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Issues of Universal Design and the Relational Model of Disability in *Avatar: The Last Airbender*

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Dedication

This work is firstly dedicated to my parents. Any success I've had in life is as much a reflection of them as it is of me. Thank you for everything. I would also like to dedicate this work in part to Dr. Susan Ghiaciuc, without whom I would have never discovered my passion for disability studies. You have influenced me and my work more than you know.

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I would like to acknowledge the work and time put into this project by my thesis

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during my entire time in graduate school, and my family at the University Health Center,

who have been incredibly understanding and flexible as I tried to balance work and

graduate studies.

Table of Contents

List of Tables

Abstract

Disability issues are prevalent throughout the animated series *Avatar the Last Airbender*.

This thesis focuses specifically on issues of universal design throughout the show, while

also understanding disability through the relational model. In particular, two episodes are

rhetorically analyzed for their representation of universal design philosophies and the

body-environment relationship.

Issues of Universal Design and the Relational Model of Disability in *Avatar: The Last Airbender*

Introduction

I chose the subject of this thesis when I discovered the intersection of two very specific interests of mine: disability studies and the animated television series *Avatar: the Last Airbender*. I would have never imagined that these two subjects could overlap in such exciting and relevant ways. Fortunately for me, they do.

For an animated show airing on a station targeted at a youth audience, this series boasts a remarkable blending of skilled storytelling and 'adult' themes. The storytelling far surpasses the plot lines of the average Saturday morning cartoon, and the mature themes woven throughout the narrative appeal to both the young, coming-of-age viewer as well as older audiences. The storytelling features the perfect pacing of plot and character development. Expert crafting and pacing of dialogue keep the audience connected to the story and make for the masterful storytelling that sets *Avatar: the Last Airbender* apart in the world of animated youth series.

One such aspect that sets *Avatar* apart is the show's incorporation of heavy themes not typically encountered in other prominent Nickelodeon shows like *Spongebob* or *The Fairly Oddparents*. *Avatar: the Last Airbender* features some rather serious and archetypal themes such as good versus evil, coming of age, and man's place both within and pitted against nature. It features issues like war, love, death, and survival. The entire show is riddled with religious and spiritual undertones. It touches upon complex social issues like discrimination, sexism, imperialism, crime, ethics, and of course, disability.

Perhaps the most impressive aspect of the show is its unfolding of these topics through the experiences of four young kids, all around the age of 12. Indeed, a noteworthy and enamoring property of the show is that the savior of this fantasy world–the harbinger of justice, fairness, peace, and equality–is a twelve-year-old boy and his group of friends. The storytelling demands a whole new tier of admiration for its ability to address such complex themes both through and for children.

While the show has garnered a huge adult following as well, its primary viewership is young boys aged 6-11 (Nickelodeon). Thus, the show represents the opportunity to introduce mature themes and issues to young children at a highly impressionable age–and it succeeds so effortlessly and so simply that viewers never suspect they are partaking in the narrative of some ethical dilemma. The teasing out of these major dilemmas is as much the viewers' as it is the characters'.

When I first started watching this show as a young adult, none of these features that make the show so extraordinary were evident to me at all. Only when I reached graduate school did I begin to reflect on the successful rhetorical techniques of this show. Only then did I contemplate how the show conceptualized and portrayed disability and the body. In a way, my slow realization of the many social issues in the show, and my subsequent analysis of bodies and disability featured in the show, mimicked the main character's journey to master his bending skills and develop himself. My involvement in the show began rather innocuously, unaware of the sub-context of bodies, disability, and the body-environment relationship in the show. As I grew as a graduate student, I became much more critical of the depiction of disability and human bodies in general, as well as gained the skills and knowledge to discuss their representations in the media.

I took my first course on disability studies as a first-year graduate student in the Writing, Rhetoric and Technical Communication program at James Madison University. The class altered my entire view of disability, health, medicine, the human body, modern interventions on the body and–what I hope to focus on in this thesis–the body-environment relationship, especially in terms of spatial design and universal design theory. As a particular result of this course, the voices of disability rhetoric scholars occupied my all my readings and other studies. Authors like Jay Dolmage, Tom Shakespeare, Rosemarie Garland-Thomson, Lennard Davis, and Sharon Stone are included among the many scholars I became familiar with through that course and whose work came to capture my full attention. Particularly influential were the works of Dolmage and Davis in revealing the meanings conveyed about bodies and disability through narrative, whether visual, oral, or written (Davis 2013; Dolmage 2014). Likewise, Shakespeare, Garland-Thomson, and Stone, as well as others, all introduced to me the theoretical foundations underlying the medical and social models of disability. Garland-Thomson, Davis, and Dolmage further expanded these conceptions of disability through their interrogation of normalcy.

My immersion into disability studies marked a turning point in not only the path of my graduate studies, but also the perception of my own personal position in the context of all human embodiment and the perception of my own taken-for-granted fit within my environment. I began to look at–really look at–my immediate physical surroundings. I became acutely conscious of the ways the built environment quite straightforwardly accommodated my own body, while disregarding aspects of other forms of embodiment. I noticed when the only connection to a parking lot was a flight of

stairs, when buildings did not have assisted doors, or when access to certain resources were placed high above waist level. Bolstered with an assemblage of disability studies research, I can now appreciate how the social and physical environments that disregard the functioning abilities of a body can truly affect the self-identity and embodied consciousness of that person.

As most disability scholars would agree, everyone will experience either temporary or permanent disability at some point in their lives (Davis 2013; Dolmage 2014; Shakespeare 2006; Stone 2006). Stone reassures us, "acknowledging our own disabilities does not mean acknowledging our own helplessness, it means acknowledging and honouring our humanness" (Stone 2006). However, it is much less certain if every instance of disability will be accommodated or embraced. Embracing and celebrating a disability identity is complicated by layers of social norms, the medicalization of the body, the reverence of the statistically average form, and the marginalized status of 'abnormal' embodiment. Shakespeare deconstructs the issues preventing the re-appropriation of disability as a proud status. Disability is markedly different than reclaimed and celebrated identities such as Blackness or Gay Pride, he writes, "because disability is difficult to recuperate as a concept, as it refers either to limitation and incapacity, or else to oppression and exclusion, or else to both dimensions" (Shakespeare 2006).

This leads me in part to the "why" of this thesis. Disability is, indeed, a difficult concept to recuperate. However, perhaps disability cannot be recuperated until popular understandings of humanness transform in such a way as to make disability simply a naturally occurring variation of humanness, rather than a distinct category of interrupted

or objectionable humanness. Examining the portrayal of both disability and the human

body in this youth television series could provide a reading of current views about the

body or potential understandings of the body in its environment. Dolmage and Davis

iterate the role that media representations of disability have in echoing society's

understanding–or more often misunderstanding–of disabled persons' lived experiences.

Dolmage contends that "myths belie arguments about reality. Myths…can be viewed

as…an inventory of and impetus for arguments about cultural values" (Dolmage 2014).

Avatar, as a fantasy television narrative featuring numerous examples of disability,

likewise represents the opportunity for analyzing our own cultural values about the body

and disability as reflected through the show.

      In preliminary searches, I had not found any scholarly piece about disability in

Avatar: the Last Airbender, although there are certainly fan pages, wiki sites, and blogs

that exist on the presence of disabled characters in the show. However, most of these

existing conversations on disability in the show focused only on either physical or

cognitive disability in certain characters. While these characters would be both interesting

and relevant to write about, many other disability issues proliferate the show. Of course,

physically disabled characters in the show provide the most obvious source for discussion

about the depiction of disability in the media. However, other less blatantly illustrated

disability themes materialize throughout the series as well. References to gender in the

show as disabling could be a potential site of analysis on the intersection of gender and

disability. Questions about the psycho-somatic link in the body also emerge at some parts

in the series, including if and how a person could self-disable their physical embodiment

through their own psychological state. Additionally, plenty of examples of the body-

environment interaction exist, which could offer insight into conversations on universal

design and accessibility.

My original goal was to briefly explain and analyze all these disability-related issues

in the show, making my thesis a sort of drive-by tour of disability and embodiment in

Avatar: the Last Airbender. However, my topic was broad and scattered across a range of

disciplines, connected by a thread of disability issues. I wouldn't be able to produce

quality analysis with such a large quantity of topics. My concern lay in the potential of

turning my research into a map of all these themes portrayed in the series without fully

developing any coherent discussion about them, rendering them vulnerable to

misinterpretation outside of any theoretical contextualization. Instead, I focused my

energies on one topic that underlies all the other themes throughout the series and would

thus be a natural starting point for analysis: the body-environment relationship. This topic

then expanded some to include not only the body-environment relationship in the series,

but also its implications for understanding disability and universal design theory.

But why should we care about what some animated children's show–especially a

fantasy one–says about the human body or how our built environments interact with our

bodies? How can this fantasy world, in which some people have what could be described

as "super powers," impact our understanding of our human abilities in the real world? As

I have already briefly touched upon, disability narratives reflect real cultural attitudes

toward disability. However, they do more than just reflect already existing values of

disability. Narratives featuring disability additionally act as sites of meaning formation

and meaning transformation. Judith Butler elaborates this idea: "To claim that discourse

is formative is not to claim that it originates, causes, or exhaustively composes that which

it concedes; rather, it is to claim that there is no reference to a pure body which is not at the same time a further formation of that body" (Dolmage 2014). Thus, the representation of bodies and disability in *Avatar* is an important site of analysis not only because it mirrors cultural attitudes, but because it actively forms and creates meaning about bodies and disability.

The need to analyze *Avatar's* depiction of disability and humanness among popular media sites is further delineated by the following issues:

1) The scope of the audience.

2) The contributions of and to disability studies.

The current social and political climate in the United States.

Scope of audience.

Avatar: the Last Airbender launched on Nickelodeon in February of 2005. According to press releases by Nickelodeon published on their site just for *Avatar* news and forums, the first three seasons garnered 21.7 million viewers aged 2 and older, including 8.8 million kids aged 2-11 and 6.3 million kids aged 6-11 (Nickelodeon). In 2008, the series was one of the top five animated shows on television for boys 9-14 and ranked in the top ten for boys 2-11 (Nickelodeon). During the week of the series finale in 2008, 5.6 million viewers tuned in to watch (Nickelodeon). *Avatar: the Last Airbender* was consistently ranked in Nickelodeon's highest viewed shows while it aired before its conclusion in 2008. The huge success of the show eventually prompted a sequel series called *The Legend of Korra*, which follows the next Avatar in the cycle a generation later after the death of the first series' Avatar Aang, as well as several comic book publications that continue the stories of some original *Avatar* characters.

The millions of viewers this show received and continues to attract means that any social issue portrayed in the show is worthy of consideration. The enormous audience reach means the potential to have a real effect on the public perception of a theme delved into by the show. The audience of the show mainly consists of young children and teens, whose knowledge and attitudes about the world are still developing. Media representations affect our impression of reality–whether fiction or non-fiction, animated or live-action. A rhetorical analysis on this show's illustration of disability and the human body could offer insight into how young audiences are being conditioned by this particular show to understand these concepts. I would argue that an analysis on any social issue illustrated in this show–not just disability issues–is warranted just by the scope and age of its audience.

Contributions of and to disability studies.

Disability issues in and of themselves are worthy of research and discussion. Disability rhetoric and advocacy have contributed to the awareness of the discrimination and lived experiences that persons with disabilities face. Social discussion of disability issues has prompted legislation protecting and advocating for disabled persons. Disability studies furthermore contributes to the progression of many other disciplines, including feminist theory, occupational therapy, medicine, social justice, communications, and public policy just to name a few.

The representation of disability anywhere may have a very tangible impact on the understanding and treatment of disability everywhere. The works of Dolmage and Davis have elucidated the role that media representations of disability have in reflecting and shaping meaning. Davis argues that, in fact, "in an ableist culture disability can't just *be*–

it has to *mean* something. It has to signify" (Davis 2013). In this line of thought,

disability representation in the media will always require evaluation in order to

rationalize and critique just what it intends to mean and how it came to mean.

