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DANCE, DISABILITY, AND ASSISTIVE TECHNOLOGY: PROBING NEW INTERDISCIPLINARY LANDSCAPES AND RE-IMAGINING DESIGN

A DISSERTATION

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

IN THE GRADUATE SCHOOL OF THE

TEXAS WOMAN'S UNIVERSITY

DEPARTMENT OF DANCE

COLLEGE OF ARTS AND SCIENCES

BY

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DENTON, TEXAS

AUGUST 2017

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DEDICATION

To David, for your enduring patience and support throughout this dissertation journey, and my parents, whose lives fueled the motivation for this dissertation research and whose imprints are embedded in the pages of this work.

And, for all of the students who have been a part of my life.

ACKNOWLEDGEMENTS

I would like to especially thank my dissertation committee chair, Dr. Linda Caldwell, for her expertise, advice, and continual support, as well as my committee members Dr. Rosemary Candelario and Dr. Matthew Henley. I am also deeply appreciative for the guidance and support I received throughout the TWU doctoral program from multiple faculty, who helped stimulate my interest in new avenues of scholarly inquiry. Additionally, I would like to thank the TWU Graduate School staff for their assistance and guidance in the dissertation and graduation process. I am also immensely thankful to my research participants who were willing to participate in this research exploration and provide their responses and insights. Most importantly, I thank God for the gift of life and a body through which it is possible to move, feel, learn, connect, and discover meaning.

ABSTRACT

MERRY LYNN MORRIS

DANCE, DISABILITY, AND ASSISTIVE TECHNOLOGY:
PROBING NEW INTERDISCIPLINARY LANDSCAPES
AND RE-IMAGINING DESIGN

AUGUST 2017

This dissertation explores the complex relationships between dance, disability, and assistive technology design, foregrounding the ways in which dance practice/theory can provoke a re-imagination of both disability and the assistive device design. The research delves into the ways in which dance practice is ideally situated to continue intervening in negative constructions of disability by intentionally provoking current signifiers which reify the disabled body as dependent, restricted, tragic, static, and powerless. Specifically, I investigate one powerful signifier: the assistive device (e.g., wheelchair, crutch, prosthetic). I seek a critical endeavor into how disability perceptions may be transformed through dance by re-imagining not only what the differently-abled body might do, but also what the device might do or become as an integral relational element between the body and the environment. I pursue this line of inquiry, in part, by exploring the experiential effects of a prototype wireless-controlled, omnidirectional powered wheelchair for dance, which I developed over several years in collaboration

with engineers. Data included qualitative interviews and observations through direct engagement with dancers who have disabilities and use mobility devices under an approved IRB. As part of the research scope, participants explored their movement capacities in the prototype chair and responded to a common series of questions. Data collection further involved excavating the theoretical discourse about dance and disability while also examining relevant assistive technology/product design paradigms and theories.

This study is a pioneering research effort in assistive devices for dance, heightening attention to the interpersonal and embodied facets of assistive technology. Similar to the ways assistive device design has been challenged in Paralympic sports, I critically probe how dance is galvanizing space through assistive technology for differently-abled bodies. This research contributes new knowledge to the integrated dance field while carving an innovative space for dialogic intersections between the fields of dance, disability, and assistive technology design. Ultimately, I propose a new design paradigm from a dance lens: Embodied, Socio-Spatial Design (ESD), drawing from a Laban Movement Analysis framework. This research is situated at the threshold of burgeoning possibilities and challenges for dance practice, design practice, and disability issues at large.

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CHAPTER I

INTRODUCTION

Yellow Paint

A poem of remembrance. . .

"I'll be right back, Sonshine," he said.
Those words.
Forever remembered.
That moment.
Forever imprinted.

The room — A child's room. Half-painted. A marker. Still. Motionless. He was. In a coma. The tight-lipped police. Didn't want to say. That's all. That's it. Ended. Couldn't come to grips with an ending. Didn't want to meet the truth one finds hidden behind eyes. In fact, perhaps the saying of it would make it too real, too heavy, too much to carry, to hold. Two — Hold on. Holding on. On hold. That's what we did. That's what we were. To make it through the trauma, chaos, stormy road ahead. The unknowns. We couldn't know what they were.

A mother.
A daughter.
A father.
A family.

Broken, halt-ed, cracked open, fractured apart.

Loss.

And, always, always that perpetual feeling of a missing piece. Peace missing. Vacancy. Vacuity. The missing piece. Visceral. Palpable. Physical. Stolen life. Re-playing the day over and over again. My mom. Tried to make sense of it, tried to rewind, wishing in the beautiful past. The perfect past. Preserved, whole, cherished, complete.

Fun. That is what I remember of my dad. Play. And, also Calm. He was calm in a storm. He was my mom's caring calm, always — and always as memory. As a perfect memory of love. Years of love. Looking back in time could never heal the present. The contrast —

a reminder — cutting, splitting, ripping back open the wound. Searing like a blade. My mom closed that door. The door of memories too wonderful to peer back into, to allow one to slip into an impossible reality of Now. Her adaptation meant separation, compartmentalization. Now couldn't acknowledge Past or it would fracture again, crumble, disintegrate into emptiness, vacancy, despair.

Despite near-death, my dad, was still here. But broken. Broken mind, broken body. Brain damage. Severe. And, a miracle. Even the doctors acknowledged that. The ability to move. To speak. His life, unexplainable. We always celebrated that—aliveness. Still living. Living still. And, the hope of being made anew. He could, perhaps. Plasticity of the brain. A reality. So, we saw in hope. Lost though we were. At 12. Remember that number. Its reverse marks another imprint in time. A second loss of a father, already lost once. A child. Hurry and grow up. Acceptance. That's what children do. Adapt. An amazing gift.

My mom — a young wife. How? A caregiver now — for life. Happened in a mere breath. An instant where a car carelessly crosses over a white line forever changing another life. A life linked to other lives. Many lives fall from one. Connections are not finite. I bleed into you, you bleed into me.

Debt. In an instant. Millions. Support — Where? De-stabilization. Running to catch up. If we run fast enough, can we . . . will we . . . make it . . . ? Right? Fix it. Trying to fix it. Always. And Never.

Quiet resignation. If resignation is quiet.
Rage settling. If it does settle.
Anxiety releasing. If it releases.
Hope again. If again is possible.

Re-build. Re-connect. My mom — always trying. An energy of hope. Constant. Yet, taxed, drained, debilitated at times. Weary. The car accident happened to one, but, no one understands it happens to two, so closely intertwined. And, three. The child. Affected. But, Protected.

Halloween costumes. I remember.
Dancing. I remember. Always. A constant.
Creativity — in the seams, the cracks, the crevices. In between.
Still present.

Stilled present.

Protected. I was.

Some refer to my mom as resilient. I call it sheer, gut wrenching will. Always a desire to do better. Drawing her strength from above. Prayers carried her. Words of wisdom, of promise, of strength. “I am the life and the way.” For the few who saw and whispered words of support or met our eyes with understanding. Immense thanks. Those were words of life. Thirsted for. . .

The woman in the Straw Market. My mom never forgot her. It was an exchange in the eyes. Someone understood. Listened and understood. Reached out.

21. A number. Again. A marker. Delineating permanent loss. How can we know? If anything is permanent. Really? Energy transforms, transmits. So, too, must the spirit.

21 years he lived post-accident. The room — still half-painted. A memorial. A space waiting to be filled in. Indicating what was missing. He only needed a little more paint to finish it. That’s all. Simple. And not. I remember helping him paint my room . . . the way a child would. Dawdling about, playful, happy, and oh so, content. Safe. That’s a place I could visit again. Felt memory — drink it in. As real as anything.

When he passed my mom placed a slip of paper and pen in his pocket and whispered “Write to me.” Writing — their passion together with each other. Beautiful, nourishing words. Connecting, completing. Like hands reaching in space, emanating heat energy — the moment before they clasp.

A poem — found later, written by my dad to my mom. Pages stuck together over years. In his bible. A book. Looked at. She had. So many times. Yet, these words. Hidden. Evaded discovery. Pages. Releasing their embrace when their time came. Delivering my dad’s message of love and comfort. I choose not to believe in coincidences.

“I’ll write back Sonshine.” Maybe that’s what he meant to say that August day in 1987.

I begin THIS writing — painting the other half of the room. Filling in the empty space. This writing is not my own, it is my dad’s. My mom’s. It is in all the influences in my life. Interwoven lives. Leading us on journeys we couldn’t have known otherwise.

Background

I wrote the opening poem to this chapter to largely represent my memory, my feeling of my family’s experience with disability. It was certainly a particularly memorable and life-changing moment, demarcating a new chapter in the life of my family. But, as I reflect upon the poem, I recognize that it does not and cannot capture the

full spectrum of those 21 years with my dad. Such is true of anyone's life experiences, and such is also very true of the disability experience at large. Too often, "disability" is singularly related to tragedy, to loss, and to despair (Kuppers 2004). Society dwells in this construction of disability persistently. It is the default portrayal of disability. This one-sided portrayal designs the disability experience in a particularly negative way and destines society to imagine people and families of disability as sad or tragic "heroic" figures. People with disabilities then are relegated to one of only several non-normal categories, with the reaction to disability being pity.

In the experience of my dad, there could be a poem for each day of that journey, and each would have its own color, texture, and nuance. Some would be textured with lightness, play, and humor; others would be clouded with confusion and despair; others would be harmonious and calm; while others would be an ever-changing kaleidoscope of emotional layers – too complex to describe in words. Within that context of changing textures, the constancy of loss would still persist, yes, but also persisting is the constancy of possibilities, of opportunities, of creativity and renewal rippling into each day. As in any life experience, there are dynamic changes in the daily tapestry. Each moment tells its own tale, adds its own perspective to the mix. I also know that this is mostly my story of an experience and that my mom and dad would have their own poems with their own particular distinctions in content and perspective. Our stories would overlap indeed, but they would also have unique punctuations and would be woven in different ways.

In the writing for the following dissertation, I feel it important to strongly emphasize that disability experiences are significantly determined by society's reactions

and responses to disability (or non-responses as the case may be). This is a condition I experienced first-hand due to my family situation. Termed the "social model" of disability, this point of view recognizes the vital role society plays in influencing and constructing disability experience and rejects a strictly medical model view (i.e., impairment-based emphasizing a biological fault in the individual needing correction) (Davis 2013). The social model perspective emerged in the 1960s and has been widely embraced by the disability community. It has since influenced policy decisions and socio-political discourse regarding disability issues, including provisions of accessible architecture, education, work, and recreation. Variations of the model have sought a more balanced approach defining disability as a combination of real material impairment and societal barriers; however, the focus in disability studies remains largely upon societal design and attitudes as the formative component defining disability. The social model has also spurred the development and allocation of assistive technology.[1]

In my personal life history with my father's disability, my family experienced resistant, disapproving, and dismissive attitudes as well as structural barriers for simply engaging in life experiences. My father's car accident occurred before the advent of the Americans with Disabilities Act (ADA); thus, accessible bathrooms and access to public places, such as libraries, for people with disabilities, were not yet legally enforced. Additionally, the standard mobility aid provisions (e.g., manual wheelchairs, walkers) my

[1] In the construct of disability, assistive technology may encompass a vast array of possibilities, including structural alterations (i.e., changes to the original structure of a physical environment), assistive devices (e.g., hearing aids, vision aids, and wheelchairs), material adjustment, and environmentally-based behavioral modification. See Fuhrer et al. 2003.

dad used were often cumbersome, static, and isolating in their design.[2] They tended to inhibit interaction rather than facilitate it. Finding new and effective modes of physical and social mobility were difficult. I recall episodes where there was not an appropriate bathroom for my father to use and times when the person or entities in charge would not consider accommodating the issue. Instead, the tendency was to unquestioningly adhere to normative rules, without logical and flexible thinking. My family experienced the out of place nature of disability, the marginalization, and the feeling of being an inconvenience. My mom always felt as if she had to "take up for my dad," prove that he was worthy of existence. From medical professionals, family, and friends alike there were reactions and responses that, in retrospect, only served to derail my mom's efforts towards moving forward with our family's new situation in an inclusive, productive way, one which preserved a sense of agency for all of us. These types of social and physical barriers are discussed profusely in the disability literature. I address these themes throughout the dissertation.

Additionally, medical professionals often offered dead-end comments and advice to my family. Possibilities and opportunities did not seem to be at the forefront of their mind. They suggested my dad be placed in a home allowing my mom to "get on with her life." These statements always confounded my mom because my dad was her life, regardless of his difference. Family suggestions were similar and included the recommendation that, due to our financial situation, my mom should stop my dancing

[2] I will further discuss the crucial role of mobility devices in disability experience and how this perspective fuels the dissertation research in Chapter II, Methodology.

lessons, give away our pets, and move in with her parents. We felt the message as a complete devaluation of the fact that my dad was still her spouse and was a living human being, albeit with new needs and a different state of being. Further, friends distanced themselves, which we perceived as an inability to adapt to the different reality of my dad's condition.

We also experienced the construction of differing identity politics (at the time, I did not know there was a term for labelling what we experienced), in which my dad's brain injury separated him outside the arena of those with strictly "physical" disabilities. He did not fit in any one group. As a family, we felt we no longer identified as legitimate. This loss of identity caused us to become isolated. I now resonate with and understand how societal stigma can become internalized to the extent that a person's behaviors and very identity are affected.

In my journey into disability studies research, I found that many of the themes in the literature intersect with my personal experience. I bring my personal experience into the dissertation's fold, because to not do so would be inauthentic. My research, therefore, originates from a place that includes my personal experience of disability as well as my personal experience of dance. The intersection of disability and dance through personal lived experience has led me towards in-depth inquiry and exploration into the disability studies field and ultimately towards a focus and interest in assistive mobility technologies.

Thus, I enter the discursive space of this dissertation on multiple levels. Personal and professional knowledge and experience spheres overlap. Proximal and distal viewing

modes are in constant interplay. As I am writing, I create and construct the space for this discourse. This writing will then traverse other spaces. The space of you and me, my thought space meets yours. But, its spatial possibility is dependent upon the medium of the body. The motion of fingers to keyboard to computer screen: a page of thought manifests in space and time through the body. I am also reliant and dependent upon a device of transmittance, of mobility, which extends my body. Through my extended cyborg body, the spatial dance of body-device-environment occurs. And, because space coexists with time, this event is also a spacio-temporal dance. It is a discourse blurring and re-combining disciplinary boundaries. My kinesphere not only moves into these other kinespheres of thought, but it becomes re-configured, re-incorporated in the process. This dissertation is, first and foremost, an embodied dance generated out of movement experience, influenced by movement-based inquiry, and manifested through movement.

Statement of Research Purpose

The purpose of this research is to explore the complex relationships between dance, disability, and assistive technology thus foregrounding the ways in which dance practice/theory can provoke a re-imagination of both disability and assistive device design. Data collection involved excavating the theoretical discourse about dance and disability and examining relevant assistive technology/product design paradigms and theories. Further, data included qualitative interviews and observations through direct engagement with dancers with disabilities, all of whom are mobility device users. As part of the research scope, participants explored their movement capacities in a prototype chair and responded to a common series of questions. This dissertation research will

contribute to and expand existing developments in the mixed ability dance field while carving a new space for dialogic intersections between the fields of dance, disability, and assistive technology design.

Research Questions:

> 1. How do assistive device users in and outside of the dance genre discuss and express their relationships to their devices? How do these ideas relate to conceptions/constructions of disability and further connect with concepts of embodiment, spatiality, inclusion, autonomy, agency, and identity discussed in dance and disability literature?
>
> 2. What approaches/theories within the assistive technology/product design field might create useful ways of understanding the role of devices in the lives of users? How might these approaches or lenses potentially intersect with and inform dance and disability concepts/practices in productive ways and vice versa?
>
> 3. How do assistive device users describe and express their experiences in the prototype chair and what insights may be developed regarding the impact or effects of moving in space differently with and without interaction with others? What types of embodiment discoveries surface through physical, interactive engagement with the prototype chair for designer and participant?
>
> 4. How might the research investigation lead to a deeper theoretical understanding of person-device-environment interrelationships as situated in the larger socio-political discourses of disability? How might these theoretical insights inform dance training and practice as well as assistive device design?

Research Relevance/Significance

The integrated/inclusive dance genre is in an explosive growth period at this moment, making my research particularly relevant and timely. In July 2015, Dance/NYC held a conference entitled "Dance. Disability. Artistry," a multi-year initiative meant to coincide with the 25th anniversary of the ADA. A research report[3] was compiled

[3] See research report posted on the Dance/NYC website: http://www.dance.nyc/advocacy-and-research/research/2016/02/Disability.-Dance.-Artistry/

reporting on the conference discussions, outcomes, and recommendations for future efforts in the dance and disability field. Simi Linton, keynote speaker for the event and well-known disability rights advocate and pioneer, writes:

> In considering disability and dance, and considering the purpose of this convening, there is a fundamental question we should ask of this day: Are we here to further Disabled people's efforts toward equity, fairness, and opportunity, or are we here to expand definitions and practices of dance?

The answer as articulated later in Linton's writing was yes to both questions. The questions were not mutually exclusive and the ideas within each domain can work in synergistic ways to simultaneously expand perceptions of disability and expand perceptions of dance. As Linton's statement implies, if we narrowly focus attention on one or the other goal, we miss the dual impact disability *with* dance and dance *with* disability proposes. We also exclude the reality of a socio-political history and condition which contextualizes how dancing disabled bodies are perceived.

Furthermore, in May 2016, the first National Convening of Physically Integrated Dance was held in New York, organized by AXIS Dance Company, one of the first integrated dance companies in the U.S. As a continuation and outgrowth of the National Convening, differing regional convening conferences discussing the future of the field were then held throughout the country. I was invited to attend the National Convening and I led the Southern Regional Convening which was held at the University of South Florida in Tampa, Florida. The convenings addressed challenges in the field, such as minimal resources; poor or lack of training in the field for dancers and choreographers (disabled and non-disabled); recruitment of non-disabled dancers; lack of a strong, unified network; and sustainability. The convenings also offered the opportunity for

professionals in the field to network and share their teaching and choreography practices and approaches.

Additionally, I initiated and co-directed a largescale international dance and disability event entitled "A New Definition of Dance," in October 2015 and 2016. This event was supported initially through a National Endowment for the Arts (NEA) grant and through multiple other funding support sources. I collaborated closely with VSA Florida,[4] a statewide arts and disability organization headquartered at the University of South Florida, to produce the event. The goal was to draw together national and international professional dancers in the integrated dance field to perform, conduct workshops, and collaborate in university and community venues. Diversity was intentionally sought and represented on multiple levels, including diversity in cultural/ethnic backgrounds, diversity in dance genre, and diversity in disability type. In year two of the event, it was expanded to three cities over three weeks and the number of guest artists was almost doubled. Artists included Marc Brew/Australia, Liu Yan/China, Hanna Harchakova and Ihar Kisialou/Belarus, Hai Cohen and Tali Wertheim/Israel, Luca "Lazy Legz" Patuelli/Canada, Alito Alessi/U.S., Sonsherree Giles/U.S., Roya "the Destroya" Hosini/Australia, Sidiki Conde/West Africa and U.S., Dwayne Scheuneman/U.S. (CA and FL), Frank Hull/Canada., Marcie Ryan/U.S. (NY), and Karen

[4] VSA is formerly known as Very Special Arts; however, the name association is no longer affiliated with the letters, due to the negative connotation of the word "special" with disability. VSA is a forty-year old arts and disability organization based out of the Kennedy Center in Washington, D.C. with affiliate organizations nationally and internationally; thus, the letters were retained due to name recognition.

Peterson and Dancers/U.S. (Miami, FL). The hope is to launch a similar event in October 2018. The event reached significant numbers of people including K-12 students; college faculty, staff and students; veterans; and at-risk teens. The National Endowment for the Arts invited "A New Definition of Dance" to serve as one of a small group of model initiatives representing a state of the art effort towards inclusive or accessible culture. It will be featured on the NEA's website in the "What Works" global collection.

Chapter Overviews

Dance, disability, and design all concern themselves in some manner with moving human bodies; therefore, the body as a site of meaning-making is one of the major topics I explore throughout the dissertation. Chapter III, Disability Studies: Revealing Bodies, Confronting Space, Claiming Power, establishes the historical and socio-political context for my research, summarizing the origins of disability studies. I explore the construction of the body within disability studies and further query how notions of identity, impermanence, and societal structures weave into the construction of bodily understandings. I further discuss how the body is revealed in disability studies as a contingent, in flux, embodied, socio-spatial, and capable/skilled body. These concepts of the body are further queried through analyzing direct protest examples in the disability activism landscape, foregrounding the way bodies confront space to enact socio-political change.

Chapter IV, Dance and Disability: The Reciprocal Push, investigates how both dance and disability challenge each other in differing ways, thereby performing a reciprocal push. I explore how disability, by resisting acts of "saming," revises traditional

cultural norms and dance norms, ultimately pushing dance into new territories of practice. Conversely, dance, in its raw visual exposure, expressive intensity, and rigorous expectations, pushes the disabled body into new spaces of embodied experience. In order to flesh out the nature of this radical dance and disability duet, I then analyze the nature of the disabled dancing body in professional integrated dance by drawing from literature in the field and in live and recorded dance repertoire. Embodiment, socio-spatiality, and contingency are bodily concepts highlighted in the dance and disability duet, which all become important themes of intersection to explore in Chapter V, Dance and Disability Meet Assistive Technology. In this chapter, I attend to the major focal component of this dissertation research: emerging insights into assistive device design.

In Chapter V, I examine the ways in which dance and disability ideas and practices interact with design-related thinking, particularly assistive technology design. This chapter is therefore organized into a three-part inquiry process. First, I investigate the major shaping forces in the evolution of wheelchair design and technology. Second, I examine current assistive device conceptual models and relevant design paradigms. And, lastly, I contemplate how integrated dance, through the use of assistive devices (AD), interjects a complementary and generative force for conceptualizing AD design. The device as a creative, expressive agent enacting an embodied relationship between a moving body and the socio-spatial environment forms the crux of the argument for what the dance and disability duet specifically produces. Thus, these conceptions herald innovative design possibilities and ways of conceiving design.

In Chapter VI, A Prototype Intervention: Towards an Embodied Socio-Spatial Design Paradigm, I critically explore questions of design for assistive technology, specifically wheelchairs, by bringing a prototype design to fruition through a dance-based lens. Further, in Chapter VI, I seek to critically discuss how disability perceptions may be transformed and vivified through dance by re-imagining not only what the differently-abled[5] body might do, but also what the device might do or become as an integral relational element between the body and the environment. I pursue this line of inquiry by exploring the experiential effects of a prototype wireless-controlled, omnidirectional powered wheelchair for dance. In this chapter, I also present the bulk of the participant-based qualitative research which informs my insights and conclusions for the dissertation study. To analyze the data, I look through the lens of embodiment and socio-spatiality while also drawing from Laban Movement Analysis (LMA) as a dance-based methodological structure for analysis. I use LMA as a means to further re-imagine future design iterations. Ultimately, I outline a new type of design paradigm: Embodied, Socio-Spatial Design.

In the next chapter, Methodology, I discuss how my research process was conceived and implemented. Additionally, I highlight differing terminology that will be addressed and employed throughout the dissertation. Issues emerging from my research process are then further addressed in the concluding chapter of the dissertation. In the conclusion, I consider the possibilities for future research in an ever-changing political and social climate within the United States. My hope is that this dissertation will provoke

[5] See my discussion of language use in Chapter II Methodology.

other dance artists, designers, and disability activists to continue to question design choices in our diverse local and global communities, recognizing both dance and disability theory/practice as insightful points of departure.

CHAPTER II

METHODOLOGY

Research Rationale

In sports venues, such as tennis, rugby, racing, and basketball, significant consideration of wheelchair and other assistive technologies has led to new technological developments targeted to meet the needs of the sport and further increase accessibility (Cooper 2002; Cooper et al. 2006; Van der Woude, De Groot, and Jansen 2006). Thus, the device design has been questioned in relation to its purpose. Whether it be the desire for a tighter turning radius, faster speed, improved balance, increased ergonomic comfort, greater responsiveness, or the ability to rotate more quickly, there have been technological changes made to advance the athletes' ability to perfect and further enjoy their sport (Pallis 2003).

One seemingly unexplored area of research is in the actual design of the assistive mobility devices used for *dance athletes/performers* with differing movement abilities to support training goals, choreographic movement invention, and expressive movement qualities. Professional mixed ability or integrated dance companies and programs which encompass dancers who are differently-abled often have performers who use manual wheelchairs or power chairs. Many of these companies and performers are exploring the device interaction creatively; however, a re-evaluation of the technological aspects (including: aesthetics, wheel configuration, structure/form, seating, control system) and the biomechanical and physiological differences between dance and pedestrian activity

have yet to be addressed in any systematic, formal way. Frequently, wheelchair dancers with mobility of arms/upper body typically must coordinate both the chair's spatial movement path AND simultaneously interact with other dancers and/or perform arm movement with the free arm. In this manner, the control system (hand/arm propulsion or joystick control) restricts the very limbs through which the wheelchair dancer interacts and expresses him/herself.

