problem, and one with social solutions. While I agree with emphasizing the social nature of the problem, I have some reservations about this understanding of disability; I tend to agree

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[1] (Kraus, Lauer, Coleman, & Houtenville, 2017)
[2] (Brault, 2012)
[3] (World Health Organization, 2011)
[4] (Duggan, 2015)
[5] (Bartle, 2004)
[6] (Linden Research Inc., 2003)
[7] (Blizzard Entertainment, 2004)

with Ellis and Kent in seeing disability as "an embodied experience of physical difference *and* social stigma."[8]

Furthermore, the language surrounding disability is also contentious, specifically, in whether one refers to someone as a disabled person or a person with a disability. The latter is an instance of person-first language; its advantage is that it stresses the idea that a person is more than just their disability. The former is more often used by those who see being disabled as part of their identity. Both of these experiences are represented in the disabled community; I will not be preferencing one understanding of disability over another, thus my language may vary.

As research demonstrates, it is clear that a large minority of people are disabled, and I will be arguing that we have an ethical obligation to include them in both video games and virtual worlds. In doing so, I will be discussing two aspects of inclusion. The first is accessibility, which is where much of the focus is generally put; this looks at why we need to make virtual spaces accessible and some common challenges that people with disabilities face in trying to access them. However, accessibility is only the first step to inclusion; representation is also key. People with disabilities are largely invisible in virtual worlds, and I will discuss how this can be both empowering and extremely problematic.

B. Framework concerns

Before diving into the main body of my argument, a few words about my framework are in order. First, I approach ethics from a deontological perspective. The most pertinent implications of that are two-fold: people must be treated as intrinsically valuable, not simply as a means to an end, and actions must fall under a rule that is rationally universalizable. In the context of virtual worlds, the former implies that designers have obligations to users and potential users of these worlds; they cannot simply ignore a group of users or care only about their potential to generate revenue. Moreover, the universalization requirement means that a difference in how users are treated must be justified by some rational difference between those users; it cannot be arbitrary or unthinking. Fundamentally, the ends of disabled users are not radically different from those of everyone else; they just sometimes require different methods to achieve those ends. Since we need to treat disabled users of technology as on a par with others,[9] it is unjust if they are unnecessarily disadvantaged in pursuing their ends.

Second, one might wonder why this matters – there are so many areas in which accessibility is a concern, so why focus on what may seem like a somewhat frivolous arena? My reasons are two-fold. As Johan Huizinga recognized in *Homo Ludens*,[10] humans have a need for play in our lives. An increasing amount of play is taking place in digital worlds, frequently in the form of games. While frequently discussions of disability and virtual worlds focus on rehabilitative uses,[11] people with disabilities have the same need for play as everyone else.[12] Moreover, we are social beings. With the dwindling of physical third places, many social interactions are also

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[8] (Ellis & Kent, 2011, p. 92)
[9] (Grodzinsky, 2000)
[10] (Huizinga, 1949)
[11] (Concepcion, 2017)
[12] (Wästerfors & Hansson, 2017)

taking place online. Particularly for people with disabilities, these spaces can fulfill social needs in ways that may be very difficult to achieve otherwise.[13] Indeed, some research has shown that participation in virtual worlds can have psychological benefits to people with disabilities.[14] Given the universal human need for play and sociality, and given that much of that now takes place online, we have an ethical obligation to ensure that these virtual spaces are accessible to everyone.

    C. Accessibility

Accessibility concerns can occur at a number of stages in a game or virtual world. At its most basic, a person's interaction with the game or virtual world can be broken down into three stages: receiving some sort of stimuli, deciding how to respond to that stimuli, and providing input so as to execute their decision.[15] All of these can be disrupted, preventing progress to the next stage of interaction.

Beyond occurring at different stages, accessibility issues come in two degrees of severity.[16] The most critical issues can prevent players from engaging with the virtual space at all; they prevent access to certain groups of players. If a player is blind and a game requires visual ability to play, then that player simply will not be able to play the game. However, there are other issues that can affect the quality of a player's engagement with a game even if does not prevent it. For instance, subtitling only a game's dialogue may allow a deaf player to follow the main plot of a game, but the player will still miss out on ambient noises which set the mood of the gameworld.