Disability studies aims to deconstruct these meanings and values surrounding

disability representations in the media. However, another critical objective of disability

rhetoric is to reveal the illusion of the bodily norm or average, a concept Garland-

Thomson has coined within disability studies as the 'normate' (citations; Hamraie,

Dolmage). Thus, the two-fold hope in dissecting disability narratives and representation

includes both undermining the devaluation of disability identity as well as de-centering

this popular notion of a normate. Analyzing depictions of bodies in media narratives

makes evident the hegemony of the norm and just how ingrained the illusion of the

normate is in our culture's conceptions of the humanness (Dolmage 2014).

Finally, the significance of analyzing media depictions of the body and disability

as in the case of *Avatar* lies not in assaulting the media on incorrect representations.

Dolmage asserts the need for the field of disability studies to "move beyond just

'policing' cultural representations of disability" as a "matter of political correctness"

(Dolmage 2014). Instead, critiques of illustrations of bodies and disability should aim to

provide direction for new ways of making and conveying bodily meaning. I aim to follow

in Domage's footsteps when he calls for constructing disability within a context that

clearly affects us all. In this research, I will support more progressive ways of

understanding bodies and humanness, especially as related to disability and the body-

environment interaction.

Current social climate in the United States.

Finally, the last of my three main impetuses for this research refers to the current

social and political climate in the United States. As of this writing, I am living in an

uncertain time of political, cultural, social, economic, and environmental change. Thus,

yet another rationale for examining this topic happens to be a very kairotic one. I was

pretty well-versed in disability rhetoric by the time our current president, Donald Trump,

mocked a disabled reporter during a campaign speech. While I knew that not everyone

was as passionate about disability rhetoric as I was, I abruptly remembered that the

majority of people in the US are not aware of the issues and social injustices still faced by

millions of disabled people, and many, unfortunately, probably do not care.

This thesis focuses on instances of disability in a popular culture medium. Pop

culture mediums have grown exponentially as platforms for social sentiment, especially

within this last election cycle. Garland-Thomson echoes other disability scholars on the

influence of media, stating that "culture [through television] saturates the body with

meanings that far outstrip their biological bases and…those meanings generate social and

political consequences" (Hresko-Reid & Reid 2005). The portrayal of disability in this

pop culture television show thereby contributes to this most recent ongoing conversation

focused intently on various types of bodies, personhood, and identity. The current social

climate is asking questions about physical features of embodiment, about who is

deserving of civil rights, about what groups of people may be protected or discriminated.

Communities of people are debating who deserves and to what extent they deserve

human rights, equality, respect, dignity, and even existence. These questions are not new

to the disability community. They have faced them time and again throughout history,

and they continue to do so at the present moment. This research could potentially contribute to this discussion about the acceptance or rejection of certain type of bodies, especially in context to their built environments. The show provides cases of both the acceptance and discrimination of bodies, sometimes for political reasons. We can learn a lesson from *Avatar: the Last Airbender* about what can and what cannot be assumed about bodies, and how we can make room for all sorts of embodiment without posing a threat to any body.

My objective, then, is to analyze how the show *Avatar: the Last Airbender* portrays the relationship of bodies to the natural and built environment, how our spatial design choices can include or exclude certain groups of bodies, and what it means to construct a landscape with a diversity of human bodies in mind. I plan to analyze two examples from the show in particular. The first will be a case study of a prison in the show made to incapacitate certain physical abilities. The second will be a case study of several technologies thoughtfully designed for either the enablement or disablement of bodies.

Before I delve into these two examples, however, I will first provide some background about the show. Some background about the show is necessary to understand the role of nature and the environment in the show, which can then lay the groundwork for analyzing how the show sets up the significance of the body-environment interaction. I will explain how the show succeeds at emphasizing that our surrounding landscape is crucial to the functioning of our bodies. I will then introduce my theoretical framework for understanding disability and the human-environment relationship and define some important terms like universal design, accessibility, and usability.

Background of Television Show *Avatar: the Last Airbender*

The world of the avatar.

The story of the Avatar takes place in a fantasy world where some people are born with unique bending abilities. Bending is the ability to move, transform, and manipulate certain elements in nature. These elements include air, water, earth, and fire. However, not every person is born a bender. The world's population consists of both benders and non-benders. Non-benders resemble our understanding of typical human embodiment. They have the same abilities, needs, wants, desires, and appearances that would reflect anyone watching the show. Benders reflect the ordinary person in every way as well, except for their one extraordinary characteristic of being able to manipulate a natural element. This fantasy world of bending consists of four nations: the Fire Nation, the Water Tribes, the Earth Kingdom, and the Air Nomads. These nations formed according to each culture's special ability to bend an element of nature. Thus, the Fire Nation is made up of firebenders (as well as ordinary non-benders), and the Earth Kingdom is home to earthbenders (and non-benders).

A bender cannot bend all four of these elements. He or she inherits the capacity to bend only one element from a parent. The daughter of a waterbender, for instance, may or may not be born with the ability to waterbend. The son of an airbender and an earthbender may be born with the ability to airbend or earthbend, but not both, and perhaps neither. The ability to bend in some ways reflects the passing of a passive or dominant gene from one or both parents. As the child grows, he eventually discovers that he can bend. Benders can then train and develop their bending abilities throughout their lifetime to varying degrees of skill.

The Avatar represents the single exception to this bending ability; the Avatar is the only person in this world who can bend all four elements. He or she maintains balance among all benders and the four nations. There can only be one Avatar in the world at a time, so when one Avatar dies, the next is born. The current Avatar, a twelve-year-old boy named Aang, is the present Avatar in a long line.

While individual Avatars exist one at a time, their identities, experiences, power, and knowledge are all connected. The cycle of rebirth not only maintains the power and knowledge of all the Avatars, but also ensures balance among all the nations and elements. The cycling of rebirth through the elements connects the Avatar to people of all bending and nations, so his interests do not lie with one culture alone but with every person. The duty of the Avatar is to serve to all nations but be partial to none. The Avatar's prime responsibility is to maintain peace, balance, and harmony among the nations.

Bending depends on the presence of natural elements to bend, but it also depends on the movement and cycles of nature. Firebenders become slightly more powerful with the rising of the sun or the passing of a comet. Meanwhile, waterbenders become slightly more powerful at the full moon and rising of the times. The cycles of nature serve as balancing scales so that each element draws upon its own power, but no element is more powerful than another. Just as bending is used to manipulate nature, nature influences the abilities to bend..

The Avatar not only bends all four elements, but can also enter into the 'Avatar state' in which he draws upon all the power of all the past Avatars. The Avatar state is an incredibly powerful state. However, it too comes with its checks and balances. If the

Avatar is killed while in the Avatar state, then the cycle of Avatars is broken. No Avatar

will be reborn again after him, threatening the balance and peace among the four nations.

The story of Aang.

The plot of *Avatar* is a familiar one. An evil king wanted more power than he had

and started a war to conquer other nations. A young, pure hero takes on the mission to

stop him, more or less because he is prophesized to be the only one who can. In *Avatar:*

the Last Airbender, the young Avatar Aang is this hero who must defeat Firelord Ozai,

the current ruler of the Fire Nation. As the opening theme of the series states, the four

nations used to live in peace and harmony until the Fire Nation attacked, beginning a long

and devastating war. Around the onset of the war, the Avatar vanished, never to be seen

or heard of for 100 years. His mysterious disappearance led most of the world to believe

he died in the Avatar state, breaking the cycle of Avatar rebirth.

The series actually begins 100 years after the start of the war and the

disappearance of the Avatar. The war is still ongoing, although the Fire Nation is close to

victory. A young sister and brother in the Southern Water Tribe stumble upon a frozen

glacier with a light radiating through the ice. The girl, named Katara, notices the figure of

a person trapped in the ice and begins to hammer into the block of ice. The ice suddenly

cracks and blows apart, revealing an unconscious young boy with strange blue markings

on his body. The boy awakens and introduces himself as Aang to Katara and her brother

Sokka. The boy has no memory of being trapped in the ice or for how long, nor is he

aware of the war that has been raging for 100 years. Katara soon realizes that she and her

brother have found the missing Avatar, whom the rest of the world believes died long

ago, breaking the cycle of Avatars.

Thus, the story of the young Avatar begins. Aang realizes that only he can put an end to the war. Aang, Katara, and Sokka set off on their journey–along with a fourth character Toph who eventually joins their band later–to help Aang master the other three elements, prepare to defeat the Firelord, end the century-old war, and save the world. The show of course features many other subplots and characters, but this one mission echoes above all: defeat the Firelord, save the world.

The body-environment relationship in *Avatar*.

A brief background of the show's setting is necessary in describing just how the show portrays both the body and the environment. Anyone who has not watched the series would have trouble understanding just how important nature is to the inhabitants of this world. It would be impossible to explain the body-environment connection in the show and how it can be applied to our reality without first setting up the concept of bending.

To consider the body-environment interaction in the show, the viewer has to accept the show as a reality and forget that it is a fictional TV show. We have to enter into that world and conceive a person's ability to move water as normal, just as we would conceive a person driving a car in the real world as normal. However, at the same time we perceive everything in this world as perfectly plausible and natural, we must also inherently evaluate its differences and similarities from the real world. Contemplating these differences between the fictional *Avatar* world and our own reality, while acknowledging all the similarities, will allow us to draw parallels from how bodies and the landscape are treated in the show versus in reality. Understanding the body-environment interaction in the show in turn conjures awareness for the body-environment relationship in real life, allowing us to apply lessons from the show to our own

experiences of embodiment. For example, viewers can easily recognize in the show the obvious necessity for water to be present in order to waterbend. We can infer without too much deep thinking that the abilities of a waterbender depend on his or her surrounding environment, the ready proximity and availability of water. To a waterbender, however, the realization that all her capabilities as a bender hinge on her environment may not be as obvious. Waterbenders live in one of two tribes at either the north or south pole. Their entire environment literally consists of water or ice. For the majority of waterbenders, who have never traveled outside the north or south poles, the environment is not conditional; it is a given. Water has always been available for bending. Therefore, they may conceive their relationship with the environment not as a dependent one, but as naturally absolute.

Practicing this exercise in understanding the body-environment relationship can help uncover our own assumptions about our bodies and environments. We can likewise reflect on how our bodies may or may not be dependent on our surroundings in ways we take for granted. The show *Avatar* is a prime conduit for this practice, as the show demonstrates very visibly the body-environment relationship. The world of the *Avatar* hinges on connections with the environment and coexistence with nature. The most demonstrated and contemplated individual behavior in the show is bending, which exists solely in relation to nature. To illustrate just how important nature is to every bending character's physical abilities, I will describe an example from the show.

The last two episodes of season one make up a two-part episode in which the Fire Nation initiates an attack on the Northern Water tribe, where the Avatar has been training with a waterbending master. These collaborative episodes poignantly illustrate two

significant aspects of normality in the show: 1) the degree of the body-environment

relationship in the show and 2) the importance of maintaining balance between the body

and the environment. These episodes, while demonstrating the magnitude of these two

normative features of the bending world, also display the very different conceptions that

characters can nevertheless maintain about their own relationship to the environment.

Some characters understand these two features and their own interdependence on the

landscape. However, others still hold the position that their bodies and capabilities are

independent of the natural environment. They believe the environment can be acted upon

without effects on their own being.

In the first of these two episodes, "The Siege of the North, Part 1," viewers learn

that the moon and ocean spirits were the original waterbenders. The ancestors of the

waterbenders learned to mimic the moon's push and pull of the tides, thus becoming the

first human waterbenders. *"I've always noticed my waterbending is stronger at night,"*

says Katara when the princess of the Northern Water Tribe explains the origins of

waterbending. The princess responds, *"Our strength comes from the spirit of the moon.*

Our life comes from the spirit of the ocean. They work together to keep balance." This

exchange reaffirms the pivotal relationship that benders have with nature. All physical

bending capabilities stem from a connection to the surrounding environment.

In the next episode, Part 2, the moon spirit's mortal form of a coy fish is killed by

a Fire Nation admiral. The moon is darkened and waterbending is disrupted. The Avatar

and another firebender attempt to convince the admiral, named Zhao, not to harm the coy

fish embodying the moon spirit. These two characters–Aang and Zuko's uncle–exhibit an

understanding of their own vulnerable being in the context of their natural environment.