These types of observations led me to delve into the area of design, specifically assistive device design. I began to consider how to approach the wheelchair from a dance/movement-based perspective, and this path led me to my current juncture as a design research innovator. I sought out collaborative partnerships with engineers and technologists to develop the device discussed in this dissertation as a patented prototype chair. I conceptualized the ideas for the invention, led and managed the collaborative design process, developed the research trajectory, delineated design objectives (artistic and functional), researched existing technologies, secured funding, and sought out potential commercialization partners.

The prototype chair design intervention introduced and explored as part of this dissertation research enables the possibility of hands-free transport in which the dancers shift their body to move the chair in various directions, rather than only through their arms pushing both wheels or on a stationary joystick control (Morris 2015; Morris et al. 2015; Morris 2010; Morris et al. 2011). To enable this type of shifting action, a controller, which is a smart phone, may be worn on the body of the person in the chair to propel movement. The controller may also be utilized by another person at a distance

from the chair (e.g., caregiver, spouse, or partner) to create movement of the chair. Additionally, other spatial possibilities were sought when developing the chair's design, specifically those that could be useful in dance and/or pedestrian activity, to include omnidirectionality, height change, and seat rotation.

In dance, perhaps due to the smaller population of those with disabilities and the general public's minimal awareness of dancers with disabilities, evolution and research of wheelchair design with a dance focus has been absent, beyond some of the inventive individual adaptations made by the chair users themselves. For example, some individual dancers have made technological adjustments in order for the device to better align with the needs of their specific dance performance. Therefore, like sports athletes, dance performers clearly have specialized technology needs.

It is hoped that by providing further technological options for wheelchair users, the accessibility, and perception of accessibility, to dance for those with mobility differences will improve. Additionally, through the research explored in this dissertation, it is my intent to open further discourse opportunities in the dance, disability, and design communities for assistive device design, development, and use. In the next section, I discuss my positionality as researcher. This is important as a means of establishing transparency of researcher assumptions and biases at the outset. An aspect of this positionality was also introduced in the prior chapter, where I described my familial background with disability.

Researcher Positionality

It is my perspective that disability is relevant to everyone, whether a person identifies as disabled or nondisabled. This is a perspective shared by many in the disability community (Albrecht, Seelman, and Bury 2001; Davis 2013). The relevance of disability is innately logical, given the ever-present awareness of life's changeability and fragility demonstrated on a daily, if not moment-to-moment basis. At some point most individuals will experience a disabling situation or condition through illness, injury, and/or an oppressive, inflexible social, economic, or political environment. There are more than a half billion disabled people living in the world today (Priestly 2001). Disability is, frankly, one of the most globally and personally relevant aspects of human experience and existence. Those who make clear distinctions between "able-bodied" and "disabled" miss the fact that at any given time individuals are only temporarily-abled by their physicality, their gender, their cultural or socio-economic status, and their environment at large. As advocated by the social model of disability, disability fluctuates in connection with a series of factors, in particular, the relationship with one's environment and its design (Davis 2013).

It is further important to briefly disclose my personal and disciplinary background which both influence my positionality. This positionality influences my approach as design innovator for the prototype chair[6] as well as my analysis and interpretation of the research data. As a caregiver with my mother for twenty-one years to my father, I became

[6] I would also like to recognize the collaborative involvement and contribution of expertise from the following individuals with whom I have primarily worked in the realization of this chair prototype: Mark Rumsey and Neil Edmonston.

directly involved with navigating wheelchairs of many kinds, trying to re-configure my relationship with my father in and through and, often, in spite of the chair's isolating, awkward enclosure around him. Thus, I acknowledge that my perspective naturally encompasses my personal history and includes attention to not only the chair user but also to those with whom they interact, other caregivers included. The wheelchair in this sense is very much a relational and social device; therefore, I view it as a dynamic system composed of several interconnected realities. My constant life negotiation between the basic functional necessities as a caregiver and the artistic, creative, visionary aspects of lived dance/arts experience, has produced an intersecting union in my design approach, which simultaneously merges aspects of utility with attention to visual form and qualitative, feeling aspects of human movement experience.

I also acknowledge that I am not a wheelchair user and, although I do have disabilities, including vision and hearing impairment, I am viewed as "able-bodied" based on visual appearance. I also recognize that it is due to technological advances that I am enabled to pass in society as able-bodied or nondisabled. The observation that technology can significantly affect perceptions of ability/disability has fueled part of my interest in exploring the development of technology in dance. However, aside from my caregiving experience to my father, what it feels like to be dependent on an assistive device in order to move through space is not a part of my personal daily, lived experience.

Each designer brings her or his own bodily experiences to design. There is no universal, one size fits all disability experience or device experience which could

possibly address every person's life experience and bodily uniqueness. However, my view is that there are points of intersection in which we, as humans, share relevant experiences enabling us to identify to some extent with each other's unique life experiences. We, as humans, are often dependent and reliant on "assistive aids" to live our lives. Whether this condition is recognized as a type of disability is a matter of perspective. Regardless of our differences there are commonalities which we all share as moving beings, which, if we enlarge our vision and broaden our capacity for understanding, can bring us into more of a shared reality. As sociologist Bryan Turner suggests, we are all connected through an embodied understanding of "shared frailty" (2001). This philosophical and experiential positionality informs my perspective as designer and researcher.

Additionally, my long-time history of dance experience prompts a kinesthetic, embodied way of knowing. This body-movement driven perspective significantly and intentionally informs the lens through which I have conceived the prototype chair and the lens through which I analyze the body-device relationship. I am a researcher-practitioner who is personally embedded in a long history of dance experience, using the moving body as a means of knowledge access, creation, and understanding. Therefore, my choreographic and performative work informs my intentionality to consider the device as a creative, expressive, choreographic tool, sharing similarities with toe shoes, tap shoes, aerial harnesses, and many other types of bodily extensions which engage new imaginative possibilities for dance and dancers. In this sense, I view the device simply as a creative vehicle for movement expression, not a mobility option exclusively for

"disability" or for one type of body. Further, I also work with dancers with disabilities, mainly those with physical disabilities, and I recognize that my research approach is influenced by those specific experiences.

Through this dissertation research process, I also noted that there is a void of any systematic attention to assistive device design for dance; thus, one goal of this research is to heighten attention to this area of technological void, while also proposing a general design paradigm for human mobility devices which more fully and intentionally embraces the meaningful experiential aspects of movement. Therefore, the design research intervention introduced in the scope of this dissertation intentionally opens space for more types of bodies to be considered in dance.

Further, working within various dance and disability organizations and communities, as well as in the dance medicine/science community, provides insightful points of reference for my research. My points of reference are based on current and real interactions, real conversations, and real situations in which issues of disability are key. To that end, I work with an integrated/inclusive dance program in Tampa, FL, REVolutions Dance, where I am the Education Director. Additionally, I serve on the board for VSA Florida, a statewide arts and disability organization affiliated with the Kennedy Center for the Performing Arts.[7] Further, I locate myself simultaneously in

[7] VSA is formerly known as Very Special Arts; however, the name association is no longer affiliated with the letters, due to the negative connotation of the word "special" with disability. VSA is a forty year old arts and disability organization based out of the Kennedy Center in Washington, D.C. with affiliate organizations nationally and internationally, thus, the letters were retained due to name recognition.

academia and in community practice, in dance/arts and science, and in the world of design/innovation and disability. My research is very much evolving in the present and it will continue to evolve and unfold through the peer interactions and dialogues of which I have the fortunate opportunity to be a part. Further, being positioned uniquely in several separate domains will hopefully allow me to be a catalyst for enabling and improving dialogic intersections concerning disability research and practice.

Mode of Inquiry

My research mode of inquiry is situated in qualitative methodology and influenced by a disability studies lens seeking social justice and disability advocacy aims. Qualitative research inquiry enables the construction of meaning through attending directly to an individual's experience and his/her interpretation of it (Merriam 2009, 3-19). Sharan Merriam, author of *Qualitative Research: A Guide to Design and Implementation*, describes that, fundamentally, qualitative researchers "are interested in understanding the meaning people have constructed, that is, how people make sense of their world and the experiences they have in the world" (2009, 13). Qualitative research also positions the researcher as the primary data collection instrument as opposed to inanimate instruments such as scales and tests (Merriam 2009, 15). An additional defining characteristic is that the research process is usually inductive, or theory-generating. Further, in qualitative research, unlike quantitative research, it is accepted and expected that the procedures in a study may need to be reshaped midway through the study depending upon initial data components and/or researcher realizations. The research method is very much a continual, emergent process of discovery, reflection, and

reshaping, rather than a deductive process seeking to “prove” an existing premise or idea (Creswell 2013, 22).

Additionally, Merriam asserts that basic interpretive qualitative research is foundationally and philosophically rooted in social constructionism, meaning that the intent is to understand the constructed subjective meaning of a phenomenon (2009, 8-9). Rather than ascribing to the notion of an existing truth waiting to be revealed, qualitative research is based in the idea of multiple, constructed meanings emerging through interactions in and through the world. Thus, the qualitative researcher is interested in how individuals interpret their experiences, construct their worlds, and create meaning. The main goal is to uncover and interpret these meanings (Merriam 2009).

My research is most conducive to a qualitative inquiry approach in that I am interested in how the meaning of disability is perceived and constructed by bodies with and without disabilities. Further, I am interested in how that meaning is related to the use and design of assistive devices and the environment (social and physical). And, finally, I am interested in how the relationships between the body, the device, and the environment/space coalesce in their meanings as revealed by dance performers. These emerging relationships discovered in the dissertation research will then signal new assistive design opportunities.

Furthermore, the personal component of my research also aligns well with the characteristics and methods of qualitative research. I am studying my own invention, thus the personal is in constant overlap with the more distanced researcher. A personal narrative of disability also influences my perspective. Qualitative researchers describe

and evaluate their "positioning" in the research at the outset. The researcher's presence is acknowledged and the researcher positions him/herself and reflects upon his/her positioning *throughout* the research process to help provide credibility and transparency to the process outcomes (Creswell 2013).

In qualitative research, data is typically collected in a natural (field) setting, one sensitive to the participants' needs. The written study, therefore, includes participant voices, researcher reflexivity, a complex description and interpretation of the area studied, and its relevance to the field (Creswell 2013, 44). Methods of reliability and validity (a.k.a trustworthiness and credibility) are sought through triangulation of researchers, data and/or data collection methods, member checks (rechecking data and interpretation with participants), peer review/examination, researcher's reflexivity, adequate engagement and data collection, maximum variation, audit trail, and rich thick description (Creswell 2013; Merriam 2009).

Phenomenology

Within the qualitative research genre, I was drawn to aspects of phenomenological analysis given its prioritization on exploring individual, subjective accounts of felt experience (Creswell 2013; Merleau-Ponty 1962; Sheets-Johnstone 2012). A phenomenological study describes the lived experiences of a particular group of individuals. According to Creswell, phenomenologists "focus on describing what phenomenon all participants have in common as they experience a phenomenon" (Creswell 2013, 76). Participants in phenomenologically-based studies are generally asked two broad questions: "What have you experienced in terms of the phenomenon?"

and, “What contexts or situations have typically influenced or affected your experience of the phenomenon?” (Creswell 2013, 81). Philosophically, phenomenology draws from the writings of Husserl, Heidegger, Sartre, and Merleau-Ponty. While full agreement as to what phenomenology is in practice is contested, the common generalities are its concentration on lived, conscious experience of a phenomenon (Creswell 2013, 77).

Additional foundational aspects attributed to phenomenology include suspension of researcher judgment (“epoche”). Creswell describes that, in some forms of phenomenology, the researcher “brackets himself or herself from the study by describing personal experiences with the phenomenon” (2013, 78). The bracketing process helps place and distance the researcher’s position, thus allowing the focus of the research to remain on the experiences of the research participants. To this end, data collection usually involves interviews and observations with individuals who have experienced the phenomenon, with data analysis often comprised of statements moving from micro to macro or from significant participant statements to broader meaning making statements. This form of analysis then leads to detailed descriptions summarizing the what and how of individuals’ experiences through their own insights.

In mining the data, the researcher highlights “significant statements” and a cluster of meanings are organized around these statements. The process of *horizontalization* involves laying out all of the data and giving it equal weight initially. From this process, clusters and themes are developed (Merriam 2009, 26). Lastly, *imaginative variation* consists of looking at the data from a variety of perspectives. When writing about the

experience of the participants, researchers attend to how the participants describe their experiences and the context within which these experiences live.

Therefore, to meet the purposes of this dissertation research process, I draw largely from the basic approach and analysis methods employed in phenomenological research, including epoche (suspension of judgment) and imaginative variation. Further, I approach the phenomenon from divergent perspectives by presenting diverse issues through which to interpret the research participants' descriptions of their relationships between dance, disability, and assistive devices. Additionally, I include an analysis of my own experience as part of the data in order to make clear to the reader the biases and positionality I have within the research process and writing of the dissertation.

Data Collection

Data for this dissertation has been derived from: (1) observations of and discussions with research participants about disability, dance, and assistive device experience, and (2) observations of and interviews (via questionnaire) with research participants about their experience in the prototype chair. Additionally, literature drawn from the fields of dance, disability studies, and assistive technology/product design has played an important role in situating the research and theorizing body-device-environment relationships. Further, observations and analysis of contemporary integrated dance choreography and performers, both performing live and through video/internet resources, and my own participation in the dance and disability community informed the research process. In the next section, I detail the participant-based research conducted.

Participants

Eight assistive device users from different geographical locations (Canada, China, Belarus, Australia, Israel, and USA) were recruited to test the prototype chair under an approved IRB study meeting the standards necessary for ethical qualitative research. The bulk of the live interview/observation research data with these eight participants was gathered during a week-long mixed ability dance event held at the University of South Florida. This event offered the opportunity for interviewing and observing participants about disability/dance/device experience and gathering data from their exploration of the prototype chair.

I used a purposive sampling method for this aspect of the research. A purposive or purposeful sampling method, which is a nonprobability sampling approach, is often used in qualitative research to generate descriptive data about a specific occurrence experienced by a small distinctive group with particular characteristics (Merriam 2009). According to Merriam, "purposeful sampling is based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (2009, 77).

The participant sample chosen for this research was particularly unique or atypical in that I was seeking assistive device users with disabilities who also possessed *professional* dance experience and who could, therefore, speak to their combined experiences of disability, device use, and dance. I also sought a cross-section of individuals who were diverse and unique in terms of disability-type, professional dance training and performance experiences, and cultural background. These varied

backgrounds produced interesting multi-dimensional perspectives in the research. Additionally, there was an aspect of convenience in choosing this sample, due to the participants being simultaneously at a dance and disability event I co-directed.

Participants were directly contacted through email and informed of the opportunity to participate in the research. I already had formed relationships with several of the participants due to my work in the dance and disability community. Of the participants, all device users possessed dance experience and had been dancing for at least 10 years in professional dance venues. Disability types included: cerebral palsy (1), spinal cord injury (4), arthrogryposis (1), and spina bifida (1), and one non-disclosed disability. There were six manual wheelchair users, one power chair user, and one crutch user.

Prototype Chair[8] Testing Procedures

The informed consent process took place on the campus of the University of South Florida (USF). The data collection took place in a natural field setting, a dance studio on the USF campus. Each participant[9] experimented in the chair for approximately one hour and, if needed, a physical therapist or care assistant helped the individual transfer into the prototype chair. However, most individuals were able to transfer themselves into the chair without assistance. Participants were instructed as to where the

[8] At the beginning of this chapter (Research Rationale section) I briefly described the prototype chair; however, for a more thorough description of the chair's design and features, see Chapter VI.
[9] Note: Prior to this research, similar exploratory research with the chair under an approved IRB at the University of South Florida, had taken place with a total of six participants, including one non-dancer and five dancers who were all wheelchair users. For outcomes from that research see: Morris, Merry Lynn. 2015. "Pushing the Limits: Making Dance Accessible to Different Bodies through Assistive Technology." *Journal of Dance Education* 15(4): 142-151.

stop buttons were located on the chair before the chair was powered on and any movement occurred. Adjustments were also made for each participant as needed with regard to seat cushions, leg strapping, etc., in order to help the participant feel as secure and comfortable as possible. Chair motions were initially directed by me holding the wireless smartphone controller, and I spoke to the participant throughout, explaining what I was doing. The pattern of movement followed this sequence: forward, backward, sideways, rotation right/left, and repeat. Motions began slowly, with speed gradually increased as participants felt comfortable. Once the basic motions were felt, more diverse movement combinations and changes in speed were explored.

Participants improvised moving in the chair alone as well as interactively with me and, at times, other dancers. Participants engaged with all the main chair features including: height change, seat rotation, omnidirectional movement, and the mobile control. Participants wore the smartphone control[10] on either their torsos, heads, or backs directing chair movement by leaning/tilting the different body parts. Further, participants experienced reciprocally being moved by others who were holding or wearing the control. All sessions were video-taped with participants providing verbal feedback to the researcher during and after the chair experience. Additionally, participants filled out a questionnaire asking them to discuss their sense of their device use in the past as well as asking specific questions about their experience in the current prototype chair.

[10] Not all of the participants had the opportunity to wear the controller due to calibration issues. But, all participants did have the opportunity to experience the chair's motion in a hands-free manner.

Data was, therefore, derived from my visual observations as participant-observer, spontaneous discussions with participants during the experience, videotape recordings, questionnaire responses, and personal memos by the researcher throughout the process. Video-taping allowed me to review what occurred as a triangulation method for my observation data and memos. To clarify ideas and responses from the questionnaire and check data interpretation accuracy, I also conducted follow-up dialogue with several of the participants as well.

Questionnaire Development

In my research, I developed a questionnaire[11] (a type of survey) which may also be considered a written interview format. The use of surveys is beneficial for research in which there is a defined population sample which has experienced the phenomenon of interest (Czaja and Blair 2005). In this study, all the participants recruited were assistive device users in dance. The survey questions were strategically developed in relation to the research purpose. The type of questions were both qualitative and quantitative, in that some were open-ended and meant to solicit more explanation and description, while others were more targeted and close-ended, meant to assess a particular aspect of the chair technology and assistive device use. Basic demographic questions were included as well (e.g., disability type, years of dancing, etc.). I distributed this questionnaire to my participants both in person as hard copy and via email (electronically) after they had experienced working with the prototype dance chair.

The qualitative, open-ended questions asked:

[11] See Appendix B for the IRB-approved questionnaire used in the research.

(1) Please describe how you experience your relationship with your mobility device. Has this experience changed over time? Has dance influenced this experience? If so, in what ways?

(2) Please comment on how you conceive of disability, what does it mean to you?

(3) Do you feel like your current device imposes limits on your movement choices? If yes, how and in what contexts? Please describe as completely as possible.

(4) Please describe your experience in the prototype chair as completely as possible, including any feelings/sensations which arose.

(5) Please comment on this chair's applicability level for you. Would you be likely to utilize this chair and, if so, in what capacity (i.e. dance? life?).

(6) Can you think of something that you could do in this chair that you could not do with your current device?

(7) What are the most significant differences, if any, about this chair compared to others you have used?

(8) Please describe any other feelings/sensations and/or thoughts related to your experience in the prototype chair.

The basic demographic questions were as follows:

Name:	_____
Wheelchair user:	____yes ___no
If yes, type of wheelchair:	____manual ____powered
Type of disability	_____
Dancer	____yes ___no
Years Dancing	_____
Type of dance	_____
Training or performance group/company	_____

There are several ways I could have chosen to construct the following "close-ended questions." A simple yes-no or agree-disagree question is the most close-ended, while questions which are situated on a variable scale, such as strongly agree to strongly disagree, offer more alternative responses. I utilized a variety of question types, each one

used in relation to the target aim of the research and what I valued as important to discover in relation to the research purpose.

Nominal or categorical scales refer to scales with no numeric value (e.g., male/female or wheelchair user yes/no) (Cozby 2001). Ordinal scales refer to scales with rank ordering (e.g., movie ratings). Integral scales have numeric literal properties with no true zero (e.g., aptitude tests). And ratio scales have an absolute zero point indicating absence of the variable (e.g., weight scale) (Cozby 2001). I used a Likert-type scale (a type of ordinal scale) with three possible responses (three-point), as well as a rank-order format for some questions, which asked participants to prioritize items in a list. I wanted to give the participants structured response options in order to derive information specifically about the technology, but with a degree of variability to provide more nuance. The following show two rank order questions on the questionnaire and one Likert-type scale question:

Please rank (1, 2, 3, 4 or 5) the following design elements in order of importance/benefit for you. Multiple items may be ranked as high priority, low priority, etc.

1 = highest priority, 2 = high priority, 3 = low priority, 4 = lowest priority, 5 = not important at all

___Seat Rotation independent of base

___Height Change

___Mobile phone control system

___Footholds for other dancers to step on and off

___Small base

___Removable/changeable seating

___Omni-directional movement (forward, backward, side, diagonal, and turning)

___Lighting effects

___Chair aesthetics

___Stop buttons

___Variable speed

___Stability of the base

___Overall comfortability

Please rank order (1, 2, or 3) the following uses of the mobile phone control in terms of your preference **(1-most desirable method of control to 3-least desirable method of control):**

___Holding with hand

___Wearing on body

___Other person/dancer wearing or using the control

Did you find the mobile phone control to be:

Hand-held

Not difficult at all Moderately Difficult Very difficult

Worn on body

Not difficult at all Moderately Difficult Very difficult

In designing the questionnaire, I also wanted to limit the amount of questions so that it would not be laborious for participants to fill out. Varying the types of questions was included to break up a sense of monotony. However, I did find that participants often went for brevity in their responses to the qualitative questions; thus, I followed up

through email to draw a bit more in-depth descriptions from their initial written responses.

Data Analysis

The data analysis process involved textual and conceptual levels. The textual level is similar to Merriam's "open-coding" process, or Saldaña's "initial coding," which entail reading all of the data and then associating a brief word or phrase to segments of data that are related (2009; 2013). The conceptual level of data analysis (also called axial coding) encompasses theorizing about concepts, categories, properties, and themes emerging from relationships drawn between the initial codings (Groenewald 2008). This theorizing phase further involves connecting points of emphasis in the participants' responses to significant themes and relevant concepts in the dance, disability, and design literature, as well as in dance practice. Researcher memos added credibility to the research process in assisting systematic tracking and linking of data (i.e., audit trail and noting researcher assumptions and emerging insights) (Groenewald 2008). Further, Adele Clarke's situational mapping process lent an additional strategy in which emergent themes could be related in multiple ways so that multiple perspectives of looking at the data could be considered within differing contexts (Clarke 2005).

Process of Theory Generation

One of the primary functions of scholarly research is to generate theory (Fraleigh and Hanstein 1999). According to dance research scholar Penelope Hanstein, theory generation involves identifying phenomena, discovering characteristics, and specifying relationships (Fraleigh and Hanstein 1999, 65). Additionally, the purposes of theory may

be to describe, explain, and/or predict. The theory generation in this research process encompassed all three aspects: describing phenomena, explaining phenomena, and predicting phenomena.

The theorization process for this dissertation research followed a sequence of moving from a specific observation (data point), broadening to a general conceptual framework of relationships (multiple and diverse data points), and culminating in a specific analysis, distilling and synthesizing a constellation of data. The initial specific entry point grew from an observation about assistive devices as a practitioner working in the field of integrated dance. This observation was coupled with my personal experience of my father's disability and assistive device use. I began to question wheelchair design, considering how other control options might enable different and potentially more expansive kinds of movement experiences. I further observed that although sport-specific chairs existed in athletics, there did not seem to be dance-specific assistive devices made with dance performance needs and goals in mind. I sought out methods for creating three-dimensional movement dynamics in the device, drawing from my knowledge and experience in dance and, specifically, with Laban Movement Analysis, a system of analysis discussed later in this chapter and in Chapter VI.

As I pursued developing the design of the device in collaboration with engineers, my research included reviewing existing wheelchair and relevant technologies, as well as reviewing literature about the use of assistive devices from multiple perspectives. The chair design project revealed broader questions, leading me to examine more closely the general relationships between bodies, devices, and environments/space (I am using

environment and space terms interchangeably here). I surveyed varied dance, sociology, psychology, disability, philosophy, and design literature in search of ideas or theorizations about bodily relationships to devices or bodily relationships to the environment and vice versa. I gleaned insight from multiple sources, to include Sherry Turkle's text *Evocative Objects: Things We Think With*; Mark Johnson's *The Meaning of the Body*; Bruno Latour's actor-network theory; Maurice Merleau-Ponty's discussions of embodiment and tool use; design theorists writing about emotional design, interaction design, and human-centered design; and geography scholarship dealing with bodies and materiality.