Not everyone who uses accessibility features is profoundly disabled – many people without disabilities benefit from them as well; roughly a third of people who use built-in accessibility features in technology have no disability but find the features convenient.[17] Color-blind modes in games, for instance, are becoming increasingly popular as is subtitling dialogue. These are changes that can be useful for many people. Being able to adjust the colors can be helpful if the gaming environment is very bright, which makes dark objects difficult to see; similarly, many people playing on mobile devices play without sound so as not to disturb the people around them and thus are reliant on subtitles or other textual communication. Accessibility features can benefit all players, not simply disabled ones.

I stress this fact because we have a tendency to Other disabled people. This is often exacerbated by taking accessibility into account only after the fact – it is seen as something special or extra to do, rather than as integral part of the design.[18] One way to avoid this is to recognize that impairments and abilities exist on a continuum and that design modifications can benefit many different users. If we acknowledge that there are multiple ways of engaging with a technology, and thus that disabled users are not radically different from other users, we normalize the idea of accessibility.

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[13] (Stendal, 2012)
[14] (Gilbert, Murphy, Krueger, Ludwig, & Efron, 2013)
[15] (Yuan, Folmer, & Harris, 2010)
[16] (Yuan et al., 2010)
[17] (Microsoft, 2017)
[18] (Ellis & Kent, 2011)

a. An accessibility example

There are five major categories of impairment that designers of games and virtual worlds need to consider: auditory impairments, visual impairments (including colorblindness), cognitive impairments, mobility/motor impairments, and speech impairments. Some of these will be more common among users than others, and some will be much easier to accommodate. However, most impairments have at least some kinds of simple adaptations that can be made in order to increase accessibility. For the sake of time, I am going to focus on auditory impairments, although I am happy to discuss other types of impairment in the Q&A.

Auditory impairments include any impairment that involves hearing. There are two different ways these impairments can emerge; one is primarily an issue for games while another is an issue for both games and virtual worlds in general. First, a game may rely on a player's ability to hear in order to play the game itself. For instance, many adventure games have various sorts of puzzles. One popular type involves replicating an aural pattern such as recreating a particular series of musical notes on an instrument; the correct pattern can be deduced from an audio clue in another location. An example of this would be from the first episode of *Forever Lost*,[19] in which a player must play a sequence of notes on a xylophone; the correct pattern may be found by listening to a radio elsewhere in the game. As a result, players who are deaf or hearing-impaired will have no way of completing this puzzle (and progressing in the game) without seeking outside assistance. If sound is only relevant for one or two puzzles in the game (as in this instance), this is creating an unnecessary – and easily prevented – barrier to players with hearing impairments.

Many designers have realized this and provide visual clues for such puzzles in addition to or instead of aural clues. In *Forever Lost*, since the xylophone keys are different colors the designer could have provided a color pattern clue in addition to the sounds.[20] In other games, such as *The Hunt for Lost Treasure*[21], while players must enter a musical sequence on a piano, the puzzle is not itself aural because the keys have patterns on them; the clue to solving the puzzle is available in terms of patterns, not sounds.

At the most basic level, being able to adjust music, ambient sounds, and speech is a fairly basic step that can assist people who are not completely deaf but have trouble distinguishing sounds; this is something that we see in many games, because a lot of gamers appreciate having that sort of control over their experience, even if they are not hearing impaired. Another common feature is subtitling dialogue, which is vital because a hearing-impaired player will not necessarily be able to get information conveyed purely through speech. Ideally, the designer will implement captioning, which is preferable to subtitling, because it conveys information from all aural sources, not simply speech. For instance, *Half-Life 2*[22] includes captions for sounds such as

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[19] (Glitch Games, 2012)
[20] The addition of this clue would be better than replacing it, since a color pattern may raise accessibility issues for someone who is color-blind. In striving to make a game more accessible for a group of players, designers need to ensure they are not making it less accessible for others.
[21] (Syntaxity, 2015)
[22] (Valve Corporation, 2004)

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shotgun blasts nearby or audio warnings for running low on ammunition; this is a way of making sure that no information is lost to hearing-impaired players, such as occurred in the *Forever Lost* example above.[23]

Second, it could be that sound is not required to progress in a game or navigate a virtual world per se but the community of users relies on some kind of voice chat to communicate with each other; this means that users with hearing impairments may find it difficult to interact with other users, even if the world itself is accessible. This problem arises for both games and virtual worlds, and can be difficult to solve. I will be discussing a specific case in more detail in a moment, but I would note that even if a designer provides alternatives such as text-based chat options, cultural norms among players may limit the use of those measures; if everyone assumes a person will use voice chat, then she may be excluded even if there is ostensibly another option for communication.