They realize that their own physical power only exists through their interaction within an

environment that enables that power. In contrast, the character of Admiral Zhao considers

his physical abilities as independent of the larger environment. He believes that his

individual faculties cannot be affected by a separate and seemingly autonomous physical

object. He views the worth of the object, in this case the moon, only as a direct

connection to the waterbenders, not realizing the larger, indirect connections of the

environment to all beings including himself.

        These episodes demonstrate interdependence of bodies and the environment in

this fictional world. Humans in this world remain empowered only when acknowledging

their own reliance on their surrounding landscape. In contrast, rejection of the

environment's influence results in some sort of reprisal.

        This two-part episode, then, defines for viewers some substantial concepts of the

body-environment relationship in the show. Essentially, the environment is not merely a

backdrop for bodies to move within. The environment does not exist solely as the setting

in which for people to carry out their dramas, detached from its influence. In contrast, the

association of physical space and bodies actually drives the action and meaning of the

series. Ability in the world of the Avatar, then, is defined by this body-environment

connection. Function quite evidently relies on the interaction of space and bodies. The

show illustrates this point time and again throughout the series by reminding viewers of

what happens when this connection is either disregarded by a character or otherwise

interrupted by an external cause. Quite often, bending abilities themselves are disrupted.

Thus, the show highlights this important norm of bodily-environmental connection

through its repeated disruption.

The natural environment makes an obvious example of the body-environment connection. What is often less obvious are the relationships we do not usually see: wifi connections, cables running underground into our houses and behind our walls, or even the microscopic realm of bacteria and viruses. The first step to understanding just how much the environment influences our abilities and vice versa is to recognize that our abilities might be connected to something outside our physical bodies at all. Then, we can begin to understand how we could or have already manipulated our built environment, which can lead us to consider how we may intentionally or unintentionally be ignoring the diversity of bodies through design. Reflecting on another reality's more obvious relationship with the environment can aid in understanding our own perhaps uncontemplated interdependence with the environment.

History of Universal Design

The term universal design was coined by architect Ronald Mace in the early 1970s (Hamraie 2012; Hamraie 2013). Mace's 1985 definition of universal design consisted of "a way of designing a building or facility, at little or no extra cost, so it is both attractive and functional for all people, disabled or not. The idea is to remove that expensive, 'special' label from products and designs for people with mobility problems, and at the same time, eliminate the institutional appearance of many current accessible designs" (Hamraie 2013). The establishment of universal design coincided with the civil rights movements of the 1960s and 1970s. This period of social change included the advocacy of disability rights, which succeeded over the next few decades in passing legislation that would protect and provide for persons with disabilities, including the Architectural Barriers Act of 1968, Section 504 of the Rehabilitation Act of 1973, the

Fair Housing Amendments Act of 1988, and the Americans with Disabilities Act of 1990

(Hamraie 2012; Hamraie 2013; Watson et al 2013). While these new laws provided

groundbreaking progress in constructing inclusive built environments, the legislation also

emphasized only technical, quantitative requirements. Accessible design, thus, became a

checklist of building ramps, wider hallways, and 'handicap' entrances and bathroom

stalls.

This approach signifies barrier-free design, in which the goal of the design is to

remove physical obstacles in the built environment or products that would hinder access

or mobility (Hamraie 2013). Barrier-free design adheres to legislative standards for

access. It emphasizes the final end product of the design, of which disabled persons are

the assumed and prioritized user. However, barrier-free design does not encompass the

wider theoretical objectives intended with Mace's conception of universal design, in

which the design in not merely about accessibility or mobility, nor is it only for the

benefit of disabled persons. Universal design, instead, ponders the embodiment and

vulnerability of all persons, questions the possibilities for participation and interaction

with and within a space, and focuses on the collaborative process of design rather than

the result or product.

Universal design theory developed at a much slower pace than the passing of

barrier-free legislation. Thus, barrier-free design often replaced a universal design

philosophy, as architects and designers had no formal understanding of universal design,

nor much incentive past legal rulings to re-philosophize their entire design

methodologies. As Aimi Hamraie describes, new legislation may have won protection for

disabled persons, but it "did not directly propose strategies for challenging the

professional practices through which the design professions had adopted a normate [non-disabled] template as ideal" (Hamraie 2012). Decades after coining universal design, Ron Mace himself recognized this need to provide design professionals with more direction. In the 1990s, he gathered professionals from different fields to draft the Principles of Universal Design, shown in Table 1 (Connell 1997; Hamraie 2013). This gathering established a new definition of universal design: "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (Connell 1997; Hamraie 2013). This definition is still largely referenced today across a variety of fields as the defining translation of universal design.

Table 1

Principles of Universal Design

Principle	Description	Application Guidelines
Equitable Use	Design is useful and marketable to people with diverse abilities	• Design is identical whenever possible; equivalent when not • Avoid segregating or stigmatizing any users
Flexibility in Use	Design accommodates a wide range of individual preferences and abilities	• Provide choice in methods of use • Accommodate right- or left-handed use • Provide adaptability to the user's pace
Simple and Intuitive Use	Design is easy to understand, regardless of experience, knowledge, language skills, or current concentration level	• Eliminate unnecessary complexity • Be consistent with user expectations • Accommodate wide range of literacy and language skills
Perceptible Information	Design communicates necessary information regardless of ambient conditions or user's sensory abilities	• Use different modes (pictorial, verbal, tactile) for redundant presentation of information • Provide adequate contrast • Maximize legibility
Tolerance for Error	Design minimizes hazards of accidental or unintended actions	• Arrange elements to minimize hazards and errors • Provide warnings of hazards and errors • Provide fail safe features
Low Physical Effort	Design can be used with minimum of fatigue	• Allow user to maintain neutral body position • Use reasonable operating forces • Minimize repetitive actions
Size and Space for Approach and Use	Design allows appropriate size and space for use regardless of user's body size, posture, or mobility	• Provide a clear line of sight to important elements • Accommodate variations in hand and grip • Provide adequate space for assistive devices and personal assistance

Developing Universal Design Theory

The Principles provide a place for professionals to start in considering the politics of design and space. However, the Principles were drafted as an educational tool for practicing design professionals to integrate accessibility and usability standards into their work. The Principles and new definition of universal design established by the Center for Universal Design helped to solve the issue of providing strict, non-quantitative guidelines to designers that the new legislation over the previous couple decades failed to provide. Nevertheless, their establishment did little to develop the theoretical content underlying universal design. For example, the Principles guide designers toward more thoughtful and usable products, but they do not provide a conceptual justification for inclusive design, acknowledge the inherent subjectivity in design, or deconstruct any understandings of the human condition. Aimi Hamraie explains, the "guidelines do not appear to make an overarching ideological or value-based claim. Nor do any of the Principles mention disability, leaving unanswered the question of whom equity and flexibility are meant to benefit" (Hamraie 2013). Moreover, the Principles still primarily target the audience of the designers themselves, overlooking user participation throughout the process. They also fail to convey the significance of the person-environment relationship or the universal conditions of embodiment. More theoretical development of universal design is needed to address these considerations of design overlooked by the Principles.

The field of disability studies recognized the problems that practice without further theoretical development could produce. Much contemporary literature on universal design outside the realm of disability studies remains focused on application, best practices, assessment, and policy implementation (Hamraie 2012; Hamraie 2013;

Hitch et al. 2011; Lid 2013; Sui 2011). In contrast, disability studies has consistently

urged the development of universal design theory. Disability authors Iwarsson and Stahl

champion the need for theory development asserting that "without theory there is only a

miscellany of observations" and that "the definition of concepts is a first, most necessary

step" (Iwarsson & Stahl 2003). Others from disability studies have attempted to answer

whom universal design is for, if 'universal' is really possible in design, and how to

understand fluctuating concepts of embodiment. Universal design theorist Inger Marie

Lid focuses on this last approach to developing the philosophy of universal design. Lid

particularly deconstructs the concept of 'human' and embodiment in order to specify the

term 'user' implicit in universal design theory. Lid also discusses universal design in the

context of a relational model of disability, an approach emerging from Scandinavian

disability studies. The relational model, while not without its criticisms, provides an

alternative to the social model of disability that saturates English and American disability

rhetoric. The development of universal design theory can position it as a powerful,

reflexive tool that encompasses not just current understandings of embodiment, but an

appreciation of the constant and evolving relationship between bodies and built spaces.

　　　　Inger Lid argues that universal design has not yet made clear its relationship to

disability and the concept of human, which leaves universal design without an

authoritative ideology to distinguish it from barrier-free design (Lid 2013). Current

literature delineates core features of universal design philosophy, such as a user-focus or

a democratic process. However, these values need to be grounded in what it means to be

a user, the human component implicit in the process and audience of universal design.

According to Lid, "if disability as a human experience and condition is overlooked in

UD, the epistemological content risks being reduced to mere technical knowledge about disabling physical barriers and how to avoid them" (Lid 2013). She proposes that the concept of human deserves more theoretical attention before we can adequately define and develop universal design and its relationship to the disabled body. She also supports a relational model for viewing disability in contrast to the social model. This relational model would shift the understanding of disability as a form of social oppression to one that is created by interactions relative to various environments. However, it does not completely forgo the social or medical models of disability. Rather, the relational or 'gap' model situates disability as *both* a material and social phenomenon in constant interaction with the environment. Based on Lid's approach to theorizing universal design, I will attempt to define some important terms in the field of UD–accessibility and usability–as well as define universal design itself.

I also offer some examples of how these concepts materialize in the show *Avatar*. As discussed, the world of the Avatar makes obvious the body-environment relationship to viewers. The body-environment interdependence, however, may be less evident to us in an increasingly post-human reality, where the normative presence of technology distracts from or even seeks to eliminate human vulnerability. This show provides poignant reminders about the human condition, demonstrates the body-environment interaction, and offers the opportunity for reflection on real life parallels. I will provide two case studies on two different episodes of the show that illustrate important concepts of universal design, both in problematic and successful ways, which can serve as connections to our own perhaps less obvious or under-appreciated ways of implementing universal design and the relational model.

The concept of human.

Lid echoes the concern of fellow scholars that universal design studies have been largely focused toward the practice of designing usable or accessible products and spaces (2013). Lid argues that its theoretical development is still being hindered by not clarifying the meaning of an important term in the explanation of universal design–human. Defining terminology is a necessary precursor to any theory development:

> Well-defined concepts constitute one basic condition for any theoretical development, and concept formation and theory formation in science go hand in hand. One of the distinctive features of a theoretical model is the description of relationships between the concepts included, and optimally the concepts in a model should be mutually exclusive. (Iwarsson & Stahl 2003).

Lid aims to expand upon the term 'human' embedded in the definition of universal design, or in other words, the 'person' or 'persons' for whom universal design is meant to benefit. To develop universal design, she proposes first developing the concept of human and the 'implicit person' in UD's definition. In her article "Developing the theoretical content in Universal Design" in the *Scandinavian Journal of Disability Research*, Lid calls for 1) the theoretical development of universal design, with 2) a stronger focus on the human condition, which 3) includes disability as a human condition (2013). I will detail her proposed contributions to universal theory, as well as describe ways to understand her development of universal design through examples from *Avatar*.

The design of products and environments to be used by *people* requires an understanding of what it means to be an embodied human, whose explication has been left out of universal design discussion. Lid suggests that attempting to theorize UD without first theorizing its primary audience and beneficiaries–human beings–is putting the cart before the horse. Designing for human beings demands first a fundamental grasp of the human condition. However, current universal design literature expects readers to implicitly understand the concept of human. Lid specifically illuminates for readers two universal components of human embodiment, namely, that conceptions of human should include 1) plurality and 2) vulnerability (2013).

By plurality, Lid is referring to the great diversity in human physicality and experience. She affirms that every individual's material body is unique, every lived experience is distinct, and the abilities afforded by each body will be different. Currently, design fields privilege a normate template approach when conceptualizing users rather than acknowledging a wide plurality of embodiment. Coined by Rosemarie Garland-Thomson, the normate "refers to a privileged and de-stigmatized body representing a universal or ideal type" (Hamraie 2012). The normate stems from the statistical averages of bodies, giving the illusion of normalcy. However, the average cannot be conflated with normalcy:

> The norm is a state of equilibrium determined on an individual and qualitative basis, making it distinct from the statistical average, which is based upon a quantified data set derived from a population of individuals. When the statistical

average is conflated with normalcy, the deviations from the mean are

characterized as both quantitatively and qualitatively deviant. (Hamraie 2012).