From these readings, I asked the following question: What is the impact of the device or the environment upon identity and interpersonal experience and vice versa? I was interested in delving into potential conscious or subconscious meanings cultivated between human bodies, objects, and environments. Awareness of those meanings could potentially help direct the on-going design trajectory and help solidify or deepen the "why" behind the design choices, which I often felt in the past were intuitive choices. In the theorization process, like the development of choreography, much material is often generated initially and intuitions are followed towards realizing an emerging idea or vision. Then the task of reflection, re-evaluation, sculpting, and deepening further directs and refines the vision. In a research note I wrote in June 2012, I reflexively see the seeds of the inquiry taking shape:

> Within this idea of the chair project, contextually, I am interested in the larger frame of how bodies are shaped by the structures they are attached to, move through, etc.,. and how that influences our perceptions, attitudes/personalities, identities, dis-identities. I am interested in investigating the symbolic and

> functional relationships between one's human body and the devices or structures one finds themselves relating through, interacting with, being defined, liberated, or classified by, and inhabiting over time. (Author research memo, June 2012)

If my choices in the design were to be grounded and further developed, I needed to understand the intimacy of this relationship trio: body, device, and environment.

Next, I began re-organizing the theorization structure, broadening out to consider a larger structure or frame which might situate the relationship of body-device-environment. I looked at the three intersecting subjects of the dissertation (dance, disability, and assistive technology design) as the broader frame for exploring body-device-environment interactions. Body-device-environment interactions occur in all three frames; thus, they are inherently linked through this connection. From these studies, my next questions became: How do these three knowledge and practice domains of dance, disability, and assistive technology design reveal body-device-environment relationships similarly or differently? How might these similarities and/or differences sculpt new terrains of inquiry and practice?

The two main themes or concepts which repetitively rose to the surface in the various literature I reviewed were embodiment and socio-spatiality. I encountered these terms or identified a parallel relationship to these terms in multiple textual sources. These emergent themes opened a further line of questioning: How are embodiment and socio-spatiality defined by varying scholars? How are these themes observed, understood, or experienced similarly and differently in dance, disability, and assistive technology? When does embodiment occur and are there different levels of embodiment? How can notions of embodiment and socio-spatiality inform design choices?

Ordering

In any theorization process, the ordering of statements organizes the logical consistency of the theory, thus helping to support the reliability of the study (Fraleigh and Hanstein 1999, 68). One decision I needed to make was the directionality from which I was exploring and analyzing the variables. I am calling the "variables" the large knowledge and practice domains of dance, disability, and assistive technology. Analyzing all the possible permutations between the three areas would have been too onerous and inordinate a task to move towards meaningful research in the scope of a singular dissertation. Thus, the line of inquiry in the research I chose was to examine the relational effects of the disability and dance dyad upon assistive technology design.

In Chapter III, I introduce the first variable in the research matrix: disability. In Chapter IV, I explore the intersections of the first variable with the second: disability and dance. In Chapter V, I hone the crux of my line of inquiry by exploring the intersection of the first two variables with the third: disability, dance, and assistive technology design, uniting the themes and ideas explored in Chapter III and IV. In Chapter VI, I use the themes generated in all three chapter explorations to help frame a specific analysis of the prototype chair, moving towards a dance-based design paradigm revolving around body-device-environment relationships.

Role of Participant Research: Observations and Responses

The research I conducted with the eight assistive device users in dance played an inherent role in theorizing about the relationships between dance, disability, and assistive technology. I observed participants using the chair, I danced with participants using the

chair, I talked with participants about their experiences during the session, and I asked participants to respond to the aforementioned questionnaire. For some participants, I continued follow-up email dialogue as well. Using the two major emergent themes of embodiment and socio-spatiality surfacing in the research literature as points of intrigue and possible significance, I sought to discover where signs or aspects of these notions were or were not exhibited in the responses and actions of the research participants. How did these notions manifest in the bodies and words of the participants? As I coded and themed the participants' data, I also remained open to new emergent themes and divergences as well as convergences in the data.

While the data from surveys/questionnaires may be quantitatively analyzed through sophisticated statistical methods involving multiple or logistic regression, hierarchical analysis, and analysis of variance, I did not employ these methods of analysis, as it was not a useful method for the small number of participants I had and for my research goal. Eight is a very small population value; thus, I was able to use simple processes to evaluate the close-ended questions. For instance, by collating the responses I could identify trends, commonalities, and differences among these participants. The open-ended questions were analyzed in more qualitative ways, through coding and theming, while the close-ended questions were analyzed by using both quantitative and qualitative lenses.

I often used "in vivo coding," in which the direct words of participants are extracted as being important to emphasize (Saldaña 2013, 91-95). For example, the first question directs participants to please describe how they experience their relationship

with their mobility device. Then, the question further prompts them to answer how this experience changed over time, whether dance influenced this experience and, if so, in what way. To this question, one of the participants replied:

> I have used crutches pretty much for my whole life. I have had moments where I have needed to use wheelchairs and walkers but pretty much crutches have been my go-to mobility device. As I grew more mature, I learned to accept my crutches as a part of me. I am proud of them and like to think of them as a pair of shoes almost. Dance has definitely influenced my experience with them because dance has given me the confidence to believe in myself. Dance has also shown me different ways to use my crutches.

The in vivo codes which I extracted from this excerpt were: "learned to accept," "a part of me," "proud," "as a pair of shoes," "confidence," and "different ways." The learned acceptance (over time) was echoed in other participant's responses as well and, thus, became an emergent theme for thinking about the individual's relationship to their assistive device, implicating a tension in the relationship while insinuating an embodiment process occurring over time. The structural code I applied to help organize the data responses to this question was "mobility device relationship."

Additionally, the in vivo codes "different ways" and "confidence" referred to the influence of dance upon the individual's relationship with the assistive device. Thus, these initial in vivo codes were categorized within a larger structural code: "influence of dance upon assistive device relationship." These organizing tools helped to collate the data into relevant chunks which were then tethered to larger research questions in the dissertation. In the theming process, several of the in vivo codes displayed a clear connection to personal identity and, thus, became associated with indicators of embodiment, such as "a part of me," "proud," and "like a pair of shoes." Additionally, the

emotive word “proud” signaled an emotional connection to the device which further aligned with embodiment theories and design paradigms, such as emotional design.

I also used “versus coding,” a type of coding identifying ideas which seem to be in conflict (Saldaña 2013, 115-118). This type of coding revealed varying tensions in the data. For instance, one participant indicated experiencing a sense of freedom in the prototype chair; yet, he also noted feeling “restricted” due to feeling the need for more support and not having control, especially when another person was controlling the chair. He stated:

> I felt a sense of freedom yet restricted, as I couldn’t control where I was going and although I had my hands free I spent most of the time trying to support myself to be upright and stable in the seat. As I don’t have any core stability, this proves to be difficult.

Intriguingly, another participant commented that a sense of freedom emerged *because of* not needing to control the chair; instead, this participant described a sense of restriction in utilizing his usual manual wheelchair propulsion. In these two cases, the notion of freedom versus restriction were perceived in distinctly different ways. These types of conflicted statements also arose as individuals spoke about their existing devices and about their disabilities. For some, the device and/or disability was acknowledged for its restriction, limitation, or challenge; however, this was countered with new found opportunities and possibilities (limitations versus possibilities).

Additionally, a type of coding termed “causation coding” led me to delve into the causal relationships of data segments (i.e., cause-effect relationships) (Saldaña 2013). For example, I re-examined the way participants spoke of limitations and possibilities, thus realizing that the relationship could also be viewed as a causation or directional string.

One participant stated, “While my current device has limits, it also has created many movement possibilities.” Thus, from the causal perspective, the initial “versus code,” limitations versus possibilities, could also be understood as “limitations causing or instigating possibilities.”

Whereas the first three questions of the questionnaire were focused more generally on disability and device use for participants, the remaining questions dealt with the prototype chair experience specifically. I sought participants’ insights into how the prototype chair felt and I coded these questions using similar coding techniques described formerly. For example, question four asked participants to describe their experience in the prototype chair as completely as possible, noting any feelings/sensations. Several in vivo codes arising from this question included: “not tied to a joystick,” “free for expression,” “more movement possibilities,” “insecurity in beginning,” “like floating in space,” “not having control,” “challenged,” “looks free,” “incredible experience.” The responses to this question helped me to understand what seemed important to participants or what was most prominent for them in the experience. I coupled these responses with my observations of their experience, both during the session and later upon video review of the session. Again, I further sought out connections with several major themes in the dance, disability, and design literature, to include evidence or indications of embodiment and socio-spatiality as well as meaningful design attributes (i.e., which design attributes, such as hands-free movement, the participants seemed to find most meaningful).

Choreographic and Movement Analysis

In the observation analyses of research participants' movement experiences and of dance performance in the dissertation, I drew from Foster's *Reading Dancing* (1986) and Laban Movement Analysis (LMA) (see chapter VI, pp. 202–204 for detailed description of this system) (Bartenieff and Lewis1980; Hackney 2003). Foster identifies five broad categories for discerning choreographic meaning: the frame, the mode of representation, the style, the vocabulary, and the syntax (1986, 59). I placed emphasis on the style (i.e., quality of movement), vocabulary (i.e., specific movements), and syntax (i.e., relationships of one movement to the next) to educe meaning. Drawing from both Foster's approach and the LMA framework, I looked for how parts of the body were held or released, how parts were sequenced, how Effort[12] elements, such as Space, Time, and Weight were utilized, and how the body was generally oriented in space (Bartenieff and Lewis 1980; Hackney 2003).

Also important was observing how relationships were negotiated between dancers and between the dancer and the device. In particular, exploring the movement of the disabled body in performance was relevant to the dissertation goals. From descriptive observations of how the body occupied space, utilized time, initiated and sequenced movement, and enacted qualitative nuance in relation to the assistive device, inferences could be drawn. For instance, an analysis of several professional integrated dance works revealed the way the strategic use of time and space changed binary representations of

[12] The term Effort is capitalized due to its specific referential meaning in the LMA framework. Space, Time, and Weight are also capitalized for this reason. Effort is defined as the dynamic quality of the movement as manifested through four Effort Factors: Space, Time, Weight, and Flow. See Hackney 2003.

ability and disability, while creatively expanding the role of the assistive device.

Additionally, in observing the movement experience of one participant trying the prototype chair, I observed a tensely held unchanging torso position coupled with a gripping action on the chair seat, which seemed to indicate an initial hesitancy and apprehensiveness. Gradually, the participant began moving the arms in different spatial trajectories and with timing changes; these changes allowed the upper body to appear less rigid. I interpreted these changes to be associated with becoming more comfortable in the chair over time and developing a sense of trust to explore more possibilities. This observation was further validated by the participant's questionnaire responses. The participant research is relevant to the discussions in each chapter; thus, each is intertwined throughout the dissertation, with the largest bulk of the participant data presented in Chapter VI when describing the prototype chair design.

Method of Analysis for Assistive Device

While embodiment and socio-spatiality became two significant ideas which could conceptually direct design thinking and choices, I needed a more detailed movement-based framework to yield more specificity in how a design might productively evolve through a dance lens. I turned to the application of an existing theoretical movement framework which I felt had been successfully implemented in other research: Laban Movement Analysis (LMA). I was also familiar with the framework through my studies at the Laban Institute for Movement Studies in NY, past coursework in LMA, and my continued application of the analysis system in teaching.

In Chapter VI (pp. 202–204), I describe in detail how Laban Movement Analysis was used as a tool for analysis. The general premise of the framework is to expand one's awareness and access to expressive movement potential by intentionally broadening one's range through focused exercises/practices. Applying a similar premise to objects, in particular to assistive devices and their innovative possibilities, I query how the device may expand its range and thereby broaden its expressive movement potential in conjunction with various types of bodies.

While Laban Movement Analysis has been most frequently applied to human movement and used for analyzing pedestrian movement, movement for actors, and dancers, several innovative uses of the LMA framework have also been applied to animal and robot movement (Foroud and Pellis 2003; Rett and Dias 2007). In the area of human-machine interaction design, the LMA framework and Labanotation has also been applied by researcher/designer Lian Loke and Toni Robertson (Loke 2009; Loke and Robertson 2013). These analyses are few, and I intend to further expand this existing literature and support the utility of the LMA framework by applying it to object analysis. Because this dissertation foregrounds the import of objects/assistive devices in the lives of people, drawing attention to the object's agency and embodied vitality seemed to be a productive means for analyzing the object's movement potentiality, thus equalizing its role in the human-object/machine movement duet. In this case, the subject is an assistive device, specifically a wheelchair. I extend the understanding of the chair to embrace it both as an independent body and an embedded body with a human.

Limitations and Challenges of the Study

One issue regarding the written feedback was the tendency towards brevity in the written responses. Due to this issue, I reached out to participants for follow-up dialogue in order to glean more descriptive data from which to work. One participant never completed the written questionnaire, but did speak verbally with me about her experiences. Another limitation and challenge to the study was the chair's functionality. Although I worked intensely with my engineering partner to be sure that the chair was fully ready for the week of intense experimentation, the chair's functionality faltered. This led to an inconsistency in what I could accomplish in each session with the participants. Therefore, not all the participants were able to experience the fullness of the chair's features. Ultimately, it became clear that my research purpose was not solely predicated on the prototype chair explorations; instead, it was also focused upon an overall exploration of body and device experiences. So, in the cases in which the device was not operating at an optimal level, I used the opportunity to learn more about the individuals' current and past experiences with their devices. For example, during one time when the chair was not functional, I had three participants in the dance studio and I utilized the time by having an open discussion about dance, disability, and assistive device use. This experience reminded me that clearly the research process is not always linear or predictable, and improvisation and re-direction is an important strategy, especially within the qualitative research process.

A fourth unavoidable limitation to the study was the fact that I was the primary innovator for the chair and I also served as the Principal Investigator administering the

study and interacting with participants. On one level, I observed that the participants seemed to appreciate my insider status as a dance artist and they appreciated my creativity and investment in the project. Also, several of these relationships were cultivated over time, so there was a level of trust established. On another level, I knew that their responses might be different if I were not in the room. There was no method of creating true anonymity, either of participant responses or of my involvement in the research; thus, the lack of anonymity limited the full authenticity of participant responses. Because I was aware of this factor, I did make multiple attempts to explain to the participants that I wanted to hear their authentic responses, so that viable improvements in the design of the chair could be made. Additionally, the visual data involving watching the participant move in the chair provided an authenticity in terms of what the participant's experience was on a corporeal level. In other words, if something was working well, it showed; while, if something appeared difficult or challenging, that also showed. The documented movement experiences were visual data sources which could be triangulated with participants' verbal and written responses for a more in-depth interpretation of the experience.

Lastly, time was a limitation in the study. The time I had to work with participants in the chair explorations was rather short since I would have preferred a full week-long exploration with each participant to watch their reactions to the chair over time. But, there were unavoidable time and budgetary constraints which did not permit a longer exploration period. In the future, I will develop a research situation in which the time limitation does not affect the research process, since a longer time would provide a richer

experience for the participant when embodying movement in relation to a new type of device.

Reliability

Since, in qualitative research, reliability is often termed trustworthiness, I addressed this notion of trust in several ways. First, the same site for chair testing was maintained. Second, the same procedural process was maintained for conducting the informed consent process, including instructing the participant on the use of the chair, recording the sessions, administering the follow up questionnaire, and organizing and storing the data. Third, I was the Principal Investigator on the study and I engaged with every participant in the research processes and procedures; thus, there were not multiple people involved in the procedural processes. Further, the type and length of chair exploration also was consistently maintained, except for those times when there were functionality issues.

A Note About Language

Given the complexity of language choices in the disability studies field, I will next explain my approach and rationale for language use[13] in this dissertation. There is no universal agreement upon the type of language to use regarding disability. In this section, I will discuss how I employ the variable language choices used most prevalently within the literature and which I encountered in my practice experiences working in the dance and disability community.

[13] See: http://ncdj.org/2016/01/journalists-should-learn-to-carefully-traverse-a-variety-of-disability-terminology/

First, *disability* is one of the complex terms employed in the dissertation. The medical model has traditionally defined disability as a biological impairment residing in the individual. Conversely, the social model of disability has typically defined disability as factors outside of the person (social and environmental) and used the term *impairment* to denote the biological differences between an impaired person and a person considered to have "normal" biological functionality (Albrecht, Seelman, and Bury 2001). Variations from the traditional social model have integrated the two notions, defining disability as both outside social and environmental forces and material, biological impairments (i.e., missing limbs). In this dissertation writing, when I use the term disability, I am generally referring to the combined meaning: both social and environmental barriers and material impairment issues, all of which influence a person's ability to navigate his or her environment.

With regard to the terms *integrated dance*, *mixed ability dance*, and *inclusive dance*, I will generally use all three terms interchangeably throughout the dissertation. These terms do not have firmly demarcated definitions. I use the terms interchangeably, partly so the reader knows that variations exist and varying interpretations exist. Integrated and mixed ability usually suggest dancers, those who are both disabled and nondisabled, are working or dancing together. However, when using the term "integrated dance," there is an assumption that the dancers labeled as disabled only have physical disabilities, not mental or sensory disabilities. For instance, AXIS Dance Company distinguishes themselves as a "physically integrated" dance company. On the other hand, inclusive dance frequently refers to a wider array of disabilities and also may involve

dancers with and without disabilities working together. In the program in which I teach (REVolutions Dance), the intent is to be inclusive, and we have students on the autism spectrum in the class as well as students with physical disabilities. This inclusive style is not without challenge and I do think the terrain is complex with regard to determining most effective modes of training. However, for the purposes of this dissertation, I am mainly dealing with research participants who identify as physically disabled.

Frankly, within professional integrated dance domains, there is a lack of diversity representing a full spectrum of disability (i.e., mainly physical disabilities and mainly manual wheelchair users are mostly evident in these professional dance companies). Rarely are dancers with significant visual, hearing, intellectual, or mental impairments seen in professional dance venues. I recall a statement by a blind dancer recently during my observation of her and the company with which she was working in rehearsal (Infinity Dance Theatre/NY). She said: "I hate being the only one."[14] She was speaking of noticing that everywhere she went she appeared to be the only dancer with a visual impairment. Unfortunately, there seems to be a lower percentage of other types of disabilities in professional or pre-professional dance.

Additionally, within this dissertation writing, I sometimes employ the term *differently-abled* or *differently-bodied* as an intentional language choice which recognizes and values all forms of difference and places the emphasis on ability rather than on "dis" ability. However, there are some in the disability community who find the term

[14] Informal verbal exchange with Krishna Christine Washburn, blind dancer, during a rehearsal of Infinity Dance Theatre in New York on July 8, 2016.

misrepresentative and prefer to proudly identify with the term *disabled* as an affirmation of identity. Thus, I also employ the terms disabled person and disabled people as well as disabled dancer and nondisabled dancer in this writing. Further, the terms typically-bodied and atypically-bodied have been used by some in order to avoid the misrepresentation of the terms able-bodied and disabled, which imply that disabled people are not capable.

Despite the complex tensions associated with the use of the words *able-bodied* and *disabled*, these phrases are still utilized, although usually with quotes or disclaimers denoting their problematic associations. In this dissertation writing, when I utilize terms such as able-bodied and disabled, they are used with the disclaimer that the categories are blurry and do not effectively refer to how able-bodied a person is.

There are also different opinions as to the use of "people first language" (i.e., person with a disability, person who uses a wheelchair, person who has autism, dancer with a disability) versus "identity first language" (i.e., disabled person, wheelchair user, autistic person, disabled dancer). Frequently within this writing, I subscribe to the use of people-first language in which the person is recognized before the disability. There are those that find this language more appropriate and empowering to their identity. This type of language was first prescribed by ADA legislation. However, a significant trend in current disability studies literature is to use identity-first language, in which the disability is claimed as an innate part of one's identity rather than separated out as something wrong with the individual. Thus, I also recognize and endorse the validity of the identity-first perspective by employing this language usage at times. Additionally, I often use the

term wheelchair dancer as a means of endorsing the legitimacy of wheelchair dance technique as a valid dance genre, similar to referring to someone as a jazz dancer, ballroom dancer, or ballet dancer. For me, this equalizes the perception of this form of dance. Within the dissertation writing, I strive for using disability language which creates a sense of equality and respect. In the chapters which follow, I introduce the contexts within which these language issues emerged and continue to be explored.

CHAPTER III

DISABILITY STUDIES: REVEALING BODIES, CONFRONTING SPACE, CLAIMING POWER

Introduction

The 1980 film *The Elephant Man* depicts the life of Joseph Merrick, a man with severe deformities in late 19th century London. The film is based on a true story and provides a window into the prevailing attitudes and culture of the 19th century, while also providing timely insight into the growing atmosphere of disability rights/activism in the late 20th century aura of civil rights. The film portrays a 19th century culture which simultaneously ridiculed, rejected, ostracized, devoured, owned, objectified, and measured Merrick's bodily difference. Merrick's bodily condition was an object of both curiosity and repulsion by the medical attendants who encountered him and by the multiple socio-economic groups he encountered. Merrick's existence consisted of being subjected to freak show entertainment abuses and being the object of medical scrutiny. However, the way in which the film grapples with the main doctor's own changing sense of identity and conflicted self-reflection as he interacts with Merrick represents similar consciousness raising occurring in academia as well as law and policy with regard to disability in the 1980s.

The doctor self-reflectively asks himself, perhaps like researchers of the time were beginning to do, whether he is "any better" than the freak show owner who so cruelly exhibited Merrick like a "specimen." He recognizes that his interest in Merrick as

a specimen of medical abnormality, as an object to be scrutinized and categorized, erased Merrick's human existence. The film highlights the lack of autonomy, the lack of voice, and the lack of self-hood, independence, and basic human rights afforded Merrick, due to his physical difference. Thus, the film acts as a timely critique of the medical model and disability discrimination, while also being a cultural mirror to reflect some of the contemporary changes occurring in academia and society at large, indicating greater acceptance and understanding of conditions of disability. These socio-cultural changes generated the framework for the foundations of the disability studies field, discussed in the next section.

Closely aligned with and following similar philosophical origins as race and gender studies, the academic discipline of disability studies in the United States and the UK grew from the grassroots advocacy efforts of the disability rights movement in the late 1960s and early 1970s (Ferguson and Nusbaum 2012). The efforts of individuals with and without disabilities, including health professionals, war veterans, parents of children with disabilities, and researchers from multiple domains all helped bring disability to the forefront and instigate law, policy, and social change for disability rights. The Rehabilitation Act of 1973 was the first significant piece of legislation in the U.S. explicitly protecting the civil rights of those with disabilities. It was followed by the Education for All Handicapped Children Act in 1975, stipulating equal access to public education for children with disabilities (Braddock and Parish 2001).

In the midst of this heightened attention to disability law on the political front, scholars in multiple fields were raising important discussions and debates about disability

issues. In 1982, The Society for Disability Studies, the oldest academic organization in the U.S. dedicated to the study of disability in social, cultural, and political contexts was founded (Society for Disability Studies 2014). During the 1990s, the field of disability studies in the U.S. and Britain enjoyed particular growth and development in concert with the social and political changes enforcing disability law and policy. Examples include the Americans with Disabilities Act (ADA) in the U.S. and the Disability Discrimination Act in Britain (Braddock and Parish 2001). On the global stage, disability rights was also gaining more of a political presence as evidenced in the United Nations General Assembly's *Standard Rules on the Equalization of Opportunities for Persons with Disabilities* in 1993 which provided international standards for disability programs, laws, and policy (Braddock and Parish 2001).

Research in the field of disability studies is interdisciplinary in nature and has intellectual origins in sociology, humanities, and anthropology, as well as linkages with the medical and rehabilitation sciences. An often cited work related to the philosophical foundations of disability studies is sociologist Erving Goffman's work in the 1960s on stigma as a social construct (Ferguson and Nusbaum 2012, 71; Turner 2001). Goffman helped to reveal the way in which the social construct of stigma due to many types of perceived difference (e.g., physical deformity, mental illness, etc.) became internalized by the individual to affect body image/identity leading to a variety of social responses, including isolation and distancing. Goffman's work pointed to the societal responsibility for creating disabling conditions for individuals, rather than faulting the individual's impairment. In the 1970s and 80s, medical sociologist Irving Zola contributed essential

foundations to the disability studies field by encouraging the utilization of social science methods and concepts to contextualize and embrace personal experiences of disability. As a person with a disability, Zola's work also became important as a model for raising up the voices of those with disability, enforcing the importance of involvement of scholars with disabilities in the field and validating the incorporation of personal, subjective experience/perspective into research practice. Zola later became founding member for the Society for Disability Studies as well as the first editor for *Disability Studies Quarterly*, the disability studies field's first journal.

Before disability studies fully emerged, the subject of "disability" was mostly present in the academic realms of medicine, psychology, and rehabilitation (Ignagni and Church 2007). Unfortunately, research in those fields often emphasized the "medical model" approach to disability: defining disability as a problem residing predominantly in the individual, something that required fixing. The medical model emphasizes bodily "normalization," often to the exclusion of recognizing the social and environmental forces at work shaping and impacting the experience of the individual. Disability studies sought distinctly different research approaches, subscribing to the social model of disability which emphasizes disability as a confluence of societal factors, in particular those of social, attitudinal, and environmental barriers and restrictions.