b. Problems with designing for accessibility

One of the trickiest things about accessibility is that people have differences in how they experience an impairment. For instance, being able to move only a finger is very different than being able to move a hand, despite the fact that both may be motor impairments. Moreover, if a user has multiple disabilities, they may interact in ways that make certain design decisions insufficient for accessibility. As an example, many people with motor impairments struggle with textual communication channels because gaze-based interaction devices are frequently slow; conversations frequently flow too quickly for them to be able to participate using a gaze-based device. Thus voice communications may prove more accessible to them. However, if the person also has an auditory or speech impairment, then voice-based communications may not be very helpful.

Similarly, designs which are helpful to accommodate one group of impairments may end up disadvantaging another group. We see this in the physical world with things like curb cuts; they make it easier for wheelchair users to move on and off of sidewalks but raise difficulties for people who are visually impaired and relying on the curb to help differentiate between the road and the sidewalk.[24] The same sort of thing happens in the virtual world. Originally *Second Life* only had textual communications, which was problematic for many users with visual or motor impairments. However, implementing voice chat meant that a lot of deaf users were excluded.[25] While the technical capability to use text chat remained, there was social pressure to use voice chat instead. In general, deaf users had to reveal their impairment in order to explain why they could not use voice chat; even if they chose to disclose this information about themselves, they were not always believed – many users thought that they were simply trying to disguise their gender.[26]

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[23] (Valido, 2011)
[24] (Ellis & Kent, 2011)
[25] (Carr, 2010)
[26] (Carr, 2010)

c. How do we address this, ethically speaking?

So what are our ethical obligations in this regard? People play games and interact with virtual worlds for particular reasons, and those reasons could change over time; a person might enter a virtual world out of curiosity but stay because he enjoys the community of people he meets. Reasons for engagement are varied and malleable; nevertheless, a user engages with these virtual worlds for a reason – she is pursuing some end.

Richard Bartle developed his Player Type theory to classify different types of players based on the ends that they tend to pursue. While originally developed for MUDs (Multi-User Dungeons), he studied both game-like and social MUDs, which means that his theory is relevant for virtual worlds more broadly. Roughly speaking, players fall into four categories: achievers, explorers, socializers, and killers. Achievers are trying to accomplish game-relevant goals; this could be achieving the maximum level in a video game or creating a popular destination for other users in a world like *Second Life*. Explorers are trying to understand the world and discover its secrets; they will seek out all of the corners of the virtual world to see what is there. Socializers primarily use the virtual world as a mode for interacting with other players and learning more about them. Killers are generally interested in dominating other players, frequently by killing other players' characters (or perhaps by using them to execute your multi-level marketing scheme in a virtual world.)

Clearly designers cannot cater to every possible reason for engaging with a world or game. Someone who enjoys hidden object games because he relishes solving that sort of puzzle is likely not able to achieve that end by playing a first-person shooter; they are very different kinds of games. Similarly, an explorer may not enjoy a virtual world that has a great deal of player-versus-player combat, as it will likely hinder their ability to safely explore the world. It is not unethical for designers to prioritize the achievement of particular ends when designing a world, nor is it unethical to design a world such that only some people will likely achieve a particular end; designing games which require fast reflexes, for instance, is not necessarily problematic, nor is designing a world filled with very difficult puzzles.

Problems arise when designers create a game or world where certain players or groups of players are less able to achieve an end based on a feature which is not itself relevant to achieving that end. How fast your reflexes are is relevant to whether you can complete a game that requires fast reflexes, such as a platform game. However, the feature that class shares (slow reflexes) is directly connected to the type of game (platformer); this is fine. On the other hand, if you design a virtual world like *Second Life* which is supposed to allow people to socialize, create, and explore freely but at the same time make it inaccessible to a person with motor impairments, then that user is less able to enjoy the world for reasons that are not themselves relevant.

Ultimately, designers are obligated to consider users' likely ends in playing particular games or interacting in a virtual world; they need to avoid erecting unnecessary barriers for a subgroup of users to achieve those ends. Furthermore, a barrier is unnecessary if it could be removed without substantially altering the nature of the game or world. For instance, in the *Forever Lost* example I gave earlier, sound was only necessary for a single puzzle – including another way to access the clue would have been easy and would not have significantly changed the nature of the game.

Similarly, designing a user interface that is compatible with gaze-based devices is not going to change the character of a virtual world itself; failing to do so is ethically problematic.