The problem with the normate template is that it gives the appearance of

including a wide range of bodies by designing for the average of those bodies, when, in

fact, the normate template actually invalidates the plurality of the human experience by

valuing the average over the range. It makes invisible the existence of anyone outside the

template (Hamraie 2012).

In Lid's conception of human, she calls for understanding 'human' as an

inherently diverse condition, for which designers should appreciate the range of abilities

rather than trying to consolidate the understanding of human into one normate. An

example of designing for the range rather than the average would include height

adjustable chairs. Considering the multiple and intersecting embodiments of human

beings provides more insight into designing a usable and accessible space than basing

design on an impossible average alone.

The second condition, according to Lid, that needs to inform our concept of

human refers to the inevitable fragileness and immortality of the human body, or

vulnerability. Lid borrows from philosopher Martha Nussbaum to explain human

vulnerability as "the fact that we all have mortal decaying bodies and are all needy and

disabled in varying ways and to varying degrees" (2013). Vulnerability as an intrinsic

human quality "transcends the dichotomy between disabled and non-disabled" and

establishes a spectrum of needy bodies with varying degrees of fragileness or

dependencies (Lid 2013). Acknowledging the requisite condition of vulnerability would

replace this able-bodied/disabled binary with universal ranges of vulnerability that innately communicate about the category of human, rather than an isolated category of impaired.

Avatar does a good job of illustrating this condition of vulnerability, especially as it applies to every person and not merely those with impairments. As mentioned in the episode "The Winter Solstice," the abilities of waterbenders and firebenders are affected by the movements of the sun and the moon. They depend on an external body for their abilities. This dependence automatically means a degree of vulnerability, as their functioning and power relies on something outside of their control. For example, a firebender becomes physically vulnerable during a solar eclipse when the sun is blocked by the moon. This example parallels the vulnerabilities experienced by persons in reality. Science and technology may empower and enable us in a myriad of ways, including flying, driving, curing illness, or communicating great distances to name a few. However, they have yet to completely abolish all human vulnerabilities and sometimes even create new vulnerabilities formed from the interdependence on yet more external entities.

However, perhaps the greatest credit of the show in this regard, is not simply that it supports Lid's concept of humans as inherently vulnerable, but rather that it illustrates the vulnerability of *all* human beings, including the non-disabled. In fact, in the episode mentioned above, the main characters who experience these vulnerabilities are not physically impaired. The waterbender Katara and the firebender Zuko, who become vulnerable through their interactions with the sun and the moon, would, in fact, fit into conceptions of able-bodiedness and a normate template. The only cause for exception is a burn scar on Zuko's face. The show, then, succeeds in supporting this theoretical

development of what it means to be embodied. Impairment is not a requisite for vulnerability, human embodiment is. *Avatar* demonstrates this human condition by illustrating the fluctuating vulnerabilities of all its characters, including both impaired and non-impaired. Viewers witness experiences of the characters' that consistently mark their human embodiment and abilities as both diverse and vulnerable, despite the lack of physical impairment.

The relational model of disability.

Lid's development of the concept of human also provides a greater foundation for understanding universal design's relationship to disability. The advantage of understanding 'human' as vulnerable and diverse is the subsequent ability to then contextualize disability as just one dimension of vulnerability and diversity rather than a discrete identity category altogether. Disability becomes a condition of being human instead of a condition in conflict with conceptions of human embodiment. Therefore, disability can be positioned in the physical or social environment more readily than in the individual body alone.

The historically prevalent medical model of disability conceives of disability as located in the individual body (Shakespeare 2006). This model views a disability as in conflict with the conception of human. It seeks to diagnose, treat, correct, and vanquish disability. In contrast, the social model distinctly separates impairment from disability. Impairment, not disability, resides in the physical body and is not necessarily in and of itself a detriment to that person's experiences or quality of life. Disability, on the other hand, is situated in the social reaction to and oppression of people with impairments (Shakespeare 2006). Disability emerges as a social phenomenon, in which persons with

impairments experience systematic exclusion socially, economically, physically, and so on.

Lid advocates a relational model of disability, which pulls from both these medical and social models. The relational model constitutes a framework for understanding disability that includes "both social and medical perspectives together with a focus on the interaction between the two" (2013). Lid continues:

> Disability emerges, according to this [relational] model, in the interaction between individuals and the environment, encompassing both social and material factors. The interaction itself is of importance, together with individual and environmental factors. A relational model focuses on a person-environment mismatch. (2013).

The key component of the relational model is the *interaction* component. Disability results from a person's interaction with a specific environment. Thus, disability is both partly medical and partly social, because it is situated in the relationship between the person's biological embodiment and the constructed environment's reception of their embodiment. Take, for example, another episode from *Avatar* in which the characters Aang, Katara, Sokka, and Toph come to Lake Logai. Toph, a blind earthbender, has developed an ability to 'see' her surroundings by feeling vibrations in the ground through her feet. Almost like an earthbending sonar system, she takes in vibrations that bounce back to her feet when she walks and earthbends. The show reverses the positions of vulnerability in this Lake Logai episode. Instead of depicting Toph's blindness as a vulnerability, the show actually illustrates Toph's embodiment as more enabled in this

episode than those of other characters. Toph can sense tunnels running underground beneath the lake that would be indistinguishable to anyone without her ability–unique to her–to envision the built environment through a sense other than sight. Her distinct embodiment, in combination with the surrounding environment, makes her savvy to important knowledge that ultimately affects the group's safety. In contrast, while her three companions are situated in the exact same environment, they ultimately become disabled in obtaining this production of knowledge, because their bodies do not interact with the environment in the same capacity. Their previous lived experiences never made it necessary or even possible to be able to envision what cannot immediately be seen. As a result, the other characters are rendered vulnerable from their own lack of knowledge, unable to be obtained through their embodiments.

Likewise, the design of the underground tunnels illustrates design for the average body's ability rather than the range of bodily ability. The group behind the construction of the hidden underground tunnels most likely imagined any threatening person to their secret as an able-bodied person, or at least imagined someone who fit into perceptions of the normate without physical impairments. The designers' failure to consider diverse ranges of embodiment leads to the uncovering of their secret tunnel system and meeting location. They designed their infrastructure based on the assumption that sight is the primary way to sense built environments. This assumption upholds a normate-template way of thinking about design. Yet, as this episode proves, the very person designated as 'disabled' by her culture ends up demonstrating that a diversity of human function leads to greater success in meeting goals, more knowledge about present conditions, and further access to spaces and experiences. Time and again, adversaries who fight Toph

underestimate her capacities as a person based on the evaluation of one capacity–sight.

Toph's character directly illuminates Lid's call for recognizing the plurality of the human

condition. Diverse ranges of ability and function should not speak to the worth or success

of an individual's embodiment, but rather signify a shared commonality of humanness.

Toph's character furthermore exemplifies the fluid and relative link between

bodies and environments. On the ground, Toph's body interacts with the physics of the

earth to construct her surroundings in her mind through vibrations detected by her feet.

Nevertheless, this body-environment relationship changes throughout the show in

accordance with Toph's changing environmental positioning. As soon as the group

mounts Aang's flying bison, Toph becomes disconnected to the earth and is thus disabled

from sensing her surroundings, sometimes even manifesting physical symptoms like

dizziness or motion sickness in reaction to this shift in environment. In yet another

episode, the group stumbles upon a tower in the middle of the desert. Toph has been

complaining throughout their desert trek about her 'blurry' vision, as the sand is not as

compact as earth and thus does not deliver as sharp vibrations. However, when the group

comes upon the tower, they again depend on Toph for crucial knowledge about their

landscape and, subsequently, their eventual course of action. Toph places her hands

against the tower and is able to sense the presence of an enormous underground library,

which naturally affects the plot of the episode and the destiny of the group. Again, the

body-environment relationship both enables some and disables others. The shifting

enablement and disablement of any individual depends on dynamic interactions between

space and embodiment. The show *Avatar*, then, becomes a powerful reminder of our

situatedness in the surrounding landscape. Additionally, it supports disability as a fluid

concept and innately human condition, in flux with and dependent on the relative environment and its inhabitants' abilities. *Avatar* illustrates the relational model at work through the character of Toph, whose embodiment happens to be more obviously linked to her environment.

Disability emerges from a unique person's interaction with the environment. If this knowledge is accepted, the goal for designing environments should then be to create or support, to the greatest extent possible, enabling interactions rather than disabling interactions. This end goal of supporting body-environment interactions that enable is the objective for universal design–to design for the greatest enablement of the greatest amount of users while also minimizing disablement as much as possible for as many users as possible. Lid's proposal for developing the concept of human and its relationship to disability does more than help develop the definition and goals of universal design. It also makes evident the stake that everyone has in universal design, not just persons with impairment. As Lid describes with the conditions of humanity, and as Avatar illustrates through its able-bodied characters, the surrounding environment affects *everyone* whether impaired or not. Therefore, developing and applying UD theory is relevant to every person, despite not always being obviously beneficial to all bodies.

The primary challenge I see with Lid's approach to developing the concept of human as vulnerable and diverse is that it will be increasingly harder and harder to conceive of embodiment as vulnerable and diverse as the body becomes more and more connected to technology. Scientific and technological advances often seek to combat the vulnerabilities associated with human embodiment. Technology also demands a certain level of standardization in order to network or create products that work with each other.

The integration of technology into human embodiment could minimize the characteristics of human vulnerability and plurality, making it hard to bolster the theoretical groundwork of universal design based on these conditions. It will be hard to fight the growing perception of immunity from physical fragileness, as technology increases lifespans, decreases bodily inconveniences, and circumvents the burdens of humanity. Already, technology promises an illusion of solving all life's problems, and sometimes even the illusion power over our own natural processes and disintegration. On the other hand, technology's convergence with physical embodiment could mean new and different sorts of vulnerabilities. Circumnavigating these issues will require other equally important criticisms of the post-human experience, in which we will need to realize that, while technology can be integrated into the concept of human, it cannot completely replace or override the human component (at least for now).

A critique to be made of the relational model of disability is the lack of discussion of invisible disabilities. This is not to say that relational model does not or could not include or pertain to invisible disabilities as well; there just happens to be less discussion or reference to invisible disability in literature on the relational model. The emphasis on the body-environment relationship instead tends to privilege thinking about visibly material factors, more so than other invisible, but still material, factors–assuming we accept that mental and cognitive impairments are physiologically-based and therefore material. More explicit direction on the relationship of invisible disabilities to the relational model is needed.

Additionally, defining the concept of human as one that recognizes disability as an inherent condition of being human seems to be in opposition with the name 'relational

model of disability.' Labelling a body-environment interaction approach to human functioning as the relational model of disability continues to separate disability as a distinct category of embodiment to consider *in addition to* considering the general category of human embodiment. Perhaps the relational model of functioning or the relational-ability model would be a more appropriate way to describe a framework for all embodiment, including the status of disability as a condition of embodiment, without putting disability front and center. The decentering of disability from the title would promote Lid's idea that all human function is relative and diverse and that impairment is just one of a plurality of human experiences. Yet another way to coin this ideology could be to appropriate Garland-Thomson's term 'misfit.' A relational-fit model could impart the ideas of person-environment fit–already a popularly used term–or misfit. The phrasing of 'fit' places more onus on the interaction component. After all, two or more entities need to be present to produce a fit or misfit. Thus, the shifting focus from the individual body to the relationship is reflected in the name. However, a potential repercussion of re-appropriating a term emerging from disability studies could again be a continual inclination to refer to disability as the sole spur for developing body-environment theory and universal design. While universal design undeniably has its origins in a disability rights movement, its progression in all design could be stunted by its association with specialized design for only disabled populations. The naming of concepts and theory may not be as important as their definitions or components themselves. However, the language used to describe concepts and theory, as we have seen, influences the reception and assumptions of them. It would be beneficial moving forward to reflect on coding as well as content.

Defining accessibility and usability.