Due to the linkages of disability studies with multiple disciplines including the sciences, the social sciences, and the humanities, disability studies is described as an interdisciplinary field and it continues to assert the integration of multiple disciplines as a primary goal and strength. It aims for a "radical recasting of disability from a biological

given to a socially created system of representation with material and social effects" (Ignagni and Church 2007). Extending this definition, the Society for Disability Studies, as a representative international organization for disability studies, describes the philosophical approach of disability studies in this manner:

> Disability Studies recognizes that disability is a key aspect of human experience, and that the study of disability has important political, social, and economic implications for society as a whole, including both disabled and nondisabled people. Through research, artistic production, teaching and activism, the Society for Disability Studies seeks to augment understanding of disability in all cultures and historical periods, to promote greater awareness of the experiences of disabled people, and to advocate for social change. (Society for Disability Studies 2014)

The issues of prejudice and inequality surrounding disability continue to persist in the twenty-first century; however, due to the progress made over the past thirty years in law, policy, and social activism, outright discrimination has been reduced and individuals have access to legal recourse with regard to disability rights in a growing number of countries.

Having reviewed the foundations of disability studies, I now turn to a more focused discussion of the body, tracing the ways disability studies theorizes the body in relation to identity, impermanence, and societal structures. Next, I delve deeply into the notion of the "spatial" and its implications in disability studies as a further means for conceptualizing the body. This thematic exploration involving spatiality will also re-surface later in conjunction with dance in Chapter IV. Lastly, I analyze how these bodily theorizations in disability studies are revealed in disability activism examples, emphasizing the socio-political position of the disabled body as an agent of change.

Disability Studies and the Body

Disability studies, with its emphasis on the social model, moved the focus of disability from residing in an individual's body (medical model) to residing in environmental, social, and political factors. Disability studies separated out the concept of impairment (physical, mental, and/or sensory biological variations) from disability, the latter being viewed as a condition of societal barriers (Chouinard, Hall, and Wilton 2010, 7-8). Over time, this positionality and perspective in disability studies affected definitions of disability leading to legislative actions being focused more on fixing environmental barriers rather than "fixing" what was "wrong" with the individual. Disability studies, therefore, in tandem with the disability rights movement and the independent living movement, pushed environmental and social barriers to the foreground and, perhaps unintentionally, moved the individual (body) to the background. The forthcoming effect of this push has been positive in many respects. For instance, accommodations for persons with disabilities, including provisions for architectural accommodation, attendant care/assistance, and employer anti-discrimination practice, are enforced by law (Braddock and Parish 2001). Disability studies research and activity has heightened attention to these important environmental and social factors.

However, a negative aspect of focusing priority on societal and environmental barriers is that the individual bodily experience of disability can be positioned as less important and fade to the background in the effort to combat social factors of disability construction (Turner 2001). The actual lived, material effects of impairment risk becoming invisible in this construct. Many scholars in disability studies, therefore, have

subsequently made the effort to "bring the body back into" the discourse and have encouraged a blending of medical and social models (Snyder and Mitchell 2001; Zola 1991). For instance, sociologist Bryan Turner, in "Disability and the Sociology of the Body," describes the way in which all bodies are, in fact, connected through an embodied understanding of disability as "shared frailty" (2001). Turner then argues for emphasizing embodied experience in the understanding and construction of disability and speaks to the insecurity and vulnerability a lived bodily experience engenders for all people. All bodies are vulnerable to illness, aging, and disability. He stresses the notion of a multidimensional human vulnerability on biological, social, and political levels. For instance, we, as humans, cannot control macro-policy decisions or the kinds of interdependency we have as social beings; therefore, we are vulnerable to the unavoidable flux this codependent condition dictates.

Similarly, sociologist Arthur Frank discusses this "in flux" material body at length in his text, *The Wounded Storyteller* (2013). He describes the experiences of multiple individuals with illness and disability and ultimately advocates for a more useful understanding of the body as "contingent," as opposed to controlled and predictable. Contingency is defined as: "the body's condition of being subject to forces that cannot be controlled" (Frank 2013, 31). Frank asserts that society tends to expect adult bodies to be in control, and when they are not, they are expected to attempt to regain control or conceal the loss of control as much as possible. He suggests that when individuals are seriously ill (i.e., cancer or stroke conditions) and then recover, the relationship between sickness and wellness is not an either/or; rather, the relationship is "like a computer

graphic where one shape is constantly in process of becoming the other" (Frank 2013, 9). In other words, it is false to assume that a neat division exists between sickness and wellness. Instead, it is more useful and realistic to think of the body as in flux. Thus, disability studies has brought attention to the disabled body (and potentially all bodies) as *vulnerable, contingent, and in flux* through an embodied reality.

Scholars in disability studies have also drawn from the work of Merleau-Ponty in re-focusing attention on the bodily role of meaning-making. Merleau-Ponty viewed the body in a Gestalt fashion as having embodied interconnectedness, thereby resisting notions of dualism. He described the body as a "grouping of lived through meanings which moves towards its equilibrium" (Merleau-Ponty 1962, 153). Disability scholars, such as Miho Iwakuma, have used Merleau-Ponty's concepts of embodiment to emphasize the role of the body in disability experience in terms of identity re-shaping, social experience, world-view, and one's sense of time and space (Iwakuma 2002). Bodily experience and self-hood are viewed as interdependent, with identity arising from bodily experiences in the world. Iwakuma describes examples from her research with amputees who experience the phantom limb phenomenon (feeling the sensation of a limb which is no longer there) or who are obsessed with a prosthetic leg to re-claim their sense of identity as a walker of a certain height (2002, 81). She cites these examples as indicators of prior embodied realities clashing with the individual's current bodily condition and, therefore, effecting his or her identity construction. This view of the body as a subjective mingling of body and self-hood stands in contrast to a purely medical

model or dualistic view which assumes the body is simply a collection of parts, separate from the whole subjective experience of being (Turner 2001).

Additionally, engagement with others frequently changes as the result of a disability, including sexual experiences, daily interactions, and recreational participation (Turner 2001). Disability often causes a disruption or loss in familiar ways of being and in familiar bodily habits (Standal 2011). One must re-calibrate life to adjust to a new sense of identity. This process occurs in relation to the body learning to negotiate its new physicality. Iwakuma describes the need for a significant focus on re-embodiment once a disability occurs.

Similar to Iwakuma's reference to prosthetic device users and the re-embodiment process needed to incorporate the prosthetic device, Merleau-Ponty describes extension of the body through objects, such as a blind person's stick, which become literally incorporated into the body's sensory understanding (Standal 2011). In the initial experience of using the stick, it is felt as an externalized object identifying geometric positions in space in relation to the body and it requires more conscious attention (Standal 2011). After habitual use of the stick, it becomes more like another bodily organ, a sensing mechanism which is no longer felt as a separate entity; instead, the stick functions as a direct manifestation of the user's intention (Standal 2010, 181). This assertion of the interrelation between body and object, which is also validated by neuroscience studies, supplies a deeper understanding for the ways in which individuals with disabilities interface with assistive devices and the environment: they experience an assistive device not merely with, but *through* their bodies.

Although a common scientific trend has been to measure the effectiveness of assistive technologies from objective measures and tests of functionality (i.e., dependability of control system, durability of device, etc.), the more recent prevalence of research into subjective accounts of individual users' comfort and satisfaction with their devices is evidence of the ways in which concern for the notion of embodiment again rises to the surface (Shaw 1991). More nuanced investigation into the embodiment effects of assistive devices, such as identity, self-esteem, sense of power, self-confidence, and social engagement, has gained increased attention since the 1990s. For example, researchers Jeffrey Jutai and Hy Day (2002) have developed and validated the "Psychosocial Impact of Assistive Devices Scale (PIADS)," a 26-item scale addressing psychosocial aspects of experience which is structured for both caregivers and individuals with disabilities. Multiple researchers have utilized the scale and further adapted it for their particular interests or populations. Thus, work in the field of disability studies elucidates a second understanding of the body as central to identity and to social and emotional relationships in the world: the *body is embodied and relational*.

A discussion of the place of the body in the evolution of disability rights and the disability studies field would be remiss if it did not attend to the influential development of the Paralympics movement. In this context, the disabled body is re-defined as *skilled, professional, and capable*; yet, there is a tension in how this context may also reiterate prescribed norms and create idealized expectations for disabled bodies and all bodies. The following historical discussion traces the emergence of these expectations.

The roots of the Paralympics may be traced to 1948, when a doctor by the name of Sir Ludwig Guttman launched the "Stoke Mandeville Games" in Aylesbury, England as an outgrowth of his rehabilitative work with spinal cord injured World War 2 veterans (Howe 2008). Initially, these sporting developments were simply tools to be used to help injured veterans return to "normal" social lives and return to the workforce; however, the games began to develop competitive aims, heightening attention to the skillful prowess of these athletes with disabilities. The first Paralympic Games (para meaning "alongside"), meant to mirror the goals of the Olympic Games, was held in Rome in 1960, the next in Tokyo in 1964, and then Tel Aviv in 1968 (Howe 2008). The advent of the Paralympic Games being hosted in differing places of the world had beneficial forthcoming effects for heightening attention to disability needs. Both the visibility of disability was heightened and barriers were revealed. It became quite obvious that many facilities for housing and attending to these athletes were inaccessible. For example, in the first Paralympics in Rome, military personnel were recruited to carry the athletes up and down flights of stairs (Howe 2008, 20).

However, The Paralympics tended to promote the notion of a "super-abled" body, sometimes connoted and critiqued as a "supercrip"[15] image, which overly emphasizes disabled people as heroic and inspirational for "overcoming" their disability/impairment (Schalk 2016). The assertion is that the supercrip image further marginalizes individuals with disabilities by playing into the establishment of another "idealized form" to which

[15] For a more thorough understanding of the supercrip narrative and critique in disability studies scholarship see: Schalk 2016.

all disabled bodies should aspire (Howe 2011). The supercrip image can be found in extreme portrayals of wheelchair body building, paralleling similar fitness craze cultural trends rising in the 1970s and 1980s. These images perpetuate the athletic, controlled, muscularly toned body as the ideal.

Despite a possible negative supercrip image, the Paralympic emphasis fueled beneficial skill development and professionalism for disabled athletes while also bringing attention to environmental access barriers. Athletic aims caused increasing focus on skill accomplishment such as improved coordination, balance, power, and speed. At first, a significant focus was placed upon wheelchair athletes, but as the Paralympics grew, the types of disabilities became more inclusive (i.e., visual impairment) and the types of sports also grew (Vaillo 2014). Thus, more bodies of disability became legitimized as professional, skilled athletes and the Paralympics increasingly paralleled the Olympics in its scope, size, and structure. Disabled athletes' visibility in the Paralympic venue was an unprecedented means for bringing national/international awareness of disabled bodies into the public domain on a much larger scale. Disability studies benefitted from the heightened attention brought to disabled athletes' abled bodies and the forthcoming social/environmental barriers which were revealed regardless of the negative supercrip image which was also generated.

In conclusion, as elucidated in the preceding examples, what has emerged in disability studies over time through various influences are multiple understandings of the body, which may be summarized as: (1) The body is contingent, vulnerable, and in flux; (2) The body is embodied and relational; and (3) The body is skilled and capable. These

ideas of the material body are situated in a social model context of disability which identifies disability as a consequence of social and environmental ableist[16] structures. Reciprocally, these examples point to what the body is not or should not be. Disability studies has largely rejected notions of the body which celebrate competitive supercrip spectacles, promoting one form or one idea of sameness, to include invincible bodies, passive bodies, asexual bodies, either/or bodies, and idealized bodies such as the sleek and glamorous "dandy" (Kuppers 2002).

Additionally, while not addressed in my particular examples, disability studies has also more recently attended to the implications of gender, sex, and ethnicity in disabled bodies' experiences due to the influences of feminist, queer, and critical race studies. For instance, a black disabled woman is differently received and identifies differently than a white disabled man. Thus, the body is recognized as the site of multiple convergent identities and multi-layered social constructions. The next section draws attention to a fourth conceptualization of the body in disability studies concerning the impact of space as a site of power relations, to include the social processes which construct space. The socio-spatial body is important because it merges the concept of disability and impairment, which the social model in its strict interpretation separated, distancing the body from disability discourse. Both the socially constructed body and the material body are spatially influenced and effect spatial conditions and I further detail these notions of socio-space below.

[16] Ableism is a form of oppressive discrimination which dis-acknowledges the needs and concerns of disabled people and, instead, consistently privileges "able-bodied" norms.

Disability Studies and Bodies in Space

For philosophers, historians, geographers, social scientists, architects and others alike, attention to space is a means of knowing (Withers 2009). Fundamentally, knowing *where* things occur is viewed as critical to knowing how and why they occur. Space is viewed as inherently connected to the shaping of self-knowledge and identity. Spatial studies from a variety of disciplines assert that *how* and *who* a person (or people) is has to do with *where* he/she/they are. And, similarly, how, what, and why something is (e.g., objects, institutions, knowledge) has to do with its "where-ness." I use the term "whereness" to draw attention to multi-layered comprehensions of the spatial. "Where" is not simply a matter of a neutral, fixed, mapped, bounded location, but a product of social, cultural, and political interactions which variably fix, unfix, and mediate identities, communication, and societal experiences. The increasingly global compression and expansion of space, due in large part to technology, has heightened attention to the continually shifting spatial elements of human experience.

Many scholars have delineated differences between "space" and "place"; yet, there is a sense of lack of clarity about both terms' definitions. At times, they are used interchangeably, at other times they are intentionally separated, while at other times space is conceptually akin to definitions of place and vice versa. Scholars also seem to intentionally intermingle the concepts of the terms to create hybridized and overlapping meanings. Possibly because of the linguistic forms the terms naturally take, it is more intuitive to discuss "spatial" experience in various "places," and more difficult to discuss "platial" (a non-existent term) experiences in various spaces. Regardless of syntactic or

semantic causation, the “spatial” and the “platial” comingle with overlapping connotations.

Geography scholar Charles Withers notes the complexity of the two terms’ usages when he states: “Like space, its regular epistemic dancing partner in geographical ubiquity and metaphysical imprecision, place is a widespread yet complex term” (Withers 2009, 638). So, while the terms are used profusely to enact a catch-all associative meaning, the meanings are applied in notably varied ways. A prime example is De Certeau’s reference to space as “practiced place” (De Certeau 1984, 117). Place is viewed as more stable and space as less stable in De Certeau’s construction. Thus, space, in De Certeau’s concept, emerges as a contingent condition in context with the placed practices (of people and things) which shaped it. However, other scholars seem to view “place” more similarly to De Certeau’s conception of space. As stated by Withers: “Most often, place is taken to be the location of phenomena, a particular positioning in regard to that other larger epistemological referent, space” (2009, 657). However, geographer Doreen Massey creates a differing concept of place by suggesting that place operates across many spatial scales from the personal to the global. Places, then, in this view become a conglomeration of social, political, and economic relations “giving rise to a myriad spatialities” (Hubbard and Kitchin 2011, 7). Places are “relational and contingent” as well as “multiple, contested, fluid and uncertain” (7).

Withers explains the view of political geographer John Agnew regarding three fundamental aspects of place: place as location, place as locale, and the sense of place (Withers 2009). Location refers to the grid mapping references of longitudinal/latitudinal

positioning; locale refers to the "material setting for social relations, the actual morphometry of the environments (domestic, daily, and so on) in which people conduct their lives," while sense of place refers to the "affective attachment that people have to place" (Withers 2009, 640). Withers concludes that while there are a multitude of ideas of place in circulation, he asserts two main summative divisions: "the common sense metaphysical distinction of place as location, and the more nuanced notion of place as locale" (2009, 649).

Many scholars have increasingly examined both place/space as a means of "being in the world," borrowing from the concept of being proposed by and attributed to Martin Heidegger. This examination led to more in-depth analysis of the social and cultural elements as formative constructive processes in the shaping and defining of place/space. Place/space is examined as a site of meaning construction and a site of power relationships. While some scholars emphasize place/space as a process of becoming, others emphasize the physical attributes of place/space as defining, stable characteristics shaping the social. Thus, in the disability studies and disability geography literature, concepts of place, space, location, and locale overlap and, at times, may be equated together.

In the next section, I address how the "spatial," taken as a combination of place and space, informs and shapes disability studies, and how this combination adds another significant dimension to thinking about the body in disability studies. I explore the ways the disabled body, specifically as a socio-spatial body, confronts space and acts as an agent of socio-political change. The body does not simply exist in neutral spaces. Like

the body, spaces possess meaning in the way they are organized, utilized, and understood. Most prominently, the field of disability geography has brought the import of space to the fore, but, the topic is interdisciplinary in nature and researchers in sociology, environmental psychology, and architecture also theorize the effects of space upon people and people's effects upon space.

In sociologist Herbert Gans's article, "The Sociology of Space: A Use-Centered View" (2002), Gans discusses the field of "spatial sociology," currently re-emerging as a field of interest in sociology. He delineates "natural space" from "social space." Natural space is defined as "air over dirt," or "stuff," while social space is defined once people begin to use it and assign meanings to it (i.e., it becomes a place, a lot, a plot) (Gans 2002, 329). In spatial sociology, the focus is on studying how individuals and collectivities use, exchange, and transform space and what the effects and forces involved include. The author argues that individuals and collectivities shape natural and social space by how they use it, and that there is a reciprocal effect upon the individuals and collectivities in this process, particularly with social space.

Gans further emphasizes that research should focus upon the causal relationships between space and society. He asserts two inverse causal relationships: that natural and social space have causal power which induces social effects, and that individuals and collectivities exert causal power which induces effects upon both kinds of space. For instance, natural space may impact individuals and collectivities through tornadoes, landslides, flooding, or other natural disasters. Or, natural space may prompt certain effects due to its valuable subsurface material such as oil and precious metals. Likewise,

how individuals construct and make use of private and public spaces and how policy makers organize and construct those private and public spaces creates economic, emotional, psychological, and other social effects. Most importantly, in asserting these causal relationships, Gans urges one to consider questions of when, how, and why. In other words, when, how, and why do these spatial effects occur? Thus, the spatial becomes a lens and/or entry point from which to examine a more thorough series of effects. In most cases, the spatial is an intermediary, as Gans states, "space almost never has total and direct causal power" (2002). There is a network of relations of power and influence at work in conjunction with the spatial.

In reference to his article title, "a use-centered view," Gans defines "use" broadly as "how individuals live and work in space" and "what else they do to and with it" (2002, 330). He collapses the meanings of use value and exchange value, so that his application of the word "use" refers to "production and reproduction, buying and selling, speculation, allocation, distribution, competition, as well as control, exploitation, theft, and destruction of space" (330). For Gans, use equates to "everything that emplaced humans do as space users" (330). Categories/concerns of space discussed include: land use, land values, location, density, propinquity, public space, neighborhood effects, community models, and political economy.

Gans discusses the ways in which spatial use and organization define people's lifestyles in homes, etc. He describes the hierarchical ways in which office spaces are frequently delineated (e.g., large spaces with windows for executives) and calls for further research in this area by organizational sociologists. Reference is made to Henri

Lefebvre's work which used spatial analysis to critique capitalism. Gans describes the critique as outdated to some extent now, given the many different ways in which capitalism is operationalized in the global economy. Further, he urges a consideration of spatial use to account for the diversified nature of capitalist operations on multinational and global levels. The author concludes with a discussion of the power of space and spatial research and policy.

The section regarding the power of space is particularly pertinent to my research in emphasizing the mental and physical effects of space on people, including emotional and socio-economic consequences. While Gans does not specifically or explicitly engage with disabled bodies, his insights in regard to the spatial speak to processes of marginalization and power imbalances occurring within the context of spatial constructions and usages, with these concerns being highly relevant to disability studies. He also constructs a dual meaning for the spatial in terms of natural and socio-space. Socio-space, in particular, resonates with my research trajectory involving relationships between the body, the environment, and the assistive device discussed in Chapter V.

A further detailing of socio-space as it relates to disability is illuminated by sociologist Peter Freund in "Bodies, Disability and Spaces: The Social Model and Disabling Spatial Organisations" (2001). Freund expands theorization of the social model of disability to include socio-material space and responds to some criticisms of the social model in which it is portrayed as "disembodied." The critique leveraged by multiple scholars (e.g., Pinder 1995 and Hughes and Paterson 1997) is that the social model ignores the very real effects of an objective material impairment/bodily change in the

effort to focus upon disabling socio-political contexts and conditions. Countering this claim, Freund asserts that the social model very much attends to embodiment, with "bodies in space," being a central concern (Freund 2001, 689). For instance, focusing upon the inaccessibility of public transit systems for individuals with disabilities obviously attends to "bodies in space" and is an acknowledgement of, not a dismissal of, impairment. However, what Freund acknowledges and points to as a deficit in the social model is the fact that whilst *bodies* and *embodiment* are attended to broadly, "there is a need to look more closely at the material organization of everyday life (e.g., work places) and the spaces in which life activities are carried out (e.g., in public spaces)" (2001, 691).

The social model is accused of too tidy a separation of disability (socially constructed) from impairment (bio-medical reality) and risks a reductionist view in this sense. Freund is concerned with the social model, taking a closer look at what he terms "sociomaterial" spatial structures in conjunction with bodies. Similar to Gans's "socio-space," sociomaterial space is defined as: "the medium in which people act, intersect, move and locate themselves" (Freund 2001, 694). Thus, space is movement-based, not static or neutral, sculpted by interpersonal activity. Freund emphasizes the importance of looking at structures which can accommodate the widest range of bodies. He concludes: "By focusing on structures, one can move from asking what *bodies* can function in a particular context (or looking at 'needs' in the abstract) to asking what types of structures can accommodate the widest range of bodies" (2001, 691).

Freund's argument is predicated on the perspective that impairments and differences are *normal* conditions of humanity. He is more interested in finding shared

commonalities amongst bodies of difference as a means of addressing structural features of the environment, yet acknowledges the complexities and problems of "universalizing." Freund focuses his argument upon transport systems exploring, for instance, the socio-material spaces of car-privileged contexts, thus implicating issues of loss of agency and oppression for individuals with disabilities. Ultimately, the inaccessibility to space can lead the individual to feel a sense of alienation (Freund 2001, 698). For instance, participation in life activities is inhibited for those with visual impairment or epilepsy where car transport is a necessity and there are no other reasonable options (Freund 2001, 696). Individuals are also required to adapt to the fast-paced lifestyles which automobile use has promoted. The expectation for traversing space quickly is enforced through the way street traffic is spatially structured and managed:

> Poor pedestrian signals, short traffic lights, the designs of transport platform (e.g. roadways) *materialise* an organisation of space-time that favors the 'quickly' and the 'spry', and disables those who are not. While discourses about traffic accidents tend to shift attention to those who are the most vulnerable (the 'elderly', 'people with disabilities' and children), little attention is paid to the social organisation of space and time in which such populations must move. (Freund 2001, 697)

Further, Freund draws attention to the need for people to heighten their awareness of "the disabling properties of their world through the cognitive-sensual change of consciousness" (Freund 2001, 701). In other words, Freund highlights that there is a tendency for individuals (both those with and without disabilities) to deny (subconsciously) problematic/painful conditions and to not even consider other possibilities. People become accustomed to what is, not conceiving alternative forms of existence. By heightening one's awareness to the socio-spatial or socio-material

environment, the possibility for change and for new perspectives arises. Freund encourages a greater intention towards noticing and feeling the effects of an environment, thus becoming attuned to the spatial structures as a step towards empowerment and productive action. Freund asserts: "The experience of environments depends on one's existential-phenomenological stance to it, the organization of materiality, as well as one's sensual experience of it" (2001, 700). Additionally, he further articulates: "Whether or not a person is 'confined' to a wheelchair or finds the wheelchair just another transport modality (just as my eyeglasses do not 'confine' but enable me) similarly depends on spatio-temporal arrangements (2001, 691)."

Freund focuses upon the relativity of disability, emphasizing that we, as humans, are all only temporarily "abled" and these are, in large part, socio-spatial and temporally constructed conditions. Freund posits: "If people with an impairment are not automatically or 'naturally' disabled, it is also possible that those who are not impaired may be disabled in a particular temporal-spatial context (2001, 693)." This is a particularly interesting point because it flips the abled-disabled binary, reminding able-bodied individuals about the socially and spatially constructed nature of disability. For instance, consider an environment in which the language spoken is not one's own, or a situation where electricity is absent and there is no light available. In this instance, supposed "nondisabled" individuals experience disability. In the first case, there is a communication barrier preventing the individual's ability to function well in that specific environment. While, in the second case, the non-lit condition makes eyesight, a typically construed essential norm, irrelevant, and the person suddenly feels limited due to a lack

of ability to navigate the environment through sight. In this condition, the blind person would likely be more skilled, with the non-lit condition not significantly changing their normative functional experience.

Relevant to this point is an experience I had during a presentation by disability scholar and writer Georgina Kleege at the Society for Disability Studies conference.[17] I recall Kleege, who is blind, reminding the sighted people that we were visually "dependent" and, in fact, dependent upon "visual aids." She expressed that her showing of a PowerPoint during the presentation was simply an accommodation for the sighted people in the room. In this manner, she flipped the traditional abled-disabled binary; suddenly, the question of who in the room possessed a disability was called into question. As another example, consider an instance in which an individual of a shorter stature is in an environment built and anticipated for a taller height. The shorter person essentially is disabled in accomplishing tasks and going about daily routines effectively by a disabling feature of the socio-spatial environment. Thus, in concurrence with Freund's point, disability, when understood from a socio-spatial perspective, is an in-flux condition which may affect those both with and without an "impairment." Socio-spatiality provides a useful point of insight for teasing out the influences which produce disabling situations. In Chapter IV, I will discuss how this insight can be further elucidated in a dance context.