One of the ways designers can work to meet this obligation is to consider the four common types of ends that users of virtual worlds pursue and ask whether they are placing unnecessary barriers to achieving those ends. For all users, there will need to be a focus on whether a user is able to navigate the controls of the game or world, i.e., a focus on the interface. In the case of achievers, the focus will be on whether the content of that world is accessible; is there anything that hinders progress for people with particular impairments? For explorers, there will be a focus on movement in the world; does it rely on particular input devices or a certain degree of manual dexterity? In the case of socializers, the methods of communication will be of primary importance; can users communicate with others in the world? Will they be treated like other users of that world? (The latter is, admittedly, not totally under the designer's control.) And for killers the primary question is whether users will be on an even playing field with other players – do they have an equal chance of success, all other things being equal?

In all of these cases, the focus should be on what disabled players wish to achieve, not on what they cannot do. Too often accessibility focuses on the limitations of particular impairments, which medicalizes disability and reduces users to a set of capabilities. By focusing on Bartle's Types, the shift is made to considering specific ends that many players (disabled or not) wish to achieve and thinking about how to empower those players.

I will note that this is something that designers should consider throughout the design process; trying to make an existing design accessible to players is much more difficult than designing with accessibility in mind from the beginning.[27] Similarly, since non-disabled designers lack the lived experience of people with disabilities, we need a greater integration of users with disabilities into designing and testing these virtual worlds. Being active participants in the design process has two advantages. First, it provides valuable information to designers about the capabilities of their users, since designers may not have the personal experience to know what those capabilities are.[28] Second, it helps combat the idea of disabled users as Other. Both the emphasis on broad player types and the integration of people with disabilities into designers' experiences helps these worlds become not simply accessible but inclusive.

   D. Representation

In addition to accessibility, representation is necessary for inclusion. In both games and virtual worlds, one of the primary avenues for representation is via avatar customization. Avatars, after all, literally represent users inside a virtual world and are their method of interacting with that world; this is the most fundamental level of representation within virtual worlds. In a virtual world, most (or all) of the other characters a user encounters within the world will also be avatars controlled by other users. However, in some virtual worlds (and most video games), there are also non-player characters (NPCs) which are not controlled by a human but which serve to populate the game world. This is another place where representation is relevant, as NPCs serve to flesh out the world and thus help define what the world is like and who exists in that world.

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[27] (Ellis & Kent, 2011)
[28] (Gerling et al., 2016)

The discussion of avatars will be very brief, because it is extremely rare for a game or virtual world to allow customization for visible disabilities. In *The Sims 4*,[29] the most recent entry in *The Sims* series, it is possible to make an avatar with glasses, but there is no other visible disability represented. There has even been pushback in their user forums to the idea of including the ability to make avatars with disabilities in the game.[30] Many players cite the familiar idea that this would simply be too difficult to do. However, in general this is unconvincing – a game that allows one to make a vampire with two different forms could probably manage to incorporate wheelchairs. It is almost certainly a matter of the developer's priorities, not capabilities. Furthermore, as one commenter noted, some impairments would be easy to represent: "a cane-user would merely be another type of walk cycle and a hand accessory."[31]

Disabled users of the virtual world *Second Life* fare slightly better in terms of representation, largely because Linden Labs provides users with strong tools to create their own content. While none of the default avatars provided are visibly disabled, there are customization options available in the marketplace that will allow a user to equip a wheelchair, for instance. Some of these are for sale using the world's virtual currency, but some are provided free of charge from their designer. Avatar customization is important to many people in *Second Life*, so few people stick with their original, default avatar; the notion of needing to customize one's avatar to get it feeling "right" is common. Nonetheless, it would be better to see representation in the default avatars, since otherwise there is a large difference in how disabled and non-disabled users are treated: while both may simply have an approximation of how they wish to appear from the start, having the wrong hair style is fairly different from being forced not to have a wheelchair.

As one might suspect, the outward manifestations of less visible disabilities are also generally absent from avatar customization; designing an avatar with hearing aids, for instance, is generally not common. Interestingly, there are a number of non-player characters in video games that do have less visible disabilities, perhaps in part because a game allows for an accompanying narrative that a virtual world often does not – it is thus easier to create more subtle portrayals of disability. The pilot Joker, from the *Mass Effect* series[32], has Vrolik syndrome (another name for Osteogenesis imperfecta) which causes bones to be extremely brittle. He is generally seen seated on the bridge, but there are a number of references to his condition throughout the series; moreover, in *Mass Effect 2*[33] there is a brief sequence where the player controls him and has to walk him to the artificial intelligence's core in response to an emergency. This is an interesting nuance, because most games represent people as either able to walk or completely unable to walk, a prejudice many non-disabled people display in general.