Before I delve into defining universal design, I want to position a few important

terms first: accessibility and usability. Swedish authors S. Iwarsson and A. Stahl

emphasize that the theoretical development of any concept, including universal design,

must first be based in a common language (Iwarsson & Stahl 2003). In an article of theirs

appearing in *Disability and Rehabilitation*, Iwarsson and Stahl argue that yet another

contributing factor to the lack of theoretical development of universal design is the

absence of agreement on common terms, such as accessibility and usability. Instead, they

claim a "considerable unconsciousness, ignorance, inconsistency and even

disinterestedness among the actors as concerns conceptual definitions to the core

constructs being used" (Iwarsson & Stahl 2003). By 'actors,' Iwarsson and Stahl refer to

engineers, architects, designers, occupational therapists, politicians, health care

professionals, and other groups with immediate involvement and implementation of UD

(Iwarsson & Stahl 2003). Iwarsson and Stahl confront this issue in their article by

providing definitions of these three core concepts. I use the definitions of accessibility

and usability put forth by Iwarsson and Stahl because they, too, parallel Lid's perspective

of body-environment theory. Iwarsson and Stahl situate these terms from a relational

perspective of the body-environment interaction, which coincides with both Lid's

concept of human and the relational model of disability.

Iwarsson and Stahl attempt to define these terms through an extensive review and

analysis of their use across several disciplines, including among the fields of the 'actors'

previously mentioned as well as within disability studies. A generalized definition from

the Oxford dictionary at the time of their writing in 2003 provides descriptions like

'approachable, at hand, or within reach' (Iwarsson and Stahl 2003). These words conjure

notions related to physical location and reach.

The authors conclude that meanings of accessibility in fields such as engineering,

architecture, and environmental planning tend to revolve around measurements of

distances and time, but do not consider the human element (Iwarsson and Stahl 2003).

Consequently, Iwarsson and Stahl explain that "for many people, especially when

applying a technical perspective, accessibility is an umbrella term for all parameters that

influence human functioning in the environment, thus defining accessibility as an

environmental quantity. In this way, the individual interacting with the environment is

more or less disregarded" (Iwarsson and Stahl 2003). However, the human component is

foundational to disability models and body-environment relationships. Without

understanding the human component in relation to the environment, the term accessibility

cannot fully encompass the phenomenon of disability, which in turn makes it impossible

to incorporate into design. These technical definitions of accessibility, therefore,

completely misunderstand the audience for whom accessibility is meant to benefit. A

definition of accessibility must not focus solely on factors of the physical environment

that can be manipulated to fit persons. Nor can a definition of accessibility be one that

defines successful access as when a person with impairment can 'function

independently.' As body-environment relationships demonstrate, no body in any

environment functions completely independently from that environment. Relying on

'independent function' as a successful marker of accessibility also indicates a level of

minimally acceptable function expected of able bodies, which imposes subjective values

onto a space about which bodies were originally deemed acceptable as existing in that

space in the first place (Iwarsson and Stahl 2003). A definition of accessibility must

instead acknowledge the complex, interdependent relationship of all bodies and

environments, in accordance with a relational model for understanding disability.

Iwarsson and Stahl establish a three-part definition of accessibility that succeeds

in acknowledging this relationship (See Figure 2). They also establish three steps in

which to gather information for the implementation of accessibility. They include

gathering information on 1) the bodily component, 2) the environmental component, and

3) the body-environment juxtaposition (Iwarsson and Stahl 2003). These three steps

ensure the inclusion of not only the human and environmental components, but also an

analysis of their interdependent relationship.

When it comes to defining usability, Iwarsson and Stahl conclude that an explicit

definition of usability, especially one that differentiates it from accessibility, is hard to

find. However, they do point to some designations of the term usability that appear to be

agreed upon across fields. For instance, the use of the term usability in the literature they

reviewed supports the notion that usability is, in fact, distinguishable from accessibility,

even if it does not explicitly specify how (Iwarsson & Stahl 2003). The authors also agree

that the term usability is typically referred to in such a way that acknowledges the body-

environment interaction (Iwarsson & Stahl 2003). Referring to the Oxford dictionary

again, the authors supply a general description of 'usable'–which should be noted will

differ from 'usability'–as 'fit to use, functioning, operational, serviceable, valid, and

working' (Iwarsson & Stahl 2003). This brief association of words confirms that even

loose descriptions of usability are distinct from accessibility. It also provides the starting

point for what Iwarsson and Stahl found to be true in their literature review; namely, the

term usability is concerned more so with function, while the term accessibility is

associated more with physical location, barriers, and reach (Iwarsson & Stahl 2003).

A differentiating feature of usability from accessibility is the emphasis on some

function or performance, which Iwarsson and Stahl refer to in their defintion as the

activity component. Nevertheless, usability still similarly considers issues of bodily and

environmental capacities as well as the results of body-environment interactions. Thus,

usability builds off accessibility by including the parameters for assessing accessibility,

then incorporating an assessment of an activity component as well. The relationship of

accessibility and usability, then, is compounded. Accessibility is a precondition for

usability (Iwarsson & Stahl 2003).

However, the definitions of accessibility and usability diverge further still.

Understandings of usability also comprise a subjective element not present in

understandings of accessibility: "usability is based on individual interpretations. That is,

psychological factors impinge on the definition of [body-environment] fit, e.g. self-

image, motivation, social pressure and expectations. In other words, individuals interpret

and evaluate the degree to which the environment restricts and supports the satisfaction

of their goals and desires" (Iwarsson & Stahl 2003). This subjective element of body-

environment fit is the most distinctive characteristic of usability. Usability embraces

individual, user perceptions in assessing the design of a space or product (Iwarsson &

Stahl 2003). In contrast, accessibility focuses more on the objective relationship between

the body and the built environment–sizing, proximity, reach, weight, open space. To be

clear, neither the human component nor the environmental component are said to be

individually objective in the definition of accessibility. Rather, the *measurement* of

successful or unsuccessful accessibility tends to be evaluated on more objective,

quantitative terms, whereas usability measurement relies in part upon the individual

user's perception of success or lack of success in carrying out some function. Usability

becomes a combination of effectiveness (goal achievement), efficiency (required effort),

and satisfaction (subjective evaluation of user) (Iwarsson & Stahl 2003). While

accessibility might analyze effectiveness and efficiency of body-environment function,

usability incorporates individual attitudes in its design and feedback. Accessibility takes

up the politics of body-environment access and function. Usability takes on the politics of

real and perceived competent behavior in the context of body-environment access and

function.

Table 2

Iwarsson & Stahl's Definitions of Accessibility, Usability, and Universal Design

Term	Definition	Information-Gathering Steps
Accessibility	Accessibility is a relative concept, implying that accessibility problems should be expressed as a person-environment relationship. In other words, accessibility is the encounter between the person's or group's functional capacity and the design and demands of the physical environment. Accessibility refers to compliance with official norms and standards, thus being mainly objective in nature.	1) The personal component (description of functional capacity in the individual or group at target, based on knowledge of human functioning). 2) The environmental component (description of barriers in the environment at target, in relation to the norms and standards available). 3) An analysis juxtaposing the personal component and the environmental component (description of accessibility problems).

Usability	The concept of usability implies that a person should be able to use, i.e. to move around, be in and use, the environment on equal terms with other citizens. Accessibility is a necessary precondition for usability, implying that information on the person-environment encounter is imperative. However, usability is not only based on compliance with official norms and standards; it is mainly subjective in nature, taking into account user evaluations and subjective expressions of the degree of usability. Usability is a measure of effectiveness, efficiency, and satisfaction. Most important, there is a third component distinguishing usability from accessibility, viz. the activity component.	1) The personal component (description of functional capacity in the individual or group at target, based on knowledge of human functioning). 2) The environmental component (description of barriers in the environment at target, in relation to the norms and standards available, but also based on user evaluation). 3) The activity component (description of activities to be performed by the individual or group at target, in the given environment). 4) An analysis integrating the personal, environmental, and activity components (description of usability problems, i.e. description of the extent to which human needs, based on individual or group preferences, can be fulfilled in terms of activity performance in the environment at target).
Universal Design	Universal design is synonymous to 'design for all' and represents an approach to design that incorporates products as well as building features which, to the greatest extent possible, can be used by everyone. Universal design is the best approximation of an environmental facet to the needs of the maximum possible number of users. Universal design is uttermost about changing attitudes throughout society, emphasizing democracy, equity and citizenship. Universal design denotes a process more than a definite result.	

Usability builds upon the definition of accessibility. Both recognize the status of the human-environment engagement. Likewise, both are relational to the specific environment and target user or group of users. Finally, both accessibility and usability, in addition to universal design, require an understanding of the concept of human, which is manifested in Iwarsson and Stahl's 'personal component.'

Accessibility and usability are just two components of universal design. However, they represent important components, worthy the attention given to clearly defining them, because they sometimes become conflated with universal design as a whole. What, then,

defines universal design as a comprehensive design theory apart from more basic design

terminology that support practice? Too much emphasis is often given to these strategies

of practicing universal design, rather than on the theoretical content that gives universal

design its purpose and justification in the first place. Lid rationalizes the development of

terms like human; however, the clarification of terms like accessibility and usability is

likewise crucial for understanding universal design. With these terms taken together,

along with other core values of universal design emphasized by the field of disability

studies, we can begin to define universal design as a comprehensive design theory.

Defining universal design.

Making the argument for incorporating universal design into current and pre-

existing design paradigms requires us to admit the presence of bias. Human bias and

subjectivity exist all around us in seemingly objective forms. The traffic light disregards

color blindness. The high shelves in the grocery store privilege a certain height. The step

onto a bus assumes the same mobility of every passenger. Buildings and products give

the illusion of objectivity while in actuality reflecting that culture's deep-seated values of

who should and should not be considered as part of the population. Whereas design

outside the philosophy of universal design does not always recognize the politics of

buildings and products, universal design requires of its practitioners to understand that

design is inherently reflective of social values and assumptions. Aimi Hamraie

summarizes this ideology of universal design, stating that "design is a material-discursive

phenomenon that produces both physical environments and symbolic meaning" (Hamraie

2013).

Admitting to subjectivity in design is not meant to put blame on architects, engineers, or designers for a long history of systemic exclusion in design. As Hamraie also points out, the field of design did not solely create these values and biases. Rather, designers merely continued to solidify in their design practice the values their society as a whole enforced in cultural norms and expectations. Breaking this cycle requires first the concession that, as human beings, we are subject to absorbing bias, oftentimes subconsciously, or even creating a cycle of our own bias by only seeking out specific ways of knowing. Hamraie refers to this unacknowledged bias as an "epistemology of ignorance," in which the active pursuit of some knowledge, but not other forms of knowledge, can trap us in a bubble of unrealized bias (2013). Universal design combats these epistemologies of ignorance by calling for the decentralization of the designer as the expert knowledge source. Instead, universal design advocates for the user to be positioned as the principal knowledge source for the use of a given product or space. In this way, design knowledge becomes dynamic and fluid according to the changing audiences of various products and spaces. Design knowledge is no longer static, but reflexive to its audience.

Therefore, a definition of universal design must be one that acknowledges the values and ideologies situated in built environments and products. Hamraie refers to this component of universal design in which we recognize the subjective values laden in design as "value-explicit design" (2013).

This element thereby leads to several other defining qualities of universal design theory. To combat the displacement of designer values into design, universal design must also include the user as not only a source of design knowledge, but also as a participant in

the creation process. Universal design demands a user-focused and user-centered approach to design, which is at once participatory and democratic. This approach invites multiple means of data collection through users, including ethnographic methods, case studies, realistic usability testing in lived-in environments and situations, among others. Shifting the center of design knowledge to the user, then, requires the incorporation of the user(s) from the very beginning stages of the design process and until the 'end.' Of course, the 'end' of any design is fluid as well, reflexive to the fluidity of the human embodiment, disability, and the body-environment relationship. As the needs, values, and preferences of the users change over time, design fields too should adapt and respond.

Universal design, therefore, emphasizes the process of design over the product. The goal of a universal design framework is not the final end product. Instead, universal design values the process through which knowledge is produced through users, through which users become prioritized in stages of development and testing, and through which opportunities for feedback and adaptation become plentiful.