In tandem to the discussions of the impact of space in the lives of people with disabilities in sociological discourse, similar discussions are occurring at the intersection

[17] Society of Disability Studies Conference June 10-13, 2015, Atlanta, GA. Georgina Kleege, "Audio Description in the Museum: Who's Talking? Who's Listening?"

of disability studies and geography. In *Towards Enabling Geographies: Disabled Bodies and Minds in Society and Space*, Chouinard, Hall, and Wilton provide a brief summative history of the subdiscipline of disability geography and present a series of readings which engage with the "second wave" of geographical disability studies (2010). According to the authors, prior to the first wave, disability geography research fell into three basic categories: (1) "Medical geography," an epidemiological, positivist approach to tracing the incidence of disease/disability; (2) Mobility and access studies examining barriers in urban environments specifically and transport systems more generally; and (3) Mental health studies (with a medical approach) examining distribution of services and distribution of mental health illness (Chouinard, Hall, and Wilton 2010). Although it was clear that geography was indeed addressing disability, the critique leveraged by the first wave was that underlying structural and institutional barriers were unaddressed in these studies. The critique claimed that previous studies failed to address the disabling nature of the "socio-spatial environment" and focusing more on the impairment of the individual, thus supporting a medical model approach. Critique highlighted the need to focus upon both individual and broader social and spatial issues.

The first wave of disability geography studies began in the mid to late 1990s and focused upon the socio-political construction of disability within and through the built environment, as well as the disabled body and experiences of impairment in specific spaces. Researchers turned attention to "micro-geographies" of disabled individuals and the ways in which social and spatial relations (or "socio-spatial") produced disabling or enabling conditions (Chouinard, Hall, and Wilton 2010). Also, the first wave addressed

the way in which prior research had left out the voices of individuals with disability. This critique emerged in conjunction with the rise of disability activism occurring at the time, thus giving a louder voice and empowerment to those with disabilities. These concerns also were informed by postmodern discourse on the individual (subject/object), identity, and the body.

The second wave of disability geography studies is described as concerning itself with disability and space in a more "nuanced and complex" way. The second wave attends to similar concerns as the first wave, but in a deeper and broader way. The second wave concerns itself with four themes according to the authors:

> . . . a broadening of the meaning of disability to encompass other bodies and experiences; a deepening concern with the embodied experiences of disability and chronic illness; the possibilities and challenges of the increasing interaction between disabled people and technology; and, an interest in shaping policy agendas and the 'place' of disabled people in contemporary society. (Chouinard, Hall, and Wilton 2010, 3-4)

The "disablement process"[18] as a lens is mentioned several times as an approach in many of these studies. The scope of disabilities has broadened to include, fat, aging, and chronically ill people, as well as people of small stature, and people having intellectual impairment and emotional problems. The widening lens of disability is useful in extending understanding of socio-spatial disablement in different populations, but some scholars have voiced concern that a dilution effect may occur with regard to the political unity of the field.

[18] The disablement process refers to the process of becoming disabled, encompassing multiple aspects. See Albrecht, Seelman, and Bury 2001 for further description.

One chapter of the Chouinard, Hall, and Wilton text is titled, “Disability, Embodiment and the Meaning of the Home” (2010). This chapter is a useful example for pointing to the micro-level of socio-spatial effects in supporting or inhibiting a person’s mobility and sense of embodiment. In this chapter, author Rob Imrie addresses the physical layout of the home and its impact physically and mentally for individuals. The home is described as potentially evoking comfort, sense of self, and personal expression and/or being a source of isolation, oppression, or abuse. In terms of spatial design, Imrie highlights the privileging of certain bodies for the home with a lack of attention to impaired or ill bodies. For instance, most cupboard and counter heights are designed for the height of a standing individual (Chouinard, Hall, and Wilton 2010; Imrie 2004, 750). The participants in Imrie’s research also described heavy doors, window heights, and small spaces in general as incongruous to their sense of comfort and embodiment in their living space as wheelchair users. Even houses adapted more specifically for the individual were not complete in providing full access in the home. Imrie states: “For most respondents, living in the home is achieved by accepting, and adapting to, the standards of design that reflect the primacy of non-impaired bodies” (2004, 752). Ultimately, Imrie suggests that each part of the domestic environment can be considered a “body zone” for physical and mental bodily attending (e.g., grooming, dressing, eating, resting, etc.) (Chouinard, Hall, and Wilton 2010, 26). The spatial here is examined on a micro or local level as having psycho-emotional aspects effecting each individual’s sense of embodiment. In another chapter discussion of the Chouinard, Hall, and Wilton text, an example of the macro-level or more global aspect of space is discussed, providing a more

complete understanding of the broad spectrum of spatial influences upon bodies when thinking about mobility issues: where and how bodies are included or excluded.

Authors' Maddern and Stewart address "biometric geographies" (Chouinard, Hall, and Wilton 2010), in which the authors warn of the impact of implementing biometric technologies such as fingerprint capture, iris scanning, DNA matching, and facial recognition as knowledge determinants functioning to mobilize or immobilize certain groups. Of particular concern, is the impact to those with disabilities regarding these biometric tools of surveillance and classifiers of worth. According to Maddern and Stewart, the accelerated intentionality to use biometric classifiers occurred amongst policy actors in the US and the European Union after the terrorist attack of 9/11/2001. The authors suggest that, "Biometrics can be regarded as an important tool used to include or exclude individuals from the nation's polity and citizenship" (Chouinard, Hall, and Wilton 2010, 242). The scope of the argument is specific to UK policy and practice in regard to immigration and disability rights, but may be expansively applied to many other governmental systems of practice which are employing biometrics as determinants of acceptable citizenship, thus allowing access to certain goods and services. The authors warn of "inherent design assumptions" embedded in the development of biometric technologies, noting the lack of disabled people involved in the testing process. In their research, they expose the fallibility of these technologies and show some of the ways that disabled people could be marginalized. There were issues in which a disabled person could not adequately adapt to the position a particular machine required, or the lack of

accuracy for facial recognition in elderly and other populations diverting from normative expectations (Chouinard, Hall, and Wilton 2010, 247).

> The design of biometric technologies appears to be premised on the notion of a widely applicable image of a white, able-bodied, masculine body. Bodily conceptions of fit and healthy bodies dominate the assumptions of biometric technologies. As such, if bodies fail to conform to this image, then this disrupts the system. Indeed, fluidity and temporal changes create particular challenges for biometric systems. (Chouinard, Hall, and Wilton 2010, 247)

The spatial in this example refers largely to mobility and access issues on macro scales and, as relevant to my research, points out the ways in which the design of technology should be questioned for how it excludes or includes bodies of disability and difference. I will pursue further research into technology design and its implications for bodies of disability in Chapter V.

These scholarly discourses in disability geography provide insight into the impact of the body in space, and the impact of space upon the body on both micro and macro levels. Additionally, the discourse points frequently to the notion of design, to include: what perspectives are influencing societal and policy design and, therefore, what occurs in terms of spatial disablement or enablement. In Imrie's analysis of the design of the home, the body's more immediate personal space, and the emotional meanings it conveys, suggests the micro-level impact of space. Contrastingly, Maddern and Stewart address space on a more global scale, considering how groups of disabled individuals may be marginalized by the design of technological identification practices, thus effecting their mobility in the world and their ability to partake in national citizenship.

Now, I would like to examine more directly the theoretical in action by combining the notions of the body presented in the previous section, with the notions of the socio-

spatial presented in this section, attending to both micro (i.e., individual bodily experiences) and macro-level effects (i.e., broader political and policy implications). How does conceiving of the disabled body, specifically as a socio-spatial, vulnerable, contingent, embodied, and capable body, apply in lived examples and manifest beneficial socio-political change towards further equality? What historical examples might serve as model examples for what this body produces? In the history of disability rights, the disabled body in space has been used effectively as an agent of change to combat status quo structures. I now turn to these concrete examples of activism as a means of fleshing out the previously described conceptual ideas of bodies and space in the literature. Additionally, I draw from the area of dance studies to guide my exploration/analysis.

Bodies in Space as Acts of Protest, Agents of Change

Susan Foster's intention in "Choreographies of Protest" is to re-affirm and endorse the significance of the body's role in the act of protest. Foster argues for considering the body as "an articulate signifying agent" and seriously acknowledges the "tactics implemented in the protest itself" (Foster 2003, 396). Foster focuses on three specific historical protest examples in U.S. history to mobilize her argument: the lunch counter sit-ins (1960s), the ACT-UP die-ins of the late 1980s, and the World Trade Organization meetings protest in Seattle, Washington (1999). Her rationale for these choices is that all three "share a recalcitrant physicality" and implement "a tactics of non-violent direct action" (Foster 2003, 396). Her intent is to reconstruct these events, not to read them *as* dances, but to address them on their own terms regarding motivation and intent as political protests. However, she uses a dance scholarship lens to analyze the

events, attuning to the presence and utilization of bodies. She presents a series of questions from a dance scholar perspective which fuel her analysis of what bodies do and what they produce/signify in the act of protest. Her intent is also to relate these critical body-based observations to the issue of individual agency and sociality, thereby inserting a dance studies approach into sociological theory and discourse. Aligning with dramaturgical analyst Baz Kershaw's views of protest, Foster clarifies that her aim is to reverse the perception that protest is wild and spontaneous without form or technique. Rather, she asserts that the costuming, chanting, and gestures in the three protest examples she addresses all employ a "techniques of the body" (Foster 2003, 408).

Following Foster's model of analysis, I apply a similar mode of inquiry and methodological approach in pursuing an analysis of several disability rights protests in the U.S. My analysis will reflect Foster's analysis of protest in several ways: (1) I adopt a shared and similar intention, applying a dance scholar lens which emphasizes bodily significance; (2) I utilize non-violent direct action protest examples from similar time periods in the U.S. having similar characteristics of bodily intervention to Foster's civil rights examples; and (3) I proceed, methodologically, with a historical reconstruction of these events. I also embrace Foster's notion of political protests which utilize a "techniques of the body," as I survey these disability rights protests. I follow a similar line of inquiry as Foster in this discussion asking: "What are these bodies [in space] doing?; What and how do their motions signify?; What choreography whether spontaneous or pre-determined, do they enact?; What kind of significance and impact does the collection of bodies make in the midst of its social surround?" (Foster 2003,

397). In this analysis, I focus on two disability rights activism examples: the two-day ADAPT protests against Denver's Regional Transportation District (RTD) on July 5, 1975, challenging the physical accessibility of buses, and the DPN or "Deaf President Now" protests at Gallaudet University in 1988, challenging the election of a hearing President rather than a deaf President of the University.

All Aboard, We Will Ride, and Lifts on Hounds[19]

> On July 5, 1975, the "Gang of Nineteen" staged a two-day protest. They blocked off the intersection of Colfax and Broadway, the busiest intersection in downtown Denver, blocking buses with their bodies, and getting out of their wheelchairs and lying in the street. That was the "shot heard round the world" and people with disabilities in other cities wanted to learn how to do direct action to bring about change. (Cameron 2009)

In the Denver bus protests against the Regional Transportation District (RTD), nineteen wheelchair users place themselves in front and back of buses – their differently-abled vulnerable, yet empowered, bodies speaking loudly against the status quo which has immobilized them. Some users even get out of their chairs and lay their bodies underneath the bus (Cameron 2009). Here, they confront the power of a massive machine – ultimately, a socio-political legislative machine which has the goal of transporting and permitting certain bodies to travel through space. These bodies of protest re-configure spatial ownership, challenging the rules by which bodies are permitted to own space. They, in fact, completely reverse the mobility issue, immobilizing others with their bodies and enacting the very thing they wish to change with their physical presence,

[19] In a similar act of protest to the Denver bus protests, wheelchair users in St. Louis, Missouri sat in front of buses using these thematic phrases on signs: "All Aboard," "We will Ride," and "Lifts on Hounds" to protest the inaccessibility of buses. http://www.actionforaccess.mohistory.org/photo_protests2.php

while directly situating others in their experience. Tactfully brilliant, this bodily enactment simultaneously re-situates mobile bodies in the position of immobility to draw attention to the significance of the spatial access issue while creating space for the wheelchair user in the most poignant of ways: the disabled body is literally positioned as a matter of life and death. The socio-spatial aspect of the body is foregrounded, with the vulnerability (massive machine aligned with bodily fragility and proximity of bodily placement to massive machine) and contingent (unpredictable) aspects of the body implicated as well. The fact that many of the protestors sat in their chairs to block the bus also speaks to the embodiment component: they demonstrate quite clearly that their chair is an integral part of them, of their identity, and therefore should be acknowledged. Additionally, the fact that the body became positioned so prominently as a tool for the protest heightened attention to the material body as a meaningful part of existence, central to quality of life experience.

The issue these bodies are literally confronting head-on as they sit motionless in the street, illuminated by headlights, is the inaccessibility of city buses. Their goal is to see wheelchair accessible lifts on buses enforced through legislation. The bus driver (and by extension all observers) is presented with two choices: drive forward and commit murder by obliterating these bodies OR stop. The moral dilemma these bodies suggest is dramatically empowering because it implicates the RTD's responsibility in not only a mobile access issue but, more severely, in a negotiation of life and death. The protestors' bodily message to policy makers and society in general becomes: you are killing and disabling us. Every roll forward of the bus implicates the erasure of the wheelchair user

as it claims space – without them. Their bodies aren't allowed access. Only certain bodies get to move and claim space in society. The protestors with their chair-bodies and differently-abled bodies reveal the inequality of societal access in the way they intercept and re-claim space. As the protest unfolds in front of media, policy makers, and abled bodies, each is challenged to a moral decision of what their own acts enable or disable, mobilize or immobilize. All observers of this protest scene participate vicariously in a similar moral/ethical confrontation. The power imbalance and contrast is so clearly presented and demonstrated in this act of protest as the "disabled" human body in a small rolling wheelchair sits directly in front of a massive, roaring, rolling device. The disproportionate kinetic power of the image is so striking that it heightens attention to the absurdity that such a condition even exists.

The disability rights movement, modeled after the black civil rights movement and women's movement, began as a broad collective effort to resist the oppressive isolation, dependency, and stigma associated with disability (Scotch 1989). As part of the disability rights movements which began in the U.S. in the 1960s, the Denver bus protest in 1975 spawned an entire series of bus protests across the country of similar demonstrations, finally leading to legislative change to ensure accessible lifts on city buses (although the issue still persists and still needs consistent enforcement) (Cameron 2009). The bus protestors of 1975, and later similar protestors, use their differently-abled bodies in strategic positions as the means of resistance to enact change. In addition to these bodily acts, chanting and signage (such as "we will ride") was also used to affect the view of policy makers.

One disadvantage that disability activists have often encountered is that they are socially dispersed, which weakens their unified, collective power (Scotch 1989). Often wheelchair users live or are housed amongst other able-bodied family members, etc., and they are a minority group. The power in the bus protests was also in the number of wheeling bodies who participated and were seen as a larger, collective group of bodies in space. The collective force the protestors demonstrated and the beneficial outcome of the protest implicates that these bodies are indeed also capable bodies.

Deaf Bodies are Heard: Deaf President Now (DPN) Protests at Gallaudet University

> On the morning of Monday, March 7, 1988 students blocked each of the entrances to Gallaudet University with their cars and locked the university gates with chains. At about dawn, students had driven their cars to campus and deflated their cars' tires. Students kept the main entrance to the university on Florida Avenue open and formed a "human shield" to selectively permit entry to other students, faculty, and staff members. In response, the university administration cancelled classes. As a result, students and staff were able to attend meetings and organize rallies that took place throughout the day. (Kim 2012)

In the DPN protests at Gallaudet University, deaf bodies speak loudly. The protest was initiated when news of the election of a hearing president, Dr. Elizabeth Zinser, was released to the campus. Gallaudet University is the only institution of higher education focused intentionally on education of deaf and hard-of-hearing students in all programming and services; however, up until this point only hearing presidents had served the University. The protest ignited because leading up to the election there had been much advocacy and momentum for electing a deaf president, and many expected this to occur. Two of the three finalists for the position were deaf (Gallaudet University 2016). The irony is that in this instance, the deafness associated with these bodies became

a leveraging position in the protest. When police came to intervene in the protests the communication difficulties they encountered prevented a simple, efficient control of these bodies by law enforcement. The power roles reversed in this instance allowing the deaf activists to gain the upper hand and accomplish their mission. It was the hearing individuals who were less empowered – unable to use their verbal communication tools to enforce their power, they became disempowered, and the deaf bodies marched on with their message, subverting the notion of these bodies as limited, docile, or having a "less than" status in society. This protest unified students, staff, and faculty alike, invoking a collective power alliance. The collective action of these bodies signified a multi-layered alliance, a larger strength. The protest pivoted around four basic demands: (1) The resignation of Dr. Elizabeth Zinser and the selection of a deaf person as president; (2) the immediate resignation of Jane Bassett Spilman, chair of the Board of Trustees; (3) the reconstitution of the Board of Trustees with a 51% majority of deaf members (at the time, it was composed of 17 hearing members and 4 Deaf members); and (4) a guarantee that there would be no reprisals against any students or employees involved in the protest (Gallaudet University 2016).

In this protest, entrances to the campus were blocked by the protesters, preventing access to the campus, and thereby successfully shutting down the school's operation. One physical strategy or "techniques of the body" involved protestors forming a human chain and linking arms to create a barrier to school entranceways. The tires of buses and cars were deflated and placed at entrances as well. These barricades and blockades caused and formed by bodies and deflated machines assert an ultimate power to control the inner

workings of the institution and successfully halt its operations. These socio-spatial bodily acts are able to directly impact who the students want to reach: upper administration. Symbolically, not only do their chain-linked body barricades assert power over the school's operation and enforce collective strength, the deflated cars and buses signify the protestors' control to deflate/disempower the administration. Similar to the wheelchair intervention, the collective action of these bodies effectively reversed the power roles of the institution, which oppressed their very identity as deaf individuals.

In another example of an impactful bodily barrier intervention, a deaf faculty member literally intercepts the introduction of the new President by spontaneously cutting across the stage and announcing that protest demands had not been met. This resistive action of a single body catalyzes the next action of multiple bodies who proceed to exit the auditorium and march on to the U.S. Capitol. One description of this event states: "While D.C. police tried to stop the deaf students, they were unable to do so because they were unable to communicate with them" (Kim 2012).

Here again, the supposed disability becomes a point of empowerment and capability in the protest, enabling the protestors to move forward, while intriguingly disabling the "abled" norm. These bodies demonstrate their unwillingness to participate in the installment of the new President by exiting the auditorium. The message these bodies communicate to the upper administration is absence/vacancy and the stakes are high. The protestors' message is clear: we control the institution and there will be no institution unless the protest demands are met. The absence of bodies filing out of the auditorium and the absence of bodies at the school signifies no school, no President, no

administration. The protestors threaten the very viability of the school's continuation and future. Their bodies produce blockages and barricades to literally prevent any further actions by upper administration, specifically the installment of the new President. The actions of the protestors also assert agency in this manner as the students demonstrate ownership over the school and claim: this is "our" school not "yours."

These bodily acts of protest proved successful as the Board overturned the decision to hire the hearing President and instead installed the first deaf President of Gallaudet. The protestors continued with three other demands which similarly involved advocating for deaf representation for the school, which also were met after a week of protest. In both protest examples, bodies and machines are used as boundary demarcations; thus, re-claiming space literally and figuratively. In both protests, collective bodies figure prominently to enable the power of the protest. Both protests challenge existing power structures in which they are marginalized, but the DPN protestors more directly fight to protect and affirm their (collective) identity, as signified in the "human shield" and barricade acts, while the bus protestors directly fight to mobilize their agency, as signified by their spatial interception in the street immobilizing otherwise mobile vehicles and inserting their bodies in the transit system. The spatial bodily acts in both protests help to flip the existing power structures. These vulnerable bodies become collective representations of contingent and in flux, changing conditions. In fact, in the context of the protest, these bodies herald the "body" of society to change.

Conclusion

The protest examples of disability activism yield yet another significant dimension for thinking about the disabled body. The disabled body is radically challenging and resistive to societal norms; as such, it is a "teaching" body, a place for the cultural confrontation of mortality, illness, fears, and contingency. Like the apparent aim of the film, *The Elephant Man*, society is challenged to wrestle with their perceptions and their own complex bodily identities when presented with Merrick's disfigured, non-normative body. This radically challenging body also can be seen as a catalyst which prompts societal innovation in the form of new structures and new technologies (e.g., bus lifts, curb cuts, ramps, text to speech software). It ignites the opportunity for new solutions and spearheads creative modes of thought. In this way, the disabled body is positioned to lead innovative thinking and outcomes. It also implicates that the difference of bodies be more strongly attended to in productive, beneficial ways rather than ignoring the significance of bodily experiences. In summation, the conceptualization of the body within disability studies over time may be understood as a socio-spatial, embodied, contingent, vulnerable, capable, and radically challenging body positioned to subvert the existing status quo to the creative benefit of society as a whole. In the next chapter, I will explore how this body conceptualization intersects with the context and scholarship of dance practice, and what insights may be gleaned from their interplay.

CHAPTER IV

DANCE AND DISABILITY: THE RECIPROCAL PUSH

Introduction

In the previous chapter, I asserted that the conceptualization of the body in disability studies produces a socio-spatial, embodied, contingent, vulnerable, capable/skilled body positioned to radically subvert the existing status quo to the creative benefit of society. In this chapter, I probe the nature of this radical subversion by asking what occurs when disability studies, and the bodily concepts therein, intersect with dance practice. Broadly, I consider the bi-directional effect, or "reciprocal push" of disability upon dance and dance upon disability, within a Western context. For instance, I consider how some of the bodily concepts covered in Chapter III interact with traditions within the professional field of dance, in particular the traditions of Western concert dance. While some areas in the professional dance field of Western concert dance have become more flexible in the acceptance of multiple body types and ability differences, there is a long way to go towards truly incorporating a spectrum of disabled bodies in mainstream dance opportunities at pre-professional and professional levels (Aujla and Redding 2014).

There are a variety of reasons for the minimal presence of disabled bodies in mainstream professional dance, including attitudinal barriers, lack of awareness of the need for accessible practices by traditional or mainstream dance professionals, and adequate training access and training preparation for teachers and choreographers (Aujla and Redding 2014). As evidence of this point, consider the missing presence of students

with disabilities graduating from BFA dance programs in the U.S., and the missing presence of dancers with disabilities in mainstream dance companies (not just those delineated as "integrated" dance companies). Disability appears to be following a similar trajectory as race within the Western concert dance tradition. Black bodies were historically absent from mainstream dance for a variety of reasons. Companies such as Dance Theatre of Harlem formed to explicitly include and prominently represent black bodies.[20] In a parallel manner, physically integrated dance companies formed to explicitly include and invite bodies of disability onto the professional dance stage of Western concert dance. Thus, disability has pushed and is pushing traditions of dance into new territories of practice.

Similarly, the dance context is pushing disability into new terrains, bringing the body to the forefront and heightening the visibility of disabled bodies. Two areas of reciprocal convergence between dance and disability are embodiment and socio-spatiality. As disability studies draws attention to the embodied disabled body in social space and the effects therein, the corporeal nature of dance and the way bodies interact together in space to manifest meaning and co-create knowledge exponentially heightens attention to this embodied, socio-spatial body. By fleshing out several areas of convergence and divergence in the dance and disability duet, I offer a means for understanding how their duet creates a radical and revisionist space, impacting both the dance and disability fields in positive ways.

[20] For further information see: Thomas DeFrantz's essay (2012), "Dance Theatre of Harlem: A Classical Ballet Company." http://www.danceheritage.org/treasures/dth_essay_defrantz.pdf

Before delving into the specific bodily conceptions dance and disability converge and/or diverge upon, I feel it important to first discuss the backdrop, the cultural context which frames and informs their intersection. It is important to understand that the occurrence of integrated/inclusive dance in the professional Western concert dance arena did not happen seamlessly without resistance. It required a great deal of persistent effort by pioneers in the field and it continues to necessitate barrier breaking and unwavering determination, thus, pushing against an ideology of "sameness." I will detail this ideological frame through several examples in the following section to facilitate a more thorough understanding of why the union of dance and disability is radically subversive.

Backdrop

Historically, disability has always pushed against cultural norms, provoking the opportunity for societal change. When disabled bodies began entering the conventional spaces of professional dance practice, the culture of dance was also challenged to revise its established norms (Albright 2010; McGrath 2012). This friction, I believe, is ultimately and creatively productive for the dance field. When bodies are compared by the same rigid measures, rather than valued in their differences, the conception of worth is narrowly defined and understood; the ability to make change is stifled. However, disabled bodies fundamentally challenge the accepted value of "saming," or measuring the body's worth by a common rule or standard.