A number of factors make Joker's portrayal an excellent instance of representation. First, he has a genetic condition, rather than having an impairment as a result of an accident. The character

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[29] (Maxis & The Sims Studio, 2014)
[30] See the discussion at (mommataurus2, 2016) and following.
[31] (Glasgow Smiles, 2016)
[32] (BioWare, 2007)
[33] (BioWare, 2010)

George in *Stardew Valley*[34] is a rare example of a video game character in a wheelchair, but we discover he lost the use of his legs in a mining accident. While some impairments arise this way, this kind of representation runs the risk of making disabled people seem "broken" or "damaged." Having characters who have always dealt with an impairment helps show that this is simply a normal part of the world.

Second, Joker's impairment has real impact. It is not uncommon to see characters in video games who have lost a limb, but they are generally replaced by a bionic one that functions even better than the original.[35] In these cases, while the character may superficially appear disabled, they are only minimally affected by their impairments. This runs the risk of sending the message that disabled people are fine as long as they can do things in almost exactly the same way as non-disabled people, which is not the most inclusive of messages.

One of the complicating factors for representation, particularly for avatar design, is that the invisibility of disability is a double-edged sword. On the one hand, lacking any automatic visible representation of disability allows people to choose whether and how to reveal that they are disabled.[36] Since many people with visible impairments are judged immediately based on them, the ability to conceal their impairment can be empowering. No one needs to know that a person is using a screen reader or gaze-based device; they see just another avatar in the virtual world.

Moreover, it can be freeing to be able to do things in a game or virtual world that are not possible in the real world due to an impairment. A user might enjoy the ability to navigate a virtual world and explore all of its corners without worrying about whether she will have any physical problems that prevent that exploration; being able to climb and jump and swim without any thought of physical impairment can be wonderful. Similarly, being able to socialize with people at a safe distance may help people with social anxiety form connections that they feel less able to do outside of the virtual world.

However, there is a concern that if we make disabled people invisible in virtual spaces that this may have implications in the real world.[37] We run the risk of sending the message that people with disabilities are unwelcome or unwanted – or at least that they should hide any impairments that they may face. Particularly as people spend more time in these virtual places, we need to be careful not to dismiss issues of representation as frivolous or something not to be taken too seriously (since it's "just a game.") The worlds may be virtual, but the people are real and the impact of the design choices on them is also real.

Ultimately, the best thing to do is likely to provide the tools for avatar customization so that users with disabilities can choose how to design their avatar. This gives users the autonomy to decide how they wish to represent themselves. Moreover, it provides space for multiple views of disability. People who view being disabled as a fundamental part of their identity can represent themselves that way in the virtual world. People who do not view disability as essential to their identity can decide whether they wish to retain that representation or omit it.

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[34] (ConcernedApe, 2016)

[35] For instance, Nathan "Rad" Spencer from *Bionic Commando*. (GRIN, 2009)

[36] (Bates, Vickers, & Istance, 2010)

[37] (Ellis & Kent, 2011)

While it is preferable to allow users the choice as to how they wish to represent themselves, game designers need to think about the ways in which disability can manifest within their gameworld. By representing people with a range of impairments, the gameworld itself becomes richer and more realistic; it also avoids sending any unintentional messages that people with disabilities do not exist or should be hidden. Instead, people with disabilities are included as a normal part of the gameworld, just as they are a normal part of our non-virtual world.

E. Conclusion

With people spending more time in virtual worlds and playing video games, there is a pressing need to consider users with disabilities. One of the key areas of concern is ensuring that the world is accessible for people with a variety of impairments; this is best addressed by including people with disabilities at design and testing stages. The integration of disabled people at these stages also helps prevent Othering people with impairments and thus carrying over disabling designs into the virtual world.

In addition to accessibility, representation is also important. Since people have differing views of their identity, allowing them the choice of whether to visibly represent their impairment is the best choice; it promotes user autonomy by giving them control over their virtual representation. The design of non-player characters, however, should include representation of people with disabilities. This will underline the fact that impairment is a normal part of any world and should not be something that people feel required to minimize or hide.

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