A definition of universal design must also include, as Lid has demonstrated, a conception of the human/user and its relationship to ability/disability. Physical embodiment necessarily means a range of abilities to be accounted for in thinking about end users. Acknowledging vulnerability as a human condition also works to breakdown another epistemology of ignorance that universal design's main beneficiary is the impaired. In contrast, universal design's main beneficiaries will be any and all users designed for throughout the process. As all bodies interact with their built environments, all bodies can benefit from their consideration in the design. Universal design thus becomes a collective issue and not an individual issue.

Universal design supposes that solutions to adverse body-environment interactions reside in intentional design. By embracing a universal design philosophy, designers declare that the individual body alone is not a misfit to the environment. Rather, our environmental design choices create a relative site of misfit for certain bodies, which we have the power to ameliorate through thoughtful and theorized universal design.

Universal design could alternatively be defined by what it is not. Universal design is not retrofitting spaces or products as an after-thought. It is not the focus on products and spaces but the focus on the process of designing solutions for the body-environment relationship. It is not barrier-free design. It does not depend on a normate template, but understands the range of possibilities for human embodiment. It is not an objective practice, but a value-explicit design model.

Positioning universal design as an issue that affects everyone classifies it as a social justice and human rights issue. Design is certainly already recognized as an ethical issue. As I will touch upon in my first case study, design can be purposefully or unintentionally used to discriminate against entire populations. Our choices in design reflect our social values and assumptions about groups of people, forms of embodiment, concepts of human, and faith in the status quo. Challenging these embedded assumptions and traditions in design requires designers to think about the consequences of design from an ethical perspective.

The next question for discussion, then, is to what extent is universal design merely an ethically-motivated philosophy and to what extent can universal design be enforced as a human rights issue. While UD can certainly be framed as a human rights

issue, its enforcement as one through legislation and political action is less convincing due to the nature of universal design's subjectivity, fluidity, and process. The difficulty in enforcing universal design as a protected right lies in trying to make universal design measurable. Government enforcement of any issue necessitates the ability to measure a desired behavior and then prove any breach of that requirement. Aside from technical guidelines for barrier-free design, universal design has eluded precise measurement or tracking. Table 2 visibly demonstrates this conundrum. Iwarsson and Stahl present information-gathering steps for accessibility and usability, which could be quantified to certain extents for the benefit of measuring specific instruments. In contrast, the authors do not provide any information-gathering steps for universal design, presumably because much more goes into the measurement of universal design than the combination of accessibility and usability measurements. For the time being, it appears that only technical standards for accessibility and usability stand a chance as enforceable legislation. A course for further research and discussion could be how to measure the implementation, effort, and success of universal design philosophy in design, or if attempting to measure universal design is counterintuitive to its very nature. This area for future research could provide insight into how–if at all–states can structure universal design philosophy, and not just aspects of barrier-free design, as a protected right for citizens.

This section defining universal design reflects the themes prevalent in current literature on universal design and disability studies. However, this attempt at explaining the philosophy underpinning universal design is by no means conclusive or representative of all cultural perspectives. Most literature reviewed originated from western journals or

publications. Conceptions of UD might benefit from analyzing eastern approaches of the

body, disability, accessibility, and usability as well. In addition, not every component of

this universal design description is without problem. Perhaps one of the most frustrating

issues of universal design for practitioners is the apparent contradiction in designing for

the individual user and designing for all. Universal design operates amidst a push and

pull of audience scope from the very narrow to the very broad. Indeed, viewing diversity

as a condition of being human would seem to demand a consideration of each individual

user's unique capabilities. On the other hand, universal design is proclaimed by many as

'design for all' and for the benefit of the greatest number of users possible. Iwarsson and

Stahl actually include the phrase 'design for all' in their ultimate description of universal

design.

I hesitate to call universal design 'design for all' and have purposefully left that

phrasing out of my own universal design definition. 'Design for all' suggests an

impossible standard for designers by implying that such a piece of design exists to

maximally enable every person on the planet. The phrase puts impractical pressure on

designers. Now, I do not believe that when the phrase 'design for all' is used to describe

universal design, it is meant to be taken literally. Instead, the sentiment behind this phrase

refers to the previously mentioned investment that every person has in good design.

Every *body* has a stake in universal design, because every body is influenced by the

design of its surroundings. However, not every body has a stake in the same design,

because every body interacts differently with the environment according to unique

features of embodiment and function. Thus, it might be more relevant to replace 'design

for all' with 'design for all, within the given audience of a relative space.' This verbose

clarification may not get points for catchiness. However, it again speaks to the role that language and codifying plays on an idea's reception. Those well versed in the theoretical meaning of universal design could ascertain that 'design for all' is not meant to be taken literally. Meanwhile, those less exposed to theoretical discussion of universal design, which may very include many design practitioners, could feel daunted and misunderstood by an imperative to design for all.

Case Study 1: Unethical Design

Avatar the Last Airbender, **Season 1, Episode 6: "Imprisoned"**

Released March 18, 2005 by Nickelodeon

In this first case study, I look at one particular episode from the first season of *Avatar*, in which the intentional design of a structure becomes a prominent point of discussion and action for the characters throughout the episode. This structure of import is a large, stationary rig constructed by the Fire Nation. The rig acts as a prison for a specific group of Fire Nation prisoners: earthbenders. I chose to analyze this instance of environmental design not because of its success at implementing universal design theory or key concepts. Rather, this example serves as an illustration of the power of design to disable individual and entire groups of bodies. Looking at this example of unethical design, and drawing parallels to real world examples, further justifies universal design as a social justice and human rights issue. Additionally, it illustrates the need for value-explicit design philosophies as described by Aimi Hamraie.

Summary

The sixth episode of the first season, titled "Imprisoned," begins with three of the main characters stumbling upon an earthbender practicing his bending in the woods. Aang calls out to the earthbender and startles him. The bender is clearly unaware of anyone else's presence in the woods and immediately runs away, creating a small avalanche of rocks behind him to prevent being followed. Aang, Katara, and Sokka are confused by his behavior, but are more concerned with restoring their dwindling food supply. They decide that the presence of the boy must mean they are near some village where they might be able to buy more food. They follow the direction of the boy and eventually find a small mining village.

While the three friends shop in the market place, Katara recognizes the earthbending boy from the woods as he walks into a nearby shop. Katara approaches the boy in the store and asks why he ran away from them. The boy pretends he has no idea what she is talking about. Aang and Sokka enter the store and clarify that they all saw him earthbending in the woods. The storekeeper, who is also the boy's mother, becomes alarmed, exclaiming, "They saw you *what*?!"

The remainder of the scene reveals the history of the village. Fire Nation soldiers had invaded the mining town five years ago to supply their ships with coal. They arrested and imprisoned all the earthbenders. One such currently imprisoned earthbender is the boy's father. Now, the town lives in fear of the Fire Nation soldiers still residing there. They harass the town civilians and exploit business owners, such as the boy's mother, by demanding payment for 'protection' in a stereotypical mafia-like fashion. Aang, Katara, and Sokka learn that only the boy and his mother know of his earthbending capabilities.

They guard the boy's earthbending ability from everyone in the village out of fear he may

be arrested too. The earthbending boy, however, secretly visits the woods to practice his

skills, unknown to his mother.

The boy's mother offers to feed and shelter the group for the night. The group

agrees. At one point later that day, Katara and the earthbending boy are walking together

and come across a mine that had collapsed just moments before. An older man is trapped

under some of the rubble, screaming for help. Katara and the boy rush to his side and

attempt to pull him from the debris, but the weight of the collapsed earth is too heavy.

The man is close to being crushed. Katara pleads with the boy to use his earthbending to

move the collapsed dirt and rock off the man. The boy hesitates, but agrees to earthbend

after Katara reassures him that no one is around to notice. He earthbends the collapsed

dirt and rock off the man, saving his life.

The next morning, Katara wakes up to find the boy's mother crying. The man

they saved from the mine had revealed the boy's secret to the Fire Nation soldiers.

Soldiers arrested the boy during the night and took him away to prison. Katara feels

devastated that her coaxing led to exposing the boy's secret and subsequent arrest. Her

guilt for further breaking up a family leads her to contrive a plan for rescuing the boy

from the prison. With the help of Aang and Sokka, Katara stages a fake earthbending

spectacle, inciting her own arrest.

Katara and some other recently captured earthbenders are taken upon a boat and

navigated to a large rig anchored in the middle of the ocean. They learn upon boarding

the prison-rig that it was designed specifically to hold earthbenders. The warden explains

that they are miles from the nearest land. Thus, the prisoners have no way to bend

without access to earth. The location and design of the rig suppresses their bending abilities.

In the meantime, Aang and Sokka follow Katara to the prison on Aang's flying bison. They agreed to Katara's plan to rescue the boy, but she only has twelve hours. That night, they fly up next to the side of the prison-ship to pick up Katara and the boy. However, Katara no longer wants to leave the ship without first finding a way to help all of the prisoners. She has discovered how hopeless and downtrodden the earthbenders have become after years of imprisonment away from their home and families. The group brainstorms a plan. Aang notices black smoke rising from some towers on the rig. He realizes that the ship must be burning coal, or in other words, earth. The group comes up with a plan to airbend the coal through the vents and out into the main recreation yard where the prisoners spend their days. Then, the earthbenders will have clear access to earth and will be able to rebel against the guards. Their plan works. The earthbenders seize the opportunity to overpower the guards with their newly found access to coal and restored bending abilities. The escaped earthbenders commandeer several Fire Nation ships and sail home.

Analysis

Evidence for the relational model of disability.

This episode of *Avatar* substantially demonstrates the concepts of the relational model. The relational model poses that the interaction between individual bodies and the environment affects the functioning of that body. Any behavior or action that can be performed by a body within a space is directly related to the interaction of that body with the surrounding space. Thus, environments have the capacity to enable or disable the

functioning of a person to varying degrees. As explained, this model then supposes that individual ability/disability is relational. Function is understood as relative to diverse means of embodiment interacting with diverse environmental settings, both of which can be subject to change at any point.

Upon arrival at the prison-rig, earthbenders experience a change in their individual function. In this example, the adjustment in their functioning is related to a change in environment rather than a change in embodiment. The earthbenders' environment no longer supports their abilities to earthbend not because anything about their embodiment has significantly altered, but because a key element of earthbending–earth–is now absent from their surroundings. Thus, they become disabled not by a physical impairment, but by an unsupportive environment. The warden makes evident this aspect of the prison's design during his introduction to new prisoners, stating, "You will notice, earthbenders, that this rig is made entirely of metal. You are miles away from any rock or earth. So, if you have any illusions about employing that brutish savagery that passes for bending among you people, forget them. It is impossible" (DiMartino 2005). The Fire Nation clearly designed this prison for the specific population of earthbenders. Their intentional design of the prison demonstrates the desire to both imprison and disable earthbenders. The fact that the earthbenders' disablement relies on their removal from one location and subsequent segregation in another environment proves the relative impact that environment has on individual bodily functioning.

The situation of the earthbenders demonstrates the ideas underlying the relational model. Ability is relative to the interdependent relationship of body and environment. If ability is relative to the body-environment interaction, then disability likewise results

from relative adverse body-environment interactions, such as the interaction of earthbending bodies and the prison rig. Disability materializes from a combination of embodiment features and environmental features.

The relational understanding of disability thus positions disability as a condition of being human. Anyone can become disabled from either bodily or environmental attributes affecting function. However, despite illustrating this model quite evidently in the setting and design of the prison, the show's characters still occasionally tend to position disability as residing in the body alone. In one scene, Katara states to earthbenders, "Yes, they might've taken away your ability to bend, but they can't take away your courage" (DiMartino 2005). Katara asserts in this line that the Fire Nation has taken away an 'ability.' Viewed through the relational model, however, an ability has not in fact been taken away at all. Understanding ability through the lens of the relational model would posit that abilities actually are not 'given' or 'taken,' because ability is not a discrete thing but the result of an *interaction*. Ability fluctuates according to embodiment-environment relationships. Either characteristics of embodiment or characteristics of the environment would require a significant enough change to affect their interaction. Katara's statement opposes the relational model by suggesting the Fire Nation has taken away a direct ability situated in the body. This conflation of ability with the embodiment alone reflects a more traditional medical model reasoning. The episode, and show as a whole, progresses the relational model and theories of body-environment relationships. However, remnants of the medical model paradigm still remain throughout the series.