Traditionally, the Western dance context (specifically ballet) has promoted notions of a finely controlled body with particular norms of appearance: thin, long-limbed, white, and with full limb/joint functionality. The idea of a dancer with no legs,

with paralysis of any type, or with any kind of physical/mental impairment, is still largely understood as an oxymoron. Although changes have occurred in the dance field in which alternate views are introduced, traditional perspectives embedded in saming persist (Aujla and Redding 2014; Whatley 2007). As a point of fact, I was directly told the following at a professional dance conference in 2014: "People in wheelchairs don't dance." I found the statement rather shocking, of course, as I have been working in the integrated/inclusive dance field for fifteen years and professional companies with dancers using wheelchairs have been active since the 1980s.

Throughout my research explorations, I found that there is often a societal difficulty with how the notion of uniqueness is accepted or how space is made for an individual uniqueness to develop. Instead, saming is once again the prevailing paradigm. In the following, I now look more closely at how I use this saming term in the dissertation. There is often a drive to measure aspects of sameness, to quantify sameness, to play the socio-political game of saming even in supposed climates of diversity. For the purposes of my argument in this chapter, I refer to saming as the act or desire to establish identical markers of worth and sameness as the state or quality of those established identical markers of worth. The concept is similar to what has been termed "ableism," a term that has come to mean certain "able-bodied" cognitive and physical standards/expectations which disavow the differences of disabled people (Zitomer and Reid 2011). But, my conception of saming is broader than ableism. Saming runs deeper than discriminating only against people with disabilities. I am referring to a type of discrimination rejecting any difference outside of accepted norms or accepted practices,

thus creating oppressive conditions for all people. This leveling practice can become so ingrained in a society that the ability to operate in any other way than what is considered normal is portrayed as harmful to the culture's traditional values. I contend that disability shatters this problematic paradigm incisively and, further, when effectively paired with dance, keenly disrupts traditional, expected norms through visual and kinesthetic potency.

To support these previous statements, I highlight the "Same and Other" discourses, which grapple with the issue of difference as perceived in the "Other." These ideas are fundamental to the scholarship of Emmanuel Levinas, Edward Said, Michel Foucault, and Gilles Deleuze. In this chapter, I will not pursue a review of these discourses; however, I do offer these philosophers' insights as important to how tensions surrounding saming and its corresponding partner "othering" are not new to the realm of scholarship. In the following sections, I will detail the notion of sameness through several contemporary performative examples and investigate how disability radically intercedes in these specific contexts. Additionally, using this premise of saming as a tethering point, I delve into the ways disability similarly challenged values embedded in traditional dance to shift to new values within the field of integrated dance.

Disability: De-stabilizing the Saming Trend

Mainstream beauty pageants (i.e., Miss Universe, Miss America) accept contestants on the basis of visual standards which ascribe to certain bodily dimensions and specific bodily expectations. Judges are then chosen who clearly know how to evaluate appropriate dimensions according to narrow rubrics of assessment. In looking at

the contestants and winners from a Miss America or Miss Universe pageant, for instance, it is clear that there is a strict uniformity of bodies: bodily shapes, heights, and dimensions appear the same and, in some cases, skin color still remains notably white.[21] Thighs and breasts should meet particular standard sizes and shapes, speech content and style should adhere to the prescribed continuum of sameness, and so on and so forth.

Jane Comfort's choreographic work, "Beauty" (2012),[22] provides a useful commentary on the saming trend she senses as ingrained in American/Western culture. Comfort troubles competition frames of saming and plays with how they can be used to determine certain measures of human worth and human capacity. Comfort's work implies that The Beauty Crown, The Gold Medal, or The Trophy all exist as hyperbolic and extremist symbols for how human value is discerned. Comfort uses the well-known Barbie image as her point of entry to display female specimens as objects of sameness in a beauty pageant context. At the end of the work, she invokes the audience to take part in the ultimate judging of the five women who have been paraded on stage in differing ways that highlight their measure of sameness. At the same time, Comfort intermittently reveals unique qualities in each dancer/woman troubling any measures of sameness, such as utilizing women of color in the piece, challenging the typical racial sameness (white) Barbie traditionally embodied. Throughout the piece, Comfort does an ingenious job of transporting the audience into the warped mindset of sameness. The audience is cued to

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[21] As a point of fact, the Miss America pageant used to require contestants to be of the white race. See: "Miss America, National Identity, and the Identity Politics of Whiteness" by Sarah Banet-Weiser in *There She Is, Miss America, The Politics of Sex Beauty and Race in America's Most Famous Pageant* (2004), editors Elwood Watson and Darcy Martin.

[22] I am referencing a live performance of this work at Hillsborough Community College, Ybor Campus Mainstage Theatre January 18, 2013.

look in particular visual ways, to measure in particular ways common to current media trends and beauty pageant structures. In a compelling and disturbing way, the audience is invited to be the final judge of beauty, writing their choice for Barbie 1, 2, 3, 4, or 5 on a slip of paper and turning it into the announcer on stage at the end of the piece.

In the audience of which I was a part, the choice made after all papers were tabulated was also the closest "Barbie" image selection. As explicated in the post-performance discussion at the end of the show, in rare cases, an audience member will write something else on the paper like "all of them" or write nothing. Even more alarming was that the audience of which I was part was seemingly comprised of arts-oriented individuals, assumingly with more perceptive eyes.[23] After watching and participating in Comfort's cultural experiment, I sensed even more strongly that individuals can be influenced to see beauty with a particular lens and make a judgment call based on that lens, regardless of whether they actually ascribe to that lens. During the course of Comfort's dance, I even found myself seduced into the arena of judgment, unwillingly lured into the frame, into a visual mirage of predetermined value, thereby partially deceived into believing value lives in this saming frame.

Disability, in its variable complexity, its situation of flux, its defiant demand to be acknowledged uniquely, lives in a different frame from Comfort's Barbies. In fact, the very notion of disability defies the act of saming. It renders this act of saming obsolete. And in so doing, disability can also stimulate and spur technological innovation and

[23] The performance was hosted as part of a dance program season at a local college. I am a part of this dance community and have been a part of it for 40 years. Therefore, to some extent, I am able to make an educated guess as to the demographic of the audience.

imagination, re-interpret and re-imagine the design of the social and built environments, and force a recognition of and a reckoning with perceived limits, thus, producing possibilities from what are defined impossibilities constructed from the precepts of sameness. Within this re-imaging process, the existence of disability becomes useful as a cultural intervention/invitation. Why would this intervention be desirable?

Let's, for a moment, imagine Comfort's five Barbies on stage, but let's add a sixth one, a woman without legs who uses a wheelchair. This insertion radically alters an easy interpretation of the scenario. It displaces the lens, or perhaps simply neutralizes it, leaving the audience grasping for what and how to measure. The saming rubric, which could be so consistently mapped onto each woman, is rendered ineffectual. How does one compare legs where there are no legs? And what about the bodily extension to the scene, the rolling chair? How is it judged? The wheelchair user in this portrayal, as a symbol of disability, may also evoke conflicted feelings from the viewer, including fear/anxiety, judgment, empathy, pity, guilt, curiosity, revulsion, etc. (Davis 2013; Siebers 2003). Whatever the feelings evoked, the observer would likely be brought out of his/her current frame of understanding the rules of the saming game. Disability then is a game changer.

Beyond Comfort's dance portrayal of the saming trend in American culture through the traditional Barbie icon and the beauty pageant context, the saming trend can be identified in another regularly occurring performative event: high level competitive sports, most prominently, the Olympics. Olympic sport competitions have evolved with such specificity in the finely minced comparative expectations that individual differences simply do not have a place. Pressure upon the athletes to meet greater and greater

expectations as prescribed by extremely narrow measures has resulted in unhealthy drug use and other unhealthy behaviors (Corrigan and Kazlauskas 2003). Intriguingly, resisting this context of sameness, the Paralympics were developed as a partner to the Olympics and DO encompass a diversity of bodies performing sport activities in rigorous, yet different ways. However, in the history of the Paralympic movement, an interesting tension surrounding sameness has developed in the transition moving from a participatory focus to a focus upon athletic excellence in a competitive frame. In the effort to aspire to similar status as the Olympic Games, the Paralympics have sought to classify and quantify their differently-abled athletes into samed, competitive categories, to exert comparative measures (Howe 2008; Jones and Howe 2005). Perhaps the struggle in this now highly-competitive venue best represents the absurdity of the act of saming. Ironically, because the very nature of disability and difference resists acts of saming, the Paralympic committee has encountered classification problems, and many times they have had difficulty finding enough athletes to compete and fit within each category they created (e.g., single amputee, double amputee, below or above knee, etc.) (Howe and Jones 2006). The nature of disability, in its broad spectrum of uniqueness, is not as easily conducive to saming practices.

Oscar Pistorius, the famed South African differently-abled athlete, has incited an entire host of discourse surrounding his unique abilities and use of technology, which resist current classifications and saming practices in Paralympic and Olympic venues (Burkett, McNamee, and Potthast 2011; Howe 2008). Pistorius is a double below the knee amputee who utilized sophisticated lower leg prosthetic devices which some

claimed gave him an unfair running advantage. In the Paralympics, arguments ensued about his having an unfair advantage due to not only his presumed technological edge, but his competing against below the knee single-leg amputees (double amputees with amputations below the knee are known to have an easier means of finding equal balance than single leg amputees). In the typically-bodied Olympics, similar arguments arose with his use of technology being questioned as an inequitable advantage (Burkett, McNamee, and Potthast 2011). Pistorius and others like him threaten an existing ideology, obliterating the ability to easily compare bodies on levels of sameness, and prompting a culture to learn to see and, thus, act differently. By pointing out these examples, I am not suggesting that there should not be standards or expectations within sport and dance domains which celebrate athletic and artistic rigor and excellence. However, I am suggesting that the way those standards or expectations are determined and implemented should be closely examined for where value is being placed and why.

In dance, the regime of classical ballet is perhaps most at fault for the exaggerated idealization of one bodily form and the rigid adherence to one movement style/technique as the defining pinnacle of dance and dancer (Benn and Walters 2001). Ironically, ballet, in its often-harsh expectations for bodies and unhealthy training practices, has produced entire generations of dancers with disabilities. Acute or chronic injury conditions due to the intense expectations of balletic practice have relegated dancers to the sidelines and abruptly shortened dancers' careers (Gamboa et al. 2008). Few bodies can withstand the physical demands ballet places on the body for any significant length of time (Turner and Wainwright 2003; Valentino et al. 2001). Many dancers incur short or long-term

disabilities and, generally, performance or choreographic alternatives and revisions are not considered as a means of addressing the dancer's injury limitation. Instead, the dancer is replaced. Thus, within the dance genre, ballet practice is perhaps the most de-stabilized and subverted by bodies of disability entering the professional dance scene and threatening a powerful regime of tradition. However, I suggest that the ballet genre could be the most invigorated, the most altered for the better, and the most creatively and technically challenged to embrace bodies of disability in order to re-evaluate and further re-imagine its teaching and training practices.

In Western dance trends, the perpetuation of sameness is also evident in the rising popularity of most pre-professional and professional dance competitions, where extreme leg heights, split-leaps, and other acrobatic feats are idealized and privileged over any other aspects of performance (Morris 2008). A common lens is mapped onto each performer. Rarely, if ever, is a disabled body or a body departing from the visual norm, seen in this type of venue. A regressive trend has occurred in some of the professional arenas of dance in which a prescribed type of technical virtuosity in the form of increasing leg heights, number of pirouettes, deeper backbends, and higher, more complex jumps as well as inhuman speeds are prized above anything else (Guarino 2015). Individuality, artistry, and creativity are diminished in importance in favor of more objective comparative rubrics of bodily form and technical skill (Guarino 2015). The "bigger, better, faster, more" cliché so often a part of American culture, seems to have infected much of the competitive dance scene genre. Dance scholar Geraldine Morris describes the lack of acknowledgment of difference within the ballet competition

frame and the emphasis upon technical accuracy rather than individual artistry when she proclaims:

> The dance movement, as danced by the candidates, lacks subtle nuances, there is no attempt to play with the music, every arabesque is somewhere in the region of 180 degrees and, every jump is big. As a result, the performances appear remarkably similar to each other. There is no difference between one dance and another, despite coming from different ballets and, after four or five repetitions of the same dance, the performances become monotonous. Having watched the competitors for three days, it became apparent that performers lacked a sense of individuality and even identity. (2008)

Additionally, in speaking with a dance faculty colleague who also owns and operates her own dance studio, she described the unhealthy pressures and tensions which eclipsed the studio atmosphere when the studio began regularly entering the Youth America Grand Prix competitions, a ballet-focused competition. Due to the level of angst generated amongst students and parents, fueled by the competitive extremism, she discontinued major participation in the event. While there may be some benefits to this type of competitive dance context, there are also potentially severe repercussions, especially for young dancers (Brandfonbrener 2004; Robson 2004). The broader spectrum of dance artistry has become secondary to the emphasis upon certain measured bodily feats, and this is where dancers with disabilities, who are differently-bodied, can provide a healthy intervention to balance tendencies towards extremism and myopic comparative trends in some dance practices, such as the dance competition landscape.

These aforementioned performative acts exist within and perpetuate an ideology of sameness in which bodies are competitively judged during a singular event in time. In these acts samed attributes are scrutinized meticulously in comparison with other bodies and often serve as representative measures of the participants' value as human beings.

Further, these grandiose celebrations of sameness lure the audience to participate in the saming game under the cloak of dramatic emotional moments, which are used to appear deeply meaningful, yet lack true depth. The moment the beauty queen is crowned, or the moment the athlete wins the gold by a nanosecond, or the moment the dancer performs one more fouetté and throws the leg past 180 degrees above the head; these measures of worth are explicitly disrupted when disability enters the arena. Disability causes us to re-negotiate value and re-formulate how we see. Therefore, disability perhaps even more so than race or gender, radically challenges the ideologies embedded within the acts and quality of sameness, as it constantly presents difference as unique, non-categorizable, and in flux. Having explored the premise of saming as an underlying construct evidenced in a variety of cultural contexts, including certain dance practices, through which both dance and disability have had to navigate, I now return explicitly to several conceptions of the disabled body expressed in the previous chapter: A body that is capable/skilled, socio-spatial, embodied, contingent, and vulnerable. I explore how dance engages with these conceptions by analyzing the work of several artists, specifically Petra Kuppers and Heidi Latsky.

Capable, Skilled Bodies

In a reaction against the saming trend, the integrated dance field has clashed against this dominating philosophy by confronting rigid, traditional dance and cultural norms in order to catalyze an entirely new form of dance. Activity in the field of integrated or mixed ability dance occurred concurrently with the rise of disability activism and the disability studies field. No doubt the reciprocal activities within the

dance genre both informed and were informed by the research and activism in the disability studies field. The context for disability and dance integrations in professional companies in the U.S. arose from the kinds of postmodern dance experiments occurring in the 1960s (Albright 2010; McGrath 2012). Pedestrian movement and almost any notion of movement and motion became legitimate and worthy experimentations of dance. These explorations countered the conventional ways of seeing dance and dancers, such as in the ballet, jazz, and modern dance norms of the time. In the postmodern experiments, trained and untrained bodies were both utilized, thus permitting new bodies to enter and explore the dance space more easily. Additionally, the advent of contact improvisation ushered in interactive, responsive bodies connecting through touch, weight sharing, energy, momentum, and unpredictability without concern for rigid notions of form (Novack 1990). The culture of dance, what dance constituted and who could do it, began to shift with these occurrences.

In the 1980s and 90s, professional integrated dance companies having dancers with and without disabilities,[24] such as *Dancing Wheels* (U.S.), *Light Motion* (U.S.), *AXIS Dance Company* (U.S.), *and Candoco* (UK), began to appear in the United States and in Europe. Additionally, DanceAbility International, the first teacher training certification program for integrated dance focusing on contact improvisation methods, developed during this time (Dance Ability International 2008). Rather than having therapeutic or

[24] It is difficult to map a full and accurate accounting of the types of integrated or mixed ability dance efforts occurring world-wide due to the lack of textual resources documenting or tracking this history. I have limited my accounting of mixed ability dance to the published accounts of the dance companies deeming themselves "professional" who have published websites, reviews and/or who have been discussed by other dance and disability researchers/scholars/activists. I recognize that this is mostly a Western accounting and limited in that regard.

recreational aims, these companies sought to achieve equal professional status with their exclusively able-bodied counterparts in the contemporary dance world. For instance, well-known contemporary dance choreographers, such as Bill T. Jones, were commissioned to set work on AXIS Dance Company, facilitating the artistic legitimacy and equality of the work (Davies 2008). This focus in the dance genre upon professionalization reflects the disability discourse and activism in these decades, which similarly promoted equal professional employment and educational opportunities for individuals with disabilities.

Yet another indicator of the disabled body's presence moving to the forefront within the dance genre as a professional, skilled body was "wheelchair dance sport," the ballroom dance-based form of integrated dance. Wheelchair dance sport traces its roots to 1968 in Sweden with further recognition and professionalization occurring in the 1980s and 90s (International Paralympic Committee [IPC] 2014). The ballroom dance arena, socially, philosophically, and politically, appears to exist quite separately from modern and improvisation-based dance company formations; although, there are intersecting aspects of these forms.

Wheelchair dance sport exists under the umbrella of "dancesport," which is competitive ballroom dancing. The use of the word "sport" was added to enhance the validity of ballroom dance for qualifying as a competitive Olympic sport. The over-arching governing body for both is the World Dance Sport Federation and, as of 1998, wheelchair dance sport is governed by the International Paralympic Wheelchair Dance Sport Committee. This form of integrated dance lent not only a professionally trained

view of disabled bodies, it also presented the body as competitive sport. The goal is to compete with other bodies on various measured expectations including musicality, posture, coordination, control, body "line," connection with partner, and expression (IPC 2014).

Wheelchair athletes are classified into two levels for the competition according to level of wheel control, push function, pull function, full arm rotation, and trunk rotation. Only wheelchair athletes with physical lower limb impairment are allowed to compete (IPC 2014). The competitions can include a single wheelchair user, a wheelchair user and a standing partner, or two wheelchair users. Those in the disabilities studies field and mixed ability dance field often resist this approach to the body, due to its perceived reinforcement of exclusion and the privileging of hegemonic dance ideals in a competitive frame, perhaps suggesting too close of an alliance with the saming trend. While professional contemporary-based dance companies (including mixed ability companies) usually do not ascribe to competitive aims, they share the professionalization aim and in some cases share similar dance performance expectations (i.e., musicality, expression) similar to the expectations in ballroom dance. Thus, an uneasy tension persists between goals of professionalism and skill development for disabled bodies and rigid trends towards extreme measures of sameness. While there is resistance to these trends, I would advocate that there is also value in how the professional dance and sports contexts can productively enable the presence and movement of disabled bodies in new performative spaces and combat misperceptions of disability as passive and not able.

Contingent, Vulnerable Embodiments

The embodied nature of dance intersects productively with disability and further supports the efforts by disability scholars to bring the body back into the disability studies discourse, a theme which I discussed in the previous chapter. Dance places the meaning of the body front and center. It is an obvious context in which embodiment can be fully discovered and types of embodiment expanded. Through the medium of dance, thought and action fuse and selfhood can be physically expressed, explored, and exposed. Dance forms a complementary and yet edgy relationship with disability, exponentially increasing embodiment exploration, while also holding disabled bodies to high expectations for physical rigor and artistry, albeit, at times based on an able-bodied rubric.

Those who have disabilities often withstand a societal rejection of their bodies and seek a sense of embodiment aligned with their sense of self (Kuppers 2000). Dance can create a context for the realization of a self-directed and fulfilling embodiment. For instance, one of the wheelchair dancers and dissertation research participants with whom I worked described her preferences for how disability is defined in terms of the unique experiences of her individual body. She states: "as for my own unique body I don't mind the term disabled in general but I prefer creatively bodied, uniquely bodied, physically challenged."[25] I was also intrigued in how she discussed her journey into dance with the mixed ability company *Dancing Wheels*, describing the way in which her perceptions of

[25] Personal email communication on April 23, 2014.

her bodily limits were transformed. She explains: "Learning modern dance technique gave me soooooooooooooooooooooooo much as a person, so much confidence, so much awareness of my body and beingness, maybe with limits understood properly but also with abilities understood and appreciated too." This dancer's emphatic description of how dance experience empowered her in understanding her body and re-interpreting her perceived limits is significant, and speaks to the power of dance to be a transformative medium for informing and re-shaping identity, particularly in the context of disability. The notion of gaining a sense of "confidence" through and because of dance experience was also echoed by several other research participants.

At the same time that dance as a performance forum may empower individuals with disabilities, it also requires a kind of vulnerable visibility and risk for the individual. Luca "LazyLegz" Patuelli,[26] a participant in my research, discussed the kind of vulnerability he sometimes experiences in the performance arena. He described the need to feel that his movement was equally compelling and accomplished as the traditional able-bodies he was interacting with in the break dance scene. When he first attempted to enter the performance arena, he had to find a certain degree of courage that would allow him to reveal who he was through his moving body. He had to carve a new space and yield to the possibility of rejection.

Intriguingly, Patuelli seems to have capitalized on the embodied vulnerability which the dance space can invoke for disabled bodies by using the condition as an intentional source of empowerment. Often he ends his lecture demonstrations by showing

[26] Participant preferred that I disclosed his name rather than remaining an anonymous voice.

the audience a movement he is still learning or developing. He seems to purposely allow himself to be vulnerable in this manner, exposing his bodily struggle, rather than trying to create a glossy finish. In many of his classes and performance demonstrations, he will also take time to show his bare, imperfect legs to the audience as he describes the nature of arthrogryposis, the muscular degenerative impairment responsible for his leg weakness. Patuelli seems to embrace the vulnerability and raw identity exposure the dance space can generate.

Similarly, another research participant, Frank Hull,[27] described the vulnerability and sensitivity he first felt when he was invited to a dance movement session by professional dancers Tracy Pattison and Debbie Wilson, whom he had recently met at The Toronto Fringe Festival in 1999. Hall states:

> They invited me to their studio space to explore with them. I first thought no way. I'm too fat and too disabled to ever dance professionally. I remember the Studio space was not wheel chair accessible. A group of dancers carried my heavy power chair into the space. I immediately compared my body to every able body dancer there. I felt so out of my league and ugly. I do meet many with disabilities that feel the same way. I think body image is a very big barrier when one is trying to find and train new Dancers with disabilities. Over coming one's negative body perception can be hard for a lot people regardless of disability[28].

Later, Frank found that pushing himself into that vulnerable dance space, although difficult, actually allowed him to better accept his body. He concludes:

> Dance for me has broken down so many barriers, socially and yes even sexually. Why?? Because I became comfortable showing my body to the world. When on stage most costumes show my whole shape: belly, butt, chest or my man boobs and so on. In my heart I know there is beauty in one natural body. So many different types of people make our Dance more diverse, more powerful. The

[27] Participant preferred that I disclosed his name, rather than remain an anonymous voice.
[28] Email correspondence follow up with research participant on November 16, 2016.

> possibilities for choreography, shape, and movement vocabulary endless. We just have to be willing to see it.

The embodiment focus in dance may be a sensitive and intense dwelling-place, inasmuch as it is also a useful and empowering dwelling place for disabled bodies.

Another point of intriguing intersection in the dance and disability duet is the notion of a controlled, predictable body versus a contingent/uncontrollable body. In some regard, this is a point of divergence in the dance and disability duet, with the exception of the genre contact improvisation, which directly attempts to embrace contingency. For many dance genres, the disabled body challenges the notions of perfect control, so cherished in many dance practices. Dancers may spend hours working towards a sense of absolute control in a sustained balance or turning motion, or during an off-axis movement extending one or more limbs into the air. Perfect, absolute control stands in opposition to the notion of contingency; unpredictability, unforeseeability. A body which is missing limbs or in which limbs or organs are dysfunctional or impaired dislodges the illusive perfection of human disciplined control over the body, a control dance practice often seeks. The response to the disabled body, then, is often one of rejection, due to the confusion over how to effectively engage with or manage the notion of a contingent or uncontrollable body. For example, when a dancer incurs a significant injury, the prevailing perception is that the individual's career is likely over. Their dance life possesses no real future, especially not a professional future as a dance performer. Often, even when dancers sustain mild injuries, the common practice is to have them sit out of class and observe until full recovery of the injured area, rather than re-thinking the

strategy and finding a new method of inclusion or alteration of standard exercises and combinations.

The uncontrolled, vulnerable dancing body is frequently dismissed as incapable, rather than viewed for its capabilities. However, in the integrated dance arena, new approaches are embraced. For instance, a dancer with cerebral palsy may walk or move with an affected gait, or other form of atypical movement pattern. Instead of trying to correct the gait pattern or other movement pattern to match a typical-bodied sameness, the dancer or choreographer may draw upon the unexpected nature of such a pattern to invent a new choreographic idea. Or, a dancer with a very unstable balance may then use the unpredictability and uncontrollability of the balance to embrace the nature of falling, using the contingent condition as a benefit, not a hindrance. Additionally, a dancer with legs that spasm unpredictably, may utilize this feature as choreographic motivation. Thus, when disabled bodies do enter the spaces of dance, they reveal that although the color palette has changed, there are still myriad possibilities with which the dancer may paint. The friction created by disabled bodies of difference and contingency entering the dance space is creatively productive (Albright 2010; Kuppers 2004). New movement possibilities rise to the surface in such a creative condition, as long as individuals are willing to pursue and allow for the exploration. These new types of movement possibilities are evidenced in the work of Petra Kuppers and Heidi Latsky discussed in the next two sections.

Socio-Spatial Bodies

Disability and performance studies scholar Petra Kuppers and others alike make an effort to counter constructions of the disabled body as tragic, poor, helpless, heroic, struggling, and not able (2004). These damaging constructions emerge in and through specific epistemological spaces (e.g., certain medical approaches, socio-cultural practices, and media representations) and physical, material spaces (e.g., architectural barriers, technological design). Most of the disability studies and related literature is in some way an effort to create new spaces of understanding for disability which deconstruct and reconstruct how the disabled body has historically been viewed and treated. Thus, inherently embedded in the literature is an advocacy goal which either implicitly or explicitly is a socio-political call to action for society on micro and macro levels. Dancers, performers, and activists often enact these "calls to action" by physically disrupting and destabilizing the warped perceptions of disability. This occurs through placing and mobilizing bodies *in particular spaces in particular spatial ways*. Thus, another point of intersection in the dance and disability duet is the socio-spatial concept of the body. Dancers and performers with disabilities are said to occupy space in radical and revisionist ways (Davies 2008; Kuppers 2004). The following questions are raised in this occupation of space: What is the nature of this radical and revisionist process? What spaces or terrains are brought into focus in these processes of "disability dance"?

Integrated dance allows the opportunity for the socio-spatial body of disability to address these questions by performing a revision of socio-space in front of a captive audience. Recall from Chapter III that "socio-space" is concerned with how individuals

and collectivities shape/design space by their use, exchange, and organization of it. Meaning is then born out of this use of space, and power is embedded in the crafting of this space manifesting the inclusion of some bodies and the exclusion of others. Socio-space also may be understood as, "the medium in which people act, intersect, move and locate themselves" (Freund 2001, 694). This type of revision is not often possible in a daily context. For instance, when a wheelchair user encounters an inaccessible environment, such as stairs or narrow spaces, it would be rare for the person to be able to re-configure the space easily or re-configure their bodies or devices spontaneously (i.e., crawl out of the chair, etc.) and, even if they did, who would be witness to this radical revision? Perhaps one or two onlookers might notice or be in the vicinity to notice.

However, in the dance context, moving in unusual ways and re-configuring space between and amongst other bodies and structures possesses a legitimacy and an explorative acceptance, enabling new versions of spatial access to be blatantly performed. Dance heightens attention to the social aspect of space, and the dance context empowers bodies of disability to enact their own socio-spatial choices, countering the imposed socio-spatial choices which might be a part of the built environment and the pedestrian context (i.e., disabled-only seating, bathrooms and parking spaces, or inaccessible spaces where disabled bodies are not made welcome). Additionally, the audience is entreated to a perpetual opportunity for witnessing these intriguing spatial manipulations. The audience is invited to sustain a stare, providing the opportunity for re-evaluation of perception. According to dance and disability scholar Telory Davies, this radical revision of perception is based in a form which ascribes to "undisguised effort" and "a use of

physical parameters that revises standard notions of the dance body" (2008, 44). Davies's term for disability dance and what it does is "dance actualism." In other words, the real, the lived, experience of disability is exposed while simultaneously being artistically challenged to engage new possibilities for what dance could be. Davies describes several works performed by AXIS Dance Company in her article, "Mobility: AXIS Dancers Push the Boundaries of Access" (2008). Consider the implication of the article title which points to the disruption of space, suggesting the double meaning between what the dancers are doing on stage and what their dances also symbolically activate in the socio-political realm of accessibility. Davies described that the spatial choices made by choreographer Bill T. Jones, in one of the company's works, included having wheeled dancers "zipping past standing dancers" and standing dancers "perching on wheelchairs" (Davies 2008, 48). Jones found ways to flip the traditional binary at times by significantly mobilizing the dancers with disabilities while stilling those without disabilities, heightening the appreciation of different forms of mobility through space. Jones, as choreographer, also shows the fluctuating and contingent nature of disability by having disabled and non-disabled dancers both in and out of wheelchairs. And, Davies notes the ways in which non-disabled dancers "abandon their vertical movement and adopt the disabled dancers' horizontal plane of motion" in the choreography (2008, 50). Thus, a sense of socio-spatial equality between disabled and nondisabled dancers is evidenced in Jones's work.

Thus, Jones's choreographic choices in terms of where bodies are placed in space and how they are moving through space disturb the hierarchical divisions and

expectations between typical and atypical bodies. Scholars, such as Telory Davies and Petra Kuppers, suggest that these types of performances signal new notions of social interaction for abled and disabled bodies, revising the status quo and revising ableist expectations (Davies 2008; Kuppers 2004). Ultimately, because social space is so imbued by the precepts of ableism and reflects the politics of power, dancers with disabilities can make particularly profound statements with their bodies in re-claiming and owning space on the dance stage as a means of disturbing those power relations and structures. Other words/phrases used frequently in the literature to describe dancers with disabilities in terms of what they are doing on artistic, social, and cultural levels include: inhabiting liminal *spaces*, intercorporeal *spaces*, unruly *locations*, and transformative *spaces* (Albright 2010; Davies 2008; Kuppers 2004). The emphasis is upon the spatial impact these bodies have, literally and metaphorically.

One of the ways in which these radical socio-spaces are created is through the permission of gazing which the dance space enables. Normally, society discourages outright staring at disabled bodies but, when on stage or when contextualized as performance, the act of staring and staring intently is encouraged. Disability scholars submit that by staging disability[29] in performative conditions such as dance, viewers are invited to stare; however, in this staring gaze, the objectifying stare can be re-configured as an interactive, reflective gaze moving beyond voyeurism and prejudice (Durham-Wall

[29] An important note to keep in mind here is that there is an assumption being made about what disability constitutes. Many of these readings of disability and dance assume and focus upon physical, visible disabilities. An entire range of disabilities are excluded in these readings of what bodies are doing, yet, understandably so due to the visual nature of dance.

2015). In the dance space, performers choose to be looked at and they can direct the audience's attention in the way they choose. Audiences are invited to look more deeply, more closely in this prolonged stare as they are drawn into the dance of difference unfolding before them. Disability scholar and psychotherapist Eimir McGrath grounds this assertion in developmental processes from birth in which babies gaze at their caregivers in an on-going interpersonal dialogue to create awareness of self. According to McGrath, "the act of looking becomes the basis for interpersonal synchrony" (2012, 150). She submits that social processes later catalyze a change from gaze to "stigmatizing stare." The stigmatizing stare can be deconstructed in dance, due to the permission of sustained gazing the dance space enables and due to the fact that performers make choices about what they want to reveal on their own terms. Dance paired with disability opens new conceptual spaces, which then constructs new knowledge about how these spaces can be utilized. This pairing between dance and disability thus has the power to transform negative societal perceptions about disability eliminate binary distinctions, while also calling into question traditional dance practices.

Why is the dance context such an ideal place for the socio-spatial body of disability to dwell? Like the emphasis upon space found within disability scholarship and lived disability experience, attention to space in dance is of paramount importance. It is a primary ingredient in the sculpting of movement artistry. Dance practitioners, particularly in contemporary genres, employ a variety of imagery to refer to the spatial. I would submit that in dance, space is engaged and understood as a substantive material which can be carved, sliced, reached through, pressed against, scribbled in, sculpted, tossed,

grasped, and floated upon. Likewise, one can succumb, be enveloped by, be halted, and be transported by space. These spatial types of references are often verbalized in dance classes as well as employed significantly in reviewers' and critics' descriptions of dance. Dancers are instructed to "reach softly through space" or "dive into the space" or "command the space" or "lengthen," "widen," "curve over," "push against," space.

These dance actions and verbal descriptions of the actions suggest that space is felt as tangible and changeable. This concept of space in dance further suggests possibilities for transformation and the ability to accept and construct multiple identities, which counters the fixed, normative notion of space, sometimes assumed in societal conditions. Space both affects the dancer and is affected by the dancer, paralleling the ways disability scholars discuss bi-directional spatial effects for those with disability. Space is not a neutral entity.

Additionally, multiple types of bodies may occupy the same space. In the same place that a dancer grasps firmly with a hand, a foot may glide, dart, or fall, and that same space may later be caressed through a melting rotary action of the spine or contained in controlled, counter tension between two bodies. The way space is shared and negotiated amongst dancers demonstrates the malleability of socio-space, its constructed nature. Potentially, the spatial choices can indicate egalitarian and/or hierarchical connections between people. Dance reminds the viewer that we are the creators of our spatial realities and that these realities are co-constructions with other bodies. Space is not an unchangeable, static known, but it is a designed choice. As dancers move, they determine spatial organization and design it.

The integrated dance space enables disabled bodies to similarly perform their own acts of spatial design, inverting their bodies and devices and mobilizing differently from one point to the next, thus illustrating the ways unique bodies may re-invent and re-design their socio-space. Further, not only does the *use of space in dance* prompt transformative ways of knowing and sensing space, the use of space in dance/art performance prompt personal and collective imaginative freedom, raw emotional exposure, and creative indulgence, acts not generally permitted in the adult or responsible spaces of daily pedestrian life, work, and even play. Therefore, dance can open up new areas of embodied discovery for disability in the same manner that disability opens up new areas of artistic discovery for dance.

Petra Kuppers: Empowering Bodies of Disability

Petra Kuppers illustrates the way embodiment and spatiality play a vital role in the lives of people with disabilities and how dance facilitates these dimensions of experience and awareness. According to Kuppers, in the case of disability, the negative perceptions or knowledges of disabled bodies can be repeatedly questioned and radically recrafted in the space of dance (Albright 2010; Kuppers 2004). She states: "performance is a place where cultural uncertainties can find expression — the unknown is framed by the conventions of the stage or the gazing scenario" (Kuppers 2004, 3). Kuppers explores this notion of uncertainty in her work with individuals diagnosed with mental illness. I point to this example particularly for the ways in which Kuppers foregrounds the importance of spatiality in the lives of these individuals, and the way in which her

dance/movement work employs the spatial to empower identities, to unfix perceptions of the other, and to avoid binary and close-ended representations.

Kuppers describes individuals with mental illness as often having "no space for themselves, their bodies, their movements in their social and physical environment" (2004, 125). Because of society's representations of madness and the institutional processes set up to invade the spaces and bodies of individuals with mental illness, Kuppers found, in working with these individuals, that they exhibited an inability to take or own space (125). Clues to this spatial aversion were evidenced by participants' difficulties in simply "breathing, standing still or allowing their voices to resonate" (125). Kuppers also read this as a disruption in their sense of embodiment, predominantly caused by the distorted representational and social dimensions of madness.

In order to re-empower the bodies and lives of these individuals, Kuppers's approach was to re-affirm and ignite the ownership of "inner space" by introducing slow, meditative, visualization journeys guided by voice and focusing on the space enabled by breath. Thus, from an outward perspective the participants were largely in stillness, but they were learning to fill space in powerful ways through breath and imagery. Kuppers's intent was therapeutic, to support a full movement experience, and artistic, to share these expressions in a larger social forum in order to re-frame mental illness. Kuppers employed imagery cues such as "sailing among clouds, in outer space, through oceans, over deserts, or floating in streams and meadows" (2004, 126). Her goal was to emphasize movement and sensory experiences in space as a means of fostering body-ownership.

For Kuppers, the sense of body ownership enacted through attending to spatial experience would facilitate an embodiment experience manifesting "pleasures and possibilities" (2004, 126). Further and ultimately, the claiming of inner space is linked to a sense of empowerment and a means towards "being wholly in the shared, social space" (2004, 127). The private space of experience created by each individual was then shared in the social space with other members in the group through brief reflecting moments, and then further shared in a wider social space as a public video installation entitled, *Traces* (Kuppers 2004, 127).

In the video installation of *Traces,* the performance space and spectator spaces blend and the space of everyday movement also becomes performed movement. Spectators are directed into the center of the installation room where they are surrounded by close up faces and glimpses of individuals in meditative acts of stillness. Performance and spectator spaces are co-inhabited rather than separated to emphasize the disruptions of subject/object dichotomies. The images on the video are not performance in the traditional sense; rather, the individuals are in quiet bodily states of being, while also being displayed in a performative way. Thus, the "everydayness" experience of bodies is placed in a performative space to be reflected upon, re-considered, and re- valued as an accessible collective experience. Performance is re-cast as the simple, yet significant, life effort of breath and stillness. These individuals are enacting the opposite of what their societal representations tend to be: distraught, out of control, and hysterical bodies. Kuppers further summarizes the intention in these portrayals of partial bodies in spaces of stillness : "By pointing again and again to the unknown behind the images, to silence, to

the open and by allowing our perception to explore the potentials of connection and unknowability, *Traces* hopes to address difference, shaping new horizons for performances" (2004, 134).

Kuppers further described the way in which Rudolf Laban's movement theories helped her view perception and emotion as spatial phenomena. Rudolf Laban, a movement/dance theorist, philosopher, and educator, placed significant emphasis on spatial experience as "a fundamental principle of life" (Kuppers 2004, 128). In Laban's theories the mental and physical are continuities and relationships of inner (self) and outer (environment) that occur cyclically (Hackney 2003). Movement *intention* is paramount. Intention is organized and realized with spatial attending, such as noticing the filling of breath as a subtle, internal, three-dimensional experience thus creating, in Laban's terminology, a vertical lengthening, horizontal widening, and sagittal bulging. Conversely, for Laban, the emptying of breath creates shrinking, narrowing, and hollowing. These experiences are coupled with consciously attending to the emotive, associative sensory aspects embedded in these spatialized movement experiences. According to Kuppers, Laban exercises create ways to locate the body in space and focus attention into inwardly attending as a dynamic place of bodily discovery.

The Laban Movement Analysis (LMA) framework deals with notions of space in two ways: (1) As one of the Effort Factors (dynamic qualities of body actions, e.g., softly, quickly, aggressively, etc.), and (2) As an entire separate category which encompasses spatial paths, facings, reach space, spatial pulls, spatial intent, spatial dimensions, planes and diagonals, and spatial tension (Hackney 2003). The term space harmony is utilized to

denote a kind of desirable, symbiotic relationship with the environment. In the words of Rudolf Laban:

> Our body is constructed in a manner which enables us to reach certain points of the kinesphere with greater ease than others. An intensive study of the relationship between the architecture of the human body and its pathways in space facilitates the finding of harmonious patterns. Knowing the rules of the harmonic relations in space we can then control and form the flux of our motivity. . . . (Bartenieff and Lewis 1980, 23)

While practitioners in dance and theatre continue to draw upon Laban's theories of movement, the notion of strict or universalizing rules in movement have been deconstructed by the post-modern lens in favor of recognizing multiple, unfixed potentialities and multiple ways of looking. What I would like to bring attention to, though, is the basic concern with space which the LMA work particularly highlights, and the concern of space within dance practice at large as described earlier. This spatial focus and the corresponding relevant LMA concepts will return as a major point of research exploration in Chapter V and VI, when I discuss assistive device design.

Additionally, there are distinct ways in which differing dance forms attend to space and, thus, re-shape ways of knowing/thinking about dance norms/values as well as social and cultural practices and norms at large. For example, classical ballet aesthetics tend to privilege the vertical dimension, symmetry, extended/lengthened lines, clear, geometric spatial patterns, and hierarchical arrangements. Human beings are *presented* as regal, finely controlled, perfected/aligned beings allocated to certain spaces (Foster 1986). In modern and post-modern dance forms, alternatively, new spatial mappings are highlighted. The body is spatially re-oriented off the vertical into horizontal and complex spiral rotary patterns. It falls and rolls onto other bodies, releasing weight, relinquishing

control. Philosophically, modern and post-modern dance sought new places and spaces for locating what dance, and the body within contemporary society, was or could be; thus, bodies of disability further aid this exploration.

In the next section I examine the work of another artist, Heidi Latsky, whose approach to disabled bodies is also propelling the dance field forward. I use this choreographer's work to illustrate not only the productive tensions of the dance and disability duet, to include the de-stabilization of sameness, but also as an example of the way all five conceptions of the disabled body discussed previously (skilled, contingent and vulnerable, embodied, and socio-spatial) are embedded in the work.

Latsky: Re-defining Disability

Heidi Latsky is an ideal example of a choreographer who embraces the palette of bodily differences, capturing the artistic potential which emerges when these contingent, skilled bodies enter the dance space. By analyzing one of Latsky's dances in her larger work entitled *GIMP*, I highlight the ways in which the dance and disability union can radically challenge traditional dance lenses and the way dance, as an expressive terrain of discovery, can also empower bodies of disability, heightening their visibility and facilitating new possibility.

Throughout Latsky's *GIMP*, a range of disabled and non-disabled performers are utilized (Heidi Latsky Dance 2017). In the name choice, Latsky is also challenging the notion of disability using a name with a "less than" association and then reconstituting its meaning through the lens of dance. Her intention seems to direct us, as audience, to the stereotypical classifications, in order to transform and evolve them. In fact, multiple

reviews of the work highlight the re-defining nature of the performance. One review describes the dance as, *“*. . . without doubt a gleaming milestone in the progress of contemporary dance and theater, proving that the term ‘disabled dancer’ is an oxymoron” (Bale 2009). In this extended work, not only does Latsky effectively remove the “dis,” the “not,” from disability, she also expands this idea into a creative opportunity for astounding *possibility* (Durham-Wall 2015).

In “Aerial Silk Duet,” part of the larger *GIMP* project, Latsky reveals that ability is a matter of perspective and she re-defines it by aligning ability and disability as *possibility*, thus obliterating any notion of samed measures. The genre of the choreography for Aerial Silk Duet is aerial dance in which dancers are often suspended off the ground through technological means. In this choreography, distinct and compelling movement possibilities are shown in the unique and different bodies on stage and in the air, with the incorporation of a red silk fabric. The unique and strategic choreographic choices Latsky makes, along with the aerial nature of the dance, generates the reconceptualization of (dis)ability. The performance discussed here occurred as part of the 30th anniversary of VSA[30] Massachusetts, and took place Friday, April 29th, 201l, in the evening, just outside of the Boston Institute of Contemporary Art (Gimp Project 2012).

Two important notes as to the approach I am taking in analyzing and presenting Latsky’s work. First, in order to identify the dancers uniquely, I will intentionally refer to

[30] VSA is formerly known as Very Special Arts; however, the name association is no longer affiliated with the letters, due to the negative connotation of the word “special” with disability. VSA is a forty year old arts and disability organization based out of the Kennedy Center in Washington, D.C. with affiliate organizations nationally and internationally, thus, the letters were retained due to name recognition.

them by name to describe choreographic moments in the piece, rather than using general or misrepresentational/dualistic terms such as male/female and able-bodied dancer/disabled dancer. Second, I am limiting my discussion to one section of the entire choreographic work, recognizing that a more thorough reading of this dance would necessitate an analysis of the full-length work to provide additional context.

On a pyramid-shaped structure outside Boston's Institute of Contemporary Art, dancers Jennifer Bricker and Nate Crawford slip into view from offstage. They both enter pedestrian-style from stage left, moving naturally, easefully, simply. Simultaneously, Latsky places two differing "walks" in front of her audience to consider and compare. Additionally, the spatial positioning choice of Jennifer walking *ahead* of Nate seems significant, implying a reversal of the hierarchical structure between "abled" (superior/ahead) and "disabled" (inferior/behind/beneath). Jennifer is positioned as leader, Nate as follower. Jennifer uses her arms to propel her body through the space, while Nate uses his legs to carry his upper body. Simultaneously, these walks both appear normal in their calm simplicity, they are not showy or spectacle-like; rather, the walks present the image of two people simply entering the space casually in very different ways.

Seamlessly, Latsky reveals a third performer, that of a long piece of red silk fabric dangling in the middle of the stage space. Nate pulls the red silk to Jennifer who is now centered on a small lighted square on the ground. She receives the fabric while Nate then kneels down in order to lift her further up allowing Jennifer to more firmly grasp the fabric and pull her body weight into its folds. She nestles into a cocoon-like position in

the fabric. There is only one piece of red silk fabric, with its unique "body." There is only one male dancer, Nate, with the uniqueness of his body. There is only one female dancer, Jennifer, with the uniqueness of her body. Latsky has established the uniqueness of these bodies, and the audience watches these multiple uniquenesses intermingle and speak in the language of movement and motion as the dance progresses.

Nate next stands and, grasping the edge of the fabric, swings himself into the air as Jennifer's body is shrouded in the fabric's interior. Both dancers are swinging in the air with a moderate rhythmic momentum, suspended off the ground from the structure above. Nate then slowly wraps himself within the fabric's cocoon. After both bodies have been fully enveloped in the red fabric, we see only the arms slip out from the red fabric body, encircling one another and creating an entirely new mobile embodiment. Nate's body slowly emerges through one side of the fabric as he falls gently back down to the ground, while Jennifer remains fluidly suspended, splitting the silk into two cord-like pieces. Nate grasps one long cord of the fabric with his arm to induce a circling motion. This motion causes Jennifer to then circle above him. The fabric and the dancers are continually reconfigured in a mesmerizing metamorphosis of differing images which highlights the dancers' skill and agility.

Jennifer's beautiful horizontal, spinning, aerial position would not work in the same way on Nate's body, and Latsky shows this difference later as Nate is spun in the air repetitively by Jennifer in a different configuration. The beauty of the dancers' different bodily possibilities in reciprocity is also exhibited toward the end of the choreography when Jennifer slowly inverts her body, flipping headfirst up the red silk

fabric to meet Nate who is now suspended at the top of the fabric. Nate then conversely reflects Jennifer's upward motion by unwinding down the fabric to meet her in a resting embrace on the ground below.

The uniqueness of the dancers' different bodies complements the visual and kinesthetic relational possibilities as they create and define an intimate shared social space. While the movements are well-coordinated, to create an effective flow, the dancers' physical efforts are made known. Latsky does not conceal the fact that these motions are intensely charged human actions. As audience, we see the process of skillful, physical exertion as each transition unfolds. The mechanics of the dancers' actions and manipulations of the fabric are revealed. The different possibilities created by the different bodies of each dancer is celebrated. The undisguised effort in Latsky's dance reveals a type of authentic vulnerability and skillful prowess for both Jennifer and Nate.

At one moment in the dance, I wonder if Latsky is highlighting the freedom in Jennifer's aerial swinging, which her body permits so easily next to the legged weightiness of Nate's grounded run. Perhaps Latsky is drawing attention to the different embodiments of the dancers and flipping the assumed paradigm of ableism. In another instance, Latsky challenges us, as the audience, to re-consider our definition of ability as Nate lifts Jennifer up to the fabric several times throughout the choreography, seemingly helping her to grasp the fabric. Nate appears to be in the support role to Jennifer. But, does that interpretation relate to (dis)ability or is Latsky simply speaking to a relationship of two people, one as giver/supporter and one as receiver? I question if the action was perhaps one of human relational care, not an indication of burdensome need or reliance.

Latsky, in this moment of the work, seems to be embracing the notion of a vulnerable body as a positive and relational human condition, versus a negative indication of individual helplessness.

In choreographing the mobile cocoon image, Latsky attunes the audience to a metamorphosis of perception: Disability to possibility, to newness. The cocoon image is unfixed, swinging in the air. Two bodies have merged to become a third body. The image is dramatic, beautiful, and extraordinary. (Dis)ability is being re-imagined, redefined, into a compelling world of creative possibility through this new enmeshed embodiment of three formerly separate bodies. Bodily boundaries are blended. The continually transforming fabric images speak of versatility and change. Additionally, as I reflect on the dance, I sense the fabric as another body,[31] an interface between two other bodies that serves as a visual metaphor for the change of perceptions about ableness that Latsky intends to evoke in her audience. The fabric's redness also alerts the viewer to pay attention, as red culturally connotes situations of heightened alertness (i.e., stop signs, emergency signs, exit signs, etc.). The fabric, itself, exerts a type of agency in the dance.[32]

By placing the dance as an aerial work, in which bodies are frequently suspended above the floor, Latsky has chosen to re-invent the potential for how these bodies might

[31] One might also consider the fabric as a type of assistive technology, helping both dancers gain a new form of mobility. This conceptual connection is relevant within the context of the dissertation research and pertinent to Chapter V, where I discuss the relationships between dance, disability, and assistive technology.

[32] This theme of non-human objects or technologies acting like human bodies and possessing agency which thereby mediates relationships, will be thoroughly discussed in Chapter V when I discuss the role of the assistive device in the body-device-environment relationship.

move in new spaces, different than the traditional floor bound space of dance. Reorienting bodies in an aerial frame disrupts the expected. This reorientation also re-shuffles spatial possibilities and spatial relationships. The dancers are flying, suspending, dangling head first, spinning horizontally, playing with the momentum of flight, and exploring a greater breadth of space. The aerial choice itself offers a new way of conceiving movement and prevents the audience from attaching to known relationships and the known world of gravity and the vertical. Latsky presents us, as viewers, with the opportunity to venture into the unknown/undefined, to explore our perceptions of ability differently. The aerial context also transports both dancers' bodies into an unfamiliar realm, perhaps, equalizing the opportunity for their own embodied discoveries. What use are legs when one is airborne?