The characters support a relational model approach more when they brainstorm ideas to help the prisoner. In another line, Katara states, ""If there was just a way to help them help themselves…" (DiMartino 2005). This line reflects concepts of accessibility and universal design within the framework of the relational model. By seeking ways to 'help the audience help themselves,' Katara invokes principles of universal design in which designers should seek ways to empower the audience of their products and spaces. Designers essentially help individuals function themselves through the thoughtful design of space and tools. The group's ultimate solution–providing earth–speaks to the issue of accessibility paramount to universal design and the relation model. Physical access to tools within a space is the first step to being able to use them in carrying out desired behaviors. Mere access to earth again enabled the function of bending. The material change in the environment supported an entirely new interaction otherwise impossible without the connection between the landscape and the bodies inhabiting it.

Value-explicit design.

The example of the prison-rig illustrates Aimi Hamraie's assertion that buildings are not sites of neutrality. They are not passive nor objective structures. Rather, constructed spaces and technology are implicitly or explicitly value-laden: "building forms reflect how a society feels about itself and the world it inhabits. Valuable resources are given over to what is cherished–education, religion, commerce, family life, recreation–and tolerable symbols mask what is intolerable–illness, deviance, poverty, disability, old age" (Hamraie 2013). In *Avatar*, the Fire Nation spends considerable resources constructing a prison to isolate and disable an entire community. This earthbending community represents something threatening to their way of life, namely,

another form of bending or power that is inaccessible to and out of the control of the Fire Nation. The building of a rig to delegitimize the abilities of earthbending symbolizes the cultural attitudes embedded in the Fire Nation of the superiority of firebending. This belief is likewise supported by the warden's own words when he refers to earthbending as "brutish savagery."

Design, then, can represent the social values of a community. The example of the earthbender prison illustrates the contempt for earthbending rooted in Fire Nation culture. The disablement of an entire community of earthbenders exemplifies the consequences of subjective design based on problematic social epistemologies about how bodies should work or appear. Value-explicit approaches to design aim to acknowledge this presence of social values in design. Universal design becomes a value-explicit design theory by "rendering overt and apparent the values, ideologies, and *partis* of physical structures" (Hamraie 2013). Universal design theory first demands acknowledgement of the embedded cultural values codified in structures and second promotes change in those social attitudes that result in the exclusion of certain bodies through design. The goal of identifying and transforming the experience of excluded groups in design reiterates universal design as a social issue. Changes in design must correspond to changes in attitudes about users. Buildings and technologies form based on designers' expectations of end users. If designers' expectations of their audience are influenced by cultural expectations of how bodies should function or materialize within a space, then design enters into a larger context of social justice and human rights.

The Fire Nation's lack of consideration of coal as earth also indicates an incomplete understanding of the audience they had in mind when designing the prison.

This oversight of coal as earth and the resulting prison break denotes how the assumptions designers make about users in their designs can have unforeseen consequences. This point harkens back to the emphasis of a user-centered approach to design. This episode of *Avatar* illustrates the back-firing of design when users are not considered fully, and designers instead base design knowledge off their own intuition and knowledge of what it means to be a part of that audience.

The design of the prison in *Avatar*, and the resulting imbalance of power and function between inmates and guards, parallels the design of real prisons. As onlookers of a fictional world, viewers of *Avatar* can objectively comprehend the unjust prejudices against earthbenders that then became manifested in design. Comprehending our own culture's biases is much more troubling. It requires admitting that our own assumed truths about the world may in fact be skewed. Likewise, grasping the role that built environments have on individual ability is easy to discern in prison design examples, where the building is more explicitly meant to contain and oppress bodies. More difficult is realizing that seemingly neutral public spaces meant for 'everybody' can in fact also exclude abilities and persons.

Case Study 2: Applying Universal Design

Avatar the Last Airbender, **Season 1, Episode 17: "The Northern Air Temple"**

Released November 4, 2005 by Nickelodeon

The previous case study exemplified the relational model of disability and the body-environment relationship. The episode that is the focus of this second case study covers issues closely related to accessibility and usability, which contribute to the

portrayal of universal design philosophies in the series. In this episode of *Avatar*, three of the main characters visit an isolated Air Temple, where a prolific inventor has created many new products for the community living there. I will analyze the role that the inventor's products have in the body-environment interaction and in the new functions afforded to bodies as a result of these technologies. The depiction of these products in the show, and the community's subsequent newfound capabilities, will be analyzed in the context of the definitions of accessibility and usability spelled out by Iwarsson and Stahl. I will then discuss how this episode contributes to the series' overall incorporation of universal design philosophy and the body-environment interdependence.

Summary

This episode begins with Aang, Katara, and Sokka gathered around a campfire listening to a storyteller describe an encounter with air walkers. Aang is surprised to discover that some airbenders might have survived the attack by the Fire Nation, which means he would no longer be the only surviving airbender. He insists the three visit the Northern Air Temple to see for themselves if the story is true. As they approach the temple, Katara is thrilled to see people flying through the sky. However, Aang immediately realizes that they are not real airbenders. They are simply using air gliders to maneuver through the air. He claims that they do not move through the air with the same "spirit" as an airbender. At that precise moment, a young boy in a glider playfully flies close them, laughing audibly. Katara comments that the boy seems to be very spirited. Aang joins the boy in the sky, and the two take turns showing off their air gliding skills for an audience of villagers.

The two finally land on the ground–Aang on his feet, the boy on the wheels of a chair which break him to a stop. The gliding wings are detached from his seat and the boy comes forward, revealing that he moves with a wheelchair. The boy, named Teo, suddenly realizes that Aang is a real airbender and the Avatar. Sokka compliments Teo's gliding chair, to which Teo responds, "Wait until you see the other stuff my dad designed" (DiMartino 2005).

The three then meet the Teo's father, who introduces them to various inventions of his throughout the episode, including a candle filled with spark powder that announces the hour in a series of loud pops. At one point, Aang asks the inventor how the community came to inhabit the ancient Air Temple. The inventor explains that the community was displaced from their home by a horrible flood. They settled at the Air Temple as refugees when the inventor discovered the flying contraptions there–gliders– and envisioned a new home for everyone 'in the sky.' The inventor explains, "I came across these fan-like contraptions…little, light flying machines. They gave me an idea– build a new life for my son in the air, then everyone would be on equal ground, so to speak. We're just in the process of improving upon what's already here. After all, isn't that what nature does?" (DiMartino 2005).

Aang becomes upset throughout the episode that the Air Temple has been so industrialized with new technologies and machines. Teo attempts to reassure Aang that not all of the Air Temple has been altered. He brings Aang and Katara to the door of an inner temple room. The door into the room requires airbending to unlock it, which has been impossible without the presence of airbenders. Thus, no one has ever been able to

enter that room. Aang is satisfied to know that at least one part of the temple remains how the monks left it.

Meanwhile, Sokka follows the inventor underground to a room, where the inventor shows him a chamber he discovered filled with natural gas. He explains to Sokka that the community has had some gas leaks, and he is afraid that they might cause an explosion and leave the village without a home again. However, he is having a hard time tracking the movement of the gas, as it is odorless, invisible, silent, and untouchable. Back in the inventor's office, Sokka and the inventor devise a plan to fill the chamber with rotten eggs. Then, when a gas leak occurs, they can follow the smell of the rotten eggs back to the source. Suddenly, a bell rings in alarm in the inventor's office, and he runs off claiming that something is wrong.

The scene cuts back to Aang, Katara, and Teo who have opened the door to the inner temple room with Aang's airbending. Inside, various inventions and weapons are scattered with Fire Nation insignias. The inventor rushes onto the scene, claiming that he can explain. The group learns that he has been making weapons for the Fire Nation. Years ago, the Fire Nation discovered their new settlement at the Air Temple and threatened to destroy it. The inventor pleaded with the soldiers to spare their new home, eventually bartering his services as an inventor in exchange for the settlement to be left in peace. Since then, he has secretly crafted weapons and products for the Fire Nation in this locked room, believed to be inaccessible by the rest of the community and his son Teo without airbending.

Aang, Teo, and the inventor talk in his office. Aang asks him when the Fire Nation will be coming next. On cue, another bell in the office rings and sounds the arrival

of a Fire Nation soldier. The soldier enters through a door in the floor and demands what

Teo's father has for him. Aang angrily exclaims that the Fire Nation will not be getting

any more weapons from them. The soldier warns that their settlement will be destroyed.

After he leaves, Aang proposes a strategy to use air power to defeat the Fire Nation: "We

have something they don't–air power. We control the sky–that's something the Fire

Nation can't do. We can win." They prepare for battle in the inventor's office. He and

Sokka demonstrate the workings of a war balloon, a new invention that he has not yet

given over to the Fire Nation. It works similarly to a hot air balloon. They also discuss

the four types of bombs the inventor created: smoke, slime, fire, and stink.

The battle commences in the next scene as Fire Nation troops march up the steep

mountain leading to the Air Temple. Gliders soar above the soldiers and drop smoke and

slime bombs. Aang airbends over a bed of snow to create an avalanche running over the

army. They succeed in slowing down foot soldiers, but the Fire Nation has tank-like

machines that are not stopped by the bombs or avalanche. Aang uses air to throw the

tanks upside down. However, the tanks merely keep moving. Another weapon devised by

the inventor, the tanks have a counter-balancing system that allows them to function

despite being completely flipped over. The troops continue to advance toward the temple.

Sokka and the inventor finally appear on the scene in the war balloon. They, too,

drop more bombs overhead, but to little avail. Then, they suddenly smell rotten eggs in

the air and notice a crevice in the earth below them from which the smell is rising. Sokka

quickly detaches the balloon's fuel source and drops it down into the ravine. An

enormous explosion ensues that blows off the part of the mountain where the Fire Nation

is advancing. The remaining troops admit defeat and retreat.

Without a fuel source, the balloon begins to descend into the forest at the foot of the mountain. Aang rescues Sokka and the inventor from the deflating balloon before it crashes and carries them back to the temple. The settlement celebrates their victory. Sokka declares, "Aang, you were right about air power. As long as we have the skies, we'll have the Fire Nation on the run."

Analysis

The body-environment relationship.

As was the case in the previous episode analyzed, this episode of *Avatar* exemplifies the significance of the body-environment interaction. The community that resettled in the Air Temple was displaced from its former home by a natural disaster. The people experienced first-hand their own vulnerability to the environment, as a flood destroyed their home and killed or injured some villagers. The inventor realized the possibilities of a new home based on his evaluation of the surrounding environment. The Air Temple resides high in the mountains above the reach of possible floodwaters. Additionally, the inventor became inspired by a life in the "air," as evidenced by his speech recalling the flying contraptions he discovered at the temple and his desire for everyone to be on "equal ground." The background story of the village's resettlement to the Air Temple again highlights the role that the environment plays on the functioning of an individual's or group's bodies.

The limits of human embodiment in overcoming environmental barriers affected the location of this community. However, the limits of their embodiment as non-benders also spurred the design of a primary tool used by the community, the air glider. Gliders– tools made of wood and a fabric-like material–allow this community of non-benders to

access a space in the environment previously unavailable to them, namely, the sky.

Originally meant as an assistive device for airbenders, the gliders were altered by the

inventor to support the bodies of non-benders in the sky, who could not control the air but

only the glider. The inventor further used the production of a hot-air pumping system to

boost non-bending persons into the sky on their gliders. These products create both new

access and use for non-benders. Gliders represent a technology that interacts with the

surrounding environment to enable its users. Whereas airbenders relied on their

embodiment as airbenders to soar through the skies, these non-benders rely on another

assistive technology that overcomes a difference in their embodiment–the lack of ability

to bend–in order to equalize interactions with the environment on par with those

experienced by benders. The interaction of non-benders with the air may not exactly

replicate the interaction of benders with the air. However, the gliders illustrate how

design can minimize differences in ability resulting from varying body-environment

interactions to create equitable access and use for everybody.

The culmination of the plot with the final battle scene invariably emphasizes the

body-environmental relationship. Aang chooses a battle strategy that depends entirely on

this relationship. His fighting proposition–using air power–is based in a body-

environment advantage that the settlement holds over the Fire Nation. Aang and the

village are able to attack from the skies with little engagement from the Fire Nation

soldiers, who do not possess the capability to interact off the ground. Technologies like

the tanks prevent the soldiers from being entirely defeated by the airstrikes, but even their

tanks cannot shield them from the massive gas explosion. The ultimate outcome of the

battle as a result from exploiting a feature in the environment illustrates just how

powerful the landscape is in determining strength or vulnerability, function or

incapacitation.

The battle scene features the strategic use of the environment to exploit

capabilities or the likewise lack of capabilities. Real life warfare, likewise, has

historically greatly depended on the environment of battle. Time and again throughout

history has the environment affected the power or abilities of persons engaged in warfare,

supporting the theory of body-environment interdependence. Take, for example, the

geographic location of Great Britain. Its isolation from the European mainland, separated

by water, has afforded the large island protection from invasion that otherwise affected

other European countries. The unfamiliar jungle of Vietnam has been cited as a

disadvantage to US troops during the Vietnam War and a likewise advantage to the

country's own soldiers familiar with and accustomed to the environment. In a more

contemporary example, the Iraq war presented the environmental challenges of a desert

to troops, requiring considerations of heat, sand, dust, and sparse cover.

Modern warfare utilizes technology to overcome limitations emerging from the

human-environment interaction. Submarines expand the battlefield to water rather than

just land. Aircraft overcome issues of speed, mobility, navigating terrain, and

surveillance. Countless technologies enhance our surveillance abilities, including drones,

advanced cameras, listening devices, and intelligence infiltrating softwares. Modern

technology appears to render environmental factors obsolete in warfare. However, a real

life war simulation occurring in 2002 proves otherwise.

The Millennium Challenge 2002 was a real-life war game costing $250 million,

funded by the United States to test new technologies of its military. Team Blue,

representing the entire US Armed Forces, employed the use of complex technologies and intelligence softwares to combat team Red, representing a Middle Eastern adversary. Team Red was led by retired Marine Lt. Gen. Paul Van Riper. Riper understood the technological advantages that Blue held over Red. Red, on the other hand, had less impressive technological resources meant to mimic the relative disadvantages of US adversaries. However, Van Riper utilized the relationship of his own troops and their environment to circumnavigate Blue's technology. He transmitted communications and orders physically rather through radio or electronic channels. He used outdated methods of light signaling to direct planes. Essentially, Van Riper both evaded and manipulated the other side's technologies through a strategic use of his soldiers and other environmental resources. The Millennium Challenge 2002 became an embarrassing show of the United States' dependency on technology (Borger 2002; Millennium Challenge 2015).

I use this real life example in combination with episode from *Avatar* to demonstrate that the person-environment relation is still relevant even in an increasingly post-human era. New technologies may overcome some human-environmental limitations, but they can also create new vulnerabilities. Understanding the human condition as vulnerable and in constant relation to the environment can provide a foundation for making informed decisions in areas like policy, consumerism, and medicine to name just a few.

Product design in *Avatar*.

This episode introduces viewers to a variety of 'inventions' that echo products in real life, such as the glider and candle-clock. Another such product shown in this episode

is the finger-safe knife sharpener, which the inventor tells Sokka only took three tries to

get right as he removes three wooden fingers in front of Sokka's bewildered eyes. Of

course, these items are in addition to the many inventions created as weapons for the Fire

Nation like the war balloon, tanks, and various types of bombs. Each of these products

embodies aspects of universal design like accessibility or usability best practices.

However, they also present contrasting illustrations of what it means to design for the

enablement of bodies and the disablement of bodies. The gliders, the candle-clocks, and

the knife sharpener clearly mean to enable users in some way, whether it be flying in the

sky or sharpening a blade without accident. In contrast, the use of other inventions like

the smoke, slime, fire, and stink bombs only serves to disable persons. Then there are

designs like the war balloon and the tanks which both enable and disable depending on

use. The designs featured throughout this episode provide ample examples for analyzing

components of universal design. Even more, they illustrate the power and ability

imbalances granted through the design of products and technologies.

Perhaps the most prominent invention of the episode, the glider, expresses the

ideas of some universal design Principles as well as Iwarsson and Stahl's definitions of

accessibility and usability. The inventor notably modifies this glider tool for one specific

user, his son. Teo's leg paralysis would hinder him from landing on his feet when using

the glider. The need for landing in his chair would also prevent him from gliding in the

same prone position as other gliders. Thus, the design of a glider for Teo's unique

embodiment requires modifications that include gliding and controlling direction while in

a seated position, manually breaking the wheels of his chair upon landing, and supporting

the extra weight of his chair. The inventor successfully designs a tool for the varying

embodiment of its users, allowing an even broader population access to the sky and use of a product. The gliding tools featured in this episode, then, encompass qualities of universal design in enabling the greatest number of users for a product or space. The glider tool likewise meets the Principle of Equitable Use. This Principle calls for identical design whenever possible and equivalent design when not. The design of the gliders remains essentially identical with the exception of Teo's modified glider. Nevertheless, while not identical in design, the types of gliders provide almost identical use for non-benders and equitable access to the skies compared to benders, particularly in a way that avoids segregating or stigmatizing users. The gliders do not segregate users in any way, even users like Teo whose glider design is modified. Just as Teo's father envisioned, the air gliders are all "on equal ground" in the sky.

The candle-clocks and knife sharpener, too, showcase Principles at work. The candle-clock enacts the Principle of Perceptible Information by communicating information–the time–through both visual and audible means. The redundant presentation of information that is a part of this Principle aims to make a design useful for individuals with varying abilities in perceiving information. The character Toph, for example, would not be able to look at a candle-clock and tell time. Yet, she could hear the snaps of powder for each hour. Thus, the invention's design succeeds in providing information for a range of users. The finger-safe knife sharpener seeks to minimize the hazards of use, invoking the Principle of Tolerance for Error. This Principle encourages the incorporation of fail-safe features whenever possible, which the inventor accomplishes with his finger-safe design.

These product designs featured in the episode exemplify the components of Iwarsson and Stahl's definitions of accessibility and usability. Iwarsson and Stahl describe accessibility as the encounter between a person's or group's functional capacity and the design and demands of the physical environment (2003). Accessibility problems, therefore, manifest as a body-environment issue. A non-airbender does not have access to the sky as a result of the intersection of their individual lack of airbending and the environmental demands of gravity. In weighing the bodily and environmental components of accessibility, the solution for non-airbenders consists of addressing the environmental barrier of gravity. The glider tool and the hot air pumping system work together to overcome the demands of gravity for non-airbenders. The glider tool relies on natural laws, such as aerodynamics and hot air rising, to overcome this physical demand. The product directly uses and depends on environmental features to solve the accessibility issue for non-airbenders. The design necessitates an understanding of the natural environment.

Moreover, the glider epitomizes Iwarsson and Stahl's construction of usability as the ability to use and move around on equal terms with other citizens. Before the inventor's adaptations of the glider, non-airbenders were not on equal terms with airbenders. The lack of access to an entire space, as well as the air gliding activity itself, put non-airbenders at a power imbalance with airbenders. The gliders succeeded in gaining access to this space for non-benders. However, the glider tool can only go so far in equalizing bending and non-bending citizens. The gliders grant access and the activity of air gliding to non-benders, but they still cannot grant airbending itself. Thus, non-airbenders remain vulnerable in new ways while gliding. They are reliant on the

robustness of their gliders and are still susceptible to gravity should their glider become damaged and unable to carry them. In addition, they are more vulnerable to uncontrollable atmospheric events like strong air currents and storms. Airbenders, too, have some fragileness to nature, but maintain greater abilities than non-benders to control air amidst undesirable weather.

The four types of bombs created by the inventor contrast with these previous designs of gliders, candle-clocks, and knife sharpeners. They contrast in design not so much because they lack successful accessibility and usability components, but rather because the end goal of their use is to disable bodies instead of enable them. The use of any of the bombs results in an environmental change meant to disable a certain capacity of the targeted individual. The smoke bomb, for example, creates a cloud of thick black smoke in the immediately surrounding area meant to disable seeing and breathing. The slime bomb discharges a thick sticky mass over any ground and bodies in the vicinity, slowing down physical movement like walking or running. The stink bomb emits a horrible smelling gas meant to make breathing difficult, which then affects the entire functioning of the body. Finally, the fire bomb naturally explodes into a fire, engulfing the area of the explosion in flames. The sole use of these products aims to disable bodies. Their design intentionally incorporates knowledge of bodies and the environment to create a disadvantageous interaction. In the case of the Fire Nation soldiers, all these bombs would be disabling to the unprotected target except the fire bomb, which would have no effect on those able to bend and control fire.

The tanks and the war balloon are significant pieces of design to analyze in this episode because they both consist of enabling and disabling design elements. The tank

enables the Fire Nation troops to maneuver over difficult terrain quickly. The tanks eject

hooks that latch into the side of the mountain, still attached to the tank with a chain. The

tank then pulls itself upwards toward the hook by reeling in the chain, allowing the troops

to move vertically up the mountain at a rapid pace. The fully enclosed body of the tank

provides almost complete protection from external elements. Furthermore, the tanks are

designed with a special counter-balancing system created by the inventor, in combination

with wheels spanning past the both the top and bottom of the body of the tank. These

features allow the tank to keep moving if it is completely flipped upside down. Thus, the

tank machine empowers the Fire Nation soldiers to combat multiple methods of enemy

counterattack. The tank is a technological fortress whose only weakness is the reliance on

water in the counter-balancing system. Katara discovers this information and uses her

waterbending against the machines.

In a similar capacity as the gliders, the war balloon enables its users by providing

access to the skies. The war balloon likewise permits its users to bypass ground terrain

and affords them protection from ground attacks. The balloon grants Sokka and the

inventor an unexpected advantage when they realize the large Fire Nation insignia

painted on its side made the troops below assume it was on their side. The bombs

dropped from the side onto them were all the more unexpected because of the deceiving

information conveyed by the design. However, also similarly to the gliders, the war

balloon creates new vulnerabilities for its users. The functioning of the balloon depends

on the interaction with environmental laws of physics and overcoming environmental

demands–again the rising of hot air and gravity. The success of the balloon's use is

subject to changes in environment around it, especially in air current or temperatures, just

like that of the glider. Sokka and the inventor become victims to the balloon's necessity

for hot air, not from an external factor, but rather when Sokka purposefully detaches the

fuel burner to fall into the ravine of natural gas.

      The war balloon and the glider actually provide very similar means of access and

use on the battlefield, with similar weaknesses as well. The same could be said for the

gliders as both enabling and disabling bodies. On closer analysis, the war balloon

designed as a battlefield technology does not differ so much in aspects of accessibility

and usability from the glider designed as a recreational activity. The comparison of these

designs, then, illustrates a component central to universal design, but absent to conceptual

definitions of accessibility and usability: the *intention* of design. Iwarsson and Stahl's

definitions of accessibility and usability do not include motivations behind design past

the immediate objective of providing access or equitable use. The concepts of

accessibility and usability do not take into account or evaluate the designer or user's

intentions for the end design. Usability does include a subjective component by

incorporating the satisfaction of the user in accomplishing the objective of use. However,

that subjective element is distinct from the valuation of what that actual use is in the first

place. The bombs, for instance, pass measurements of accessibility and usability. They

satisfy users with the end goal of disabling their targets. However, accessibility and

usability principles end there–with adequate access and use. They do not further

interrogate the consequences of that design and use. They do not include the ethical

component of universal design.

      This variation significantly distinguishes the overall philosophy of universal

design from some of its core concepts of accessibility and usability. Universal design

requires accessible and usable measures, but goes further by evaluating the biases present

in design, the social implications of design, and the ethics behind design. This episode of

Avatar illustrates the need for more than just accessibility and usability best practices.

The tanks exemplify successful accessibility and usability. Yet their design enables great

destruction and disables bodies. Principles of accessibility and usability, therefore, are not

enough to design ethically. Only a universal design framework provides a more

encompassing approach to design that includes issues of social justice and ethics.

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