Furthermore, an analysis of Latsky's work reveals that there is intentional effort by the choreographer to empower the dancer with the disability by showcasing her bodily abilities and skill in equal means to the skill of the nondisabled dancer. The social space the dancers share is intriguingly portrayed as collaborative, co-creative, and interdependent. Further, there is an element of vulnerability and contingency allowed as Jennifer's missing legs and non-traditional movement are revealed fully. In fact, the façade of perfect control is de-stabilized simply by the presence of Jennifer's non-typical, non-traditional legless body occupying a traditional performance space of expected legged dancing bodies.

Conclusion

In this chapter, I explored places of both tense and fluid intersections in the dance and disability duet, including the concept of a professional, skilled body; the concept of a contingent, vulnerable, embodied body; and the concept of a socio-spatial body. These ideas were contextualized by acknowledging a larger socio-cultural frame privileging an ideology of saming and denying difference, and thereby explaining the radical subversion of the disabled body in dance and society. I argued that both types of intersections produce convergences and divergences resulting in faciliatory effects, thus heralding new opportunities for dance innovation and changes of perception.

While normative dance traditions which rigidly adhere to the notion of one type of dancing body have created a barrier for disabled bodies, other dance contexts, such as postmodern and contact improvisation genres, have found space for disability. These genres show the ways in which disability flourishes as a creative catalyst working synergistically within the imaginative scope of dance practice. Latsky's choreographic exploration in *GIMP* exemplifies this type of productive practice in dance (Durham-Wall 2015).

Both Latsky and Kuppers are shown in this chapter as embracing the contingency and vulnerability of disabled bodies. This act of embracing is used to generate new artistic choices. Both practitioners also attend to space in non-hierarchical, egalitarian, empowering ways, recognizing the power and politics of socio-spatial relationships. Professional companies, such as AXIS Dance Company, also embody the non-uniform approach to dance and dancers' bodies which makes space for disability to emerge and

contribute new possibilities. The emergence of new choreographic explorations, new techniques (e.g., wheelchair technique, crutch technique), and innovative teaching methodologies have occurred due to the union of dance and disability. In the following chapter, I trace a third variable in the dance and disability duet: the assistive device. I pursue an investigation of how dance and disability, in their revisionist nature, impacts the conception of the assistive device, consequently implicating new considerations for design theory/practice.

CHAPTER V

DANCE AND DISABILITY MEET ASSISTIVE TECHNOLOGY

Introduction

In the previous chapter, I explored the faciliatory effects of the dance and disability dyad, as each one prompts the other to challenge the status quo. In this chapter, I move towards understanding a third significant variable in relation to the dance and disability dyad: the assistive device. I probe into how the assistive device is re-imagined through the dance and disability dyad, ultimately suggesting new notions for assistive technology design theory/practice. Assistive technology, considered in its broadest sense, may be anything an individual makes use of to enable extended or supportive possibilities for mental and/or physical capacities/needs. This means the pencil, the phone, the computer, the toothbrush, as well as cooking utensils, bicycles, cars, and planes; all fall into the category of "assistive technology." We all, in fact, utilize assistive aids to live our lives.

In the construct of disability, assistive technology may encompass a vast array of possibilities, including structural alterations (i.e., changes to the original structure of a physical environment such as ramps or roll-in showers), assistive devices (e.g., hearing aids, vision aids, and wheelchairs), material adjustment (i.e., large print reading material), and environmentally-based behavioral modification (i.e., supportive features such as noise reducing rooms or apparatus inhibiting the amount of stimuli from the environment for individuals with autism) (Fuhrer et al. 2003). For the purposes of this dissertation's

discourse, I will specifically place emphasis upon “assistive technology devices” (ADs) as meaning “any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain or improve functional capabilities of individuals with disabilities” (Alper and Raharinirina 2006). Further, I will focus upon the wheelchair as a prevalent assistive device.

Assistive device design has evolved in tandem with constructions of disability. As ideas of disability were questioned, designs were concurrently questioned, prompting their evolution. Adding dance to the frame creates another powerful variable for thinking about design. As I will argue toward the end of this chapter, dance in tandem with disability is positioned as a radical catalyst for change in AD design, thus creating new ways of conceiving and working with devices. Furthermore, dance, probably more than any other area influencing assistive device design, has the power to destabilize the abled/disabled binary and untether the notion/practice of AD design from the habitually rooted domains of rehabilitation and medicine.

In order to pursue an assessment and understanding of AD design and its relationship to dance and disability, I will first explore a historical overview of the development of assistive devices, specifically wheelchairs, and their key influences in the United States and United Kingdom. Next, I will describe several contemporary, conceptual models and design paradigms relevant to AD design. Finally, I will articulate how dance and disability intersect distinctly and uniquely with these ideas to promulgate a new design lens.

Historical Snapshot: AT/AD Development

The use of rolling devices to transport individuals with disabilities is first known through the use of the wheelbarrow, invented and utilized in China (Kamenetz 1969). The earliest recording of the use of a rolling chair is traced to the depiction of a man in a chair with three wheels from China in 525 A.D. from a stone sculpture (Kamenetz 1969). There is a notable gap in historical recordings depicting the use of wheeled chairs after the 6th century until the 16th century when references are found in drawings and literature in Europe. Some sources suggest that wheeled chairs probably entered Europe sometime in the 12th century with the wheelbarrow. In 1595, King Phillip II of Spain is depicted through an artist's drawing with his own wheeling chair with foot rests, called an "invalid's chair." In 1760, the "Bath chair" was invented in Bath, England which was a light carriage with a folding hood and three or four wheels. The first appearance of wheelchairs in the U.S. occurred during the American Civil War, and in 1869 the first U.S. wheelchair patent was issued. In 1916, the first motorized wheelchair was produced in London. In 1933, the first lightweight, steel, collapsible wheelchair was invented by Harry Jennings and his disabled friend Herbert Everest, who were both mechanical engineers (Kamenetz 1969). Wheelchair design has seen the greatest changes in the 20th century with the advances in power chair technology. However, the evolution of wheelchairs should not be viewed as simply "technological," since there are inevitable political and social forces which shaped these evolutions (Woods and Watson 2003). In the next sections, I describe explicit forces of influence for AD design, including medicine, war, sports, and disability activism.

Medical Model Influence

In medicine, disabled bodies in general were often treated as "specimens," a thing to be analyzed, scrutinized, categorized, and dissected in the laboratory. The "medical model," as it has come to be called in disability studies, situates disability predominantly in the person as an isolated, problematic, static condition to be fixed, or at the very least managed in predictable ways (Davis 2013). The "social model," on the other hand, situates disability predominantly in social/environmental factors (e.g., social attitudes and conditions as well as the built environment) (Albrecht, Seelman, and Bury 2001). The social model perspective grew out of disability activism and disability studies discourse as a reaction against the medical model.[33]

Historically, connotations of disability aligned with the medical model and often assumed that a disability permanently defined a person's condition as not able, passive, and dependent, as well as economically burdensome. Things, services, systems, policies are designed for what designers expect people to do/be or expect people to want to do/be. Assumptions are made. Values are placed. Designers in positions of power (e.g., those in media, business, or government) in large part shape how human beings are imaged. Disabled people, historically, were viewed as *not capable* of attending school, being employed, or partaking in any real way in social and recreational activities; thus, there was no need to make provision for these individuals or to allocate resources in the form of assistive technology devices or anything else. They were categorized as sub-human in

[33] Reference Chapter III Disability Studies: Revealing Bodies, Confronting Space, Claiming Power for discussion and definitions of the social model and medical model.

many cases, and only charitable organizations, some families with disabled children, and select health professionals seemed to recognize the need to both care for and promote equality and life opportunities for individuals with disabilities (Albrecht, Seelman, and Bury 2001). It was not until national governments took a more active and participatory role in assistive technology development that it developed on a larger scale. One reason governments became actively involved is the subject of the following section.

War-related Influences

War was one of the most significant socio-economic forces in shaping wheelchair design. In this context, the focus was mainly concentrated on rehabilitating injured male veterans. World War I brought the attention of disability to the fore. Suddenly, government had a moral and legal obligation to care for injured veterans. Advances in medical science were also enabling people to live longer with disability. In the first developments of wheelchairs, the construction of disability began to subtly shift towards the idea that a person with a disability *could be* capable and independent with technological aids. However, it was clear that aspects of the technology posed limits for users as well. Standard manual wheelchairs possessed limits with regard to their ability to be used outdoors and with regard to the often cumbersome nature of the push-based propulsion systems. The Everest and Jennings chair (1933), through its lightweight and tubular frame, helped make the chair lighter and easier to transport; however, it was breakthroughs in power technology which helped individuals access outdoor environments with more ease (Woods and Watson 2003). The first version of this power technology was a motorized attachment, which would fit a standard, folding manual

wheelchair (Woods and Watson 2003). By the end of World War II, electrically powered wheelchairs were on the market for indoor/outdoor use.

Beyond pressures from disability rights advocates, governments saw the economic value in rehabilitating veterans back into the work force. They also saw the advantage of asserting nationalistic pride and hope by restoring veterans' disabled bodies. The images of these restored disabled-abled bodies could potentially mollify and/or justify the effects of war (Fritsch 2013). The technology facilitated the new emerging construction of disability prompting autonomy, independence, and social access for disabled individuals. But, while the technology produced benefit, it simultaneously revealed and created other conflicting issues of concern. For instance, the governmental provision of wheelchairs to male disabled veterans meant that ability in this respect was problematically tied to one population only. Other disabled bodies were less visible and, thus, less important. Disabled male veteran bodies warranted AD provision; others did not.

However, resource allocation began to change with the effects of the polio epidemics of the late 1940s and early 1950s, and thalidomide in the 1960s (Fritsch 2013; Woods and Watson 2003). Additionally, developments in antibiotics, such as penicillin, extended the life of many with severe impairments, increasing the concern for disability beyond disabled veterans. Rehabilitation engineering and rehabilitation services grew significantly during this time as a result, also facilitating technological development and AD provision.

Another way in which wheelchair developments through government provision played a liberating yet conflicted role in the disability rights landscape was when serving as a "one size fits all" solution. "One size fits all" assumes a solution for *all* types of disabled people and *any* and *all* other access issues. As K. Fritsch describes, "The wheelchair was a tool of aggressive normalization, even as it simultaneously marked the individual as different." Fritsch asserts that disability appeared only to disappear in these contexts (2013, 138). In other words, the rehabilitative process and the AD as wheelchair "solved" the problem of disability so that it could become a non-concern again. The comprehensive needs of those with disability could be veiled with the wheelchair staged as THE socio-political agent of change. Issues of employment, transportation systems, and architecture were still problematic however, as were issues of access related to other types of disabilities (i.e., intellectual or sensory). Therefore, wheelchair/AD developments had and continue to have complex and contradictory effects, enabling while simultaneously un-enabling the disability community.

Disability Activism Influences

As civil rights movements for blacks and women emerged after WWII and gathered momentum to combat negative connotations of difference, notions of disability were also altered. The notion of difference being equal to and not less than within the civil rights movement implicitly supported the disability rights platform. When the disability rights movement pushed forward in the late 1960s and early 1970s, explicit notions of disability in its varied forms were directly challenged (Albrecht, Seelman, and Bury 2001). Advocacy organizations such as the Paralyzed Veterans of America (PVA)

in the U.S. and the Invalid Tricycle Association (ITA) in Great Britain helped to further re-craft the construction of disability thus prompting more consideration of environmental factors aligned with the social model and redefining independence for individuals with disabilities. This shift from viewing disability as a medical phenomenon to viewing it more as a social concern also impacted wheelchair innovation (Woods and Watson 2003). The view of the disabled as more abled/independent through AD use became furthered through activism, which reciprocally pushed the technology forward.

The 1970 Physically Disabled Students Program (PDSP) in Berkeley, California was an organization run for and by disabled people. PDSP provided personal assistants, repaired wheelchairs, and assisted in funding resources for disabled individuals (Woods and Watson 2003). The PDSP was a precursor to the Independent Living Movement and played a significant role in the disability activism landscape (Albrecht, Seelman, and Bury 2001). In these efforts, as well as the efforts of veterans' associations, disability constructions moved further from the medical model causing the wheelchair to become a political tool for disability rights advocates.

Wheelchair users enacted demonstrations in which they used the wheelchair's presence to physically combat accessibility issues (e.g., inaccessibility on buses). (This type of activism was discussed in detail in Chapter III.) In fact, wheelchair technology revealed the ableist privileging in society even more. From housing to workforce norms, it became clear that designs/designers did not have disabled people in mind. Life was designed upon able-bodied premises, a prejudicial concept known as "ableism," in the disability studies field (Lalvani and Broderick 2013). These premises were built on

mythical notions of a society which never aged and whose bodies never or rarely deviated from a particular normative construction (Davis 2013; Fritsch 2013). The validity of these premises was more explicitly called into question when suddenly disabled bodies became more mobile with technology. Their bodily presence literally confronted the false design paradigm of privileging normalcy, critically challenging the intention behind these designed life spaces. From the physical environment (e.g., stairs, doors, sidewalks, bathrooms, work stations) to the social environment (i.e., access to recreation and social engagement activities), wheelchairs illuminated other barriers to access for all those sharing the environment together.

Wheelchair companies saw the advantage of this growing atmosphere of activism and profited from it. Quickie, a wheelchair manufacturing company, for instance, was a $40 million per year business by 1994 (Fritsch 2013, 139). Initially, much of the resistance to AT and AD development was due to capitalist perspectives assuming that there was not a large enough market; however, what has been revealed through AD development and production is that the market, and the disabled population defining and claiming that market, is much larger than anticipated.

Influence of Sports

A further contribution to AD development is in the realm of sports. As mentioned in Chapter III, the roots of the Paralympics can be traced to 1948, when a doctor by the name of Sir Ludwig Guttman launched a Stoke Mandeville Games in Aylesbury, England as an outgrowth of his rehabilitative work with spinal cord injured World War II veterans (Howe 2008). Initially, these sporting developments were simply tools to be used to help

injured veterans return to "normal" social lives and return to the workforce; however, the games began to develop competitive aims, heightening attention to the skillful prowess of these athletes with disabilities. The Paralympics accentuated the focus on ability and, in fact, promoted the notion of a "super-abled" body, sometimes connoted and critiqued as a "supercrip"[34] image, which overly emphasizes disabled people as heroic and inspirational for "overcoming" their disability/impairment (Schalk 2016). Despite a possible negative "supercrip" image, the Paralympic emphasis fueled beneficial skill development and professionalism for disabled athletes and, consequently, it spurred new technological developments. With sport, AD development became more specialized (Howe 2008). Wheelchairs needed to be adapted to help individuals with disabilities race, play tennis, and fence, etc. (Howe 2008; Pallis 2003). In this context, new technological solutions (e.g., lighter weight metals, new wheel frame designs) emerged to increase speed demands, turning needs, comfortability, etc. More importantly, the broader visibility of people with disability in competitive sports turned these individuals into legitimate athletes.

Further Technological Evolution

According to Woods and Watson, the BEC powered wheelchair, developed by Raymond Biddle, was one of the most successful due to its maneuverability and reliability (2003). In the late 1970s and early 1980s, it "set the tone for powered wheelchair technology" (Woods and Watson 2003, 170). It was noted for its "fold-

[34] For a more thorough understanding of the super-crip narrative and critique in disability studies scholarship see: Schalk 2016.

ability" and lightness, as well as its turning ability. A confluence of factors stimulated its success, including media promotion, responses of users and, in consequence, its profitability. Still, there were difficulties with BEC's use, which prompted newer innovations with the advent of microprocessor technology enabling programmable and remote controllers. These advances created new possibilities for increased further reliability, profit gains, and ease of control (Woods and Watson 2003, 172).

Powered mobility not only brought about changing societal perceptions, impacting policy and resource allocation, it also helped transform disabled people's views of themselves. The newfound freedom and independence created a sense of empowerment for the disabled body. The AD helped embody and physically actualize ability. For some individuals, manual wheelchairs relegated them to being pushed by others, whereas the power chair reformulated independence by supporting the user's sense of themselves as fully actualized, able human beings (Woods and Watson 2003, 172).

In summary, innovations in wheelchair technology have been largely driven by changing social and political contexts, including the economies and ideologies of war, as well as rehabilitative practice and medicine, capitalism, sports, and disability activism. In the process of this evolution, disabled bodies moved from social positions of passivity, dependency, and inequality to positions of improved independence and empowerment. However, while disability was being reformulated to deconstruct abled/disabled binaries, there were simultaneous limitations with this reconstruction. ADs conceived of as "wheelchairs" post-World War I increased the visibility of disabled-abled bodies;

however, they also had the problematic effect of marginalizing and excluding other bodies of disability (e.g., vision impaired, hearing, intellectual disability, etc.). AD design became largely focused on wheelchairs to the exclusion of other possibilities.

New issues of access came to the fore as well, such as access to education, work, and recreational activities. Further, difference was simultaneously accepted and reified with wheelchair development. For instance, the provisions of "accessible spaces" for wheelchair users further boxed in and emphasized the split between "normative" and "non-normative," or "abled" and "disabled" people within shared spaces. The problems and limitations of addressing the full spectrum of disability with effective egalitarian solutions continue to persist in the contemporary milieu of disability and device design. Each technological evolution, while solving some issues, simultaneously creates other challenges, making traversing the technological design terrain a complex venture. One major question then becomes: How is difference effectively acknowledged and fully embraced without reinforcing separation? In the next section, I turn attention to contemporary conceptual models and design paradigms in which this question remains an impetus for further shifts in thinking about disability and the design of ADs moving towards integration.

Contemporary Approaches to Assistive Technology: Conceptual Models and Design Paradigms

In the late 20th century and continuing into the 21st century, AT design/development was influenced by the disabling effects of war, disease, and the on-going socio-political activism in the disability/disability studies field. However, more nuanced concerns arose in the literature calling for more device options in general and

options which further increase quality of life (Alper and Raharinirina 2006). Legislation such as The Assistive Technology Act of 1998 (amended in 2004) is one indicator of this direction in more nuanced design thinking due to its reconceptualization of disability. The Act states:

> Disability is a natural part of the human experience and in no way diminishes the rights of individuals to live independently, enjoy self-determination and make choices, benefit from an education, pursue meaningful careers, and enjoy full inclusion and integration in the economic, political, social, cultural and educational mainstream of society in the United States. (Alper and Raharinirina 2006, 47)

The Assistive Technology Act of 1998 also indicates recognition of technological progress as an economic engine with benefits to individuals *with and without disabilities*. In former modes of thought, disability needs were often thought of as economically burdensome and without benefit or gain to society at large. The reconceptualization of disability as "a natural part of the human experience" suggests a relatively new paradigm of thinking about AT, recognizing it as a global issue for not just select individuals but for everyone. Also, in this paradigm, independence is highly valued, along with education and work-related pursuits as "rights." This later 20th century reconstruction of the meaning of disability is important for framing how assistive technology can ideally serve and enhance the life of a person with a disability.

The voices of people with disabilities are increasingly present in qualitative studies of disability and AT design. Chin and head control systems, tongue control, voice control, eye tracking, and thought control systems all indicate a move toward greater diversity in wheelchair and other AD design (Barea et al. 2002; Huo and Ghovanloo 2010; Megalingam et al. 2013; Simpson and Levine 2002). Smart wheelchair

technologies, including Android capabilities, have added additional possibilities for chair operation and, thus, scope of users (Kim et al 2012; Zafar et al. 2014; Milenkovic, Milosevic, and Jovanov 2013; Santhanam and Viswanathan 2013). However, AT/AD design and development still have further to go with regard to effective use, broader reach, and attention to quality of life.

The International Organization for Standardization (ISO) and the American National Standards Institute (ANSI) in conjunction with RESNA, The Rehabilitation Engineering and Assistive Technology Society of North America, have worked to develop standards for assistive device design and evaluation. These organizations are non-governmental, independent organizations made up of voluntary members. The organizations focus strongly on safety concerns as the ISO website[35] states in their intention: "They [the standards] give world-class specifications for products, services and systems, to ensure quality, safety and efficiency" (2014). One might ask here who is defining quality and how is that "quality" defined? As well, how do safety, quality, and efficiency concerns interact? Or, are they taken as separate, isolated elements? In terms of wheelchair standards the ISO list is extensive and includes dynamic stability tests, braking effectiveness, energy consumption, overall maximum dimensions, weight, turning radius, seating and wheel dimensions, flammability, and an entire host of other measures of concern for the device. The focus seems to be connected to logistical material conditions of the physical environment, but how does this focus interface with the social environment and/or the desires of individuals?

[35] See http://www.iso.org, search "wheelchairs".

Despite the existence of such organizations of standardization, there appears to be a lack of consistency in how assistive devices are evaluated and, hence, how designs progress or are developed. It is also unclear what the relationship of these practical standards is in connection to various assistive technology conceptual models discussed in the literature. While conceptual models discussed in the literature seem to create a more comprehensive view of disability and assistive device aspects, the regulatory organizations seem to adhere to a more unidimensional, functionalistic view. Perhaps this indicates a chasm between theory and practice. Researchers in the field of assistive technology, who are usually rehabilitation specialists, health professionals, assistive technology professionals (ATPs), and engineers, have called attention to the problem of inconsistency and inadequacy and have focused upon the need to find an adequate "predictive model" for the use and assessment of assistive technology (Lenker and Paquet 2003).

Towards this need for developing predictive models, a series of various conceptual models have developed; yet none have fully realized the predictive theory needs for the field. It is not my intent here to perform a comprehensive review of the full variety of conceptual models existing with regard to assistive technology; rather, I am interested in finding basic themes or commonalities in the models which are discussed frequently and then examining how and in which ways design priorities surface in the approaches of these models. Furthermore, I am interested in exploring how a dance lens interacts with these conceptualizations.

Conceptual Models

According to Lenker and Paquet, who conducted and published "A Review of Conceptual Models for Assistive Technologies Outcomes and Practice," a fundamental commonality amongst the models' approaches is the foundational basis of each in social psychology (2003). The person-environment-behavior model proposed by German-American psychologist Kurt Lewin in 1936 asserts that behavior is the function of the person in his or her environment. Assistive technology outcomes and practice models use this idea to address the "fit" of devices in relation to an individual's goals, abilities, and environment. In the assistive technology theory arena, the goal is to enable "congruence of AT devices with individuals and their contexts of use" (Lenker and Paquet 2003, 3). For instance, in the Human-Activity-Assistance Model (HAAT model), four dimensions are considered: human, activity, assistive technology, and context (Lenker and Paquet 2003, 4). The human component consists of sensory, cognitive, motor capabilities, and acquired skills. The activity component consists of self-care, work and school, and play and leisure activities. The assistive technology component consists of a "human-technology interface; a processor; and an activity output" (4). The context component consists of both social and physical contexts (including temperature, light, and sound). Here, at least theoretically, the importance of physical **and** social space is indicated through concern for environmental factors and the individual's surroundings and contexts in correspondence with the device design. The environmental component also aligns well with the social model of disability. And, for the specific purposes of this dissertation research, it can be noted that the goal for "congruence of AT devices" with body and

environment has a parallel in the dance context, where dancers work towards a thoroughly qualitative embodiment of the device in ways that merge all 4 dimensions of the HAAT model: human, activity, assistive technology, and context.

One indication that designs for assistive technology (devices) still have more room for development is the amount of research indicating the rate at which devices are abandoned or underutilized (Phillips and Zhao 1993; Roelands et al. 2002; Wessels et al. 2003). This research is shedding light on the complications of human interfaces with devices and, in some cases, heightening attention to the dynamics of both physical and social space and embodiment concerns. In "Predictors of Assistive Technology Use: The Importance of Personal and Psychosocial Factors," Scherer et al. state that "approximately 30% of obtained ATs are discarded within a year" (2005, 1323). In their study, they attribute this largely to inadequate assessment of the user's needs and preferences and the need to account for personal and psychosocial variables. They recommend (and validate) the use of the Matching Person and Technology (MPT) model as the most ideal way of predicting a match between person and technology.

The MPT model addresses three major prongs: milieu/environment, consumer personal and psychosocial characteristics, needs and preferences, and functions/features of the most desirable and appropriate technology (Scherer et al. 2005, 1322). The model was developed through grounded theory research with ten adults with physical disabilities (spinal cord injury and cerebral palsy) (Lenker and Paquet 2003). The user, in conjunction with the professional provider, work together over a series of two or more meetings to address these three main areas. The Assistive Technology Device

Predisposition Assessment (ATD PA) is one of the assessment forms used and is comprised of 54 items (three sections) encompassing quality of life and well-being questions and personal and psychosocial characteristics questions. The researchers in this study sought to statistically correlate two areas of the ATD PA (and thereby further validate the MPT model). The two areas correlated the quality of life and well-being questions specifically (12 items) with the personal and psychosocial characteristics (33 items) to determine how well these two areas predicted a person-device match. Personal and psychosocial question items ask yes/no questions about mood, self-esteem, self-determination, autonomy, family support, friend support, therapist and program reliance, and motivation to use support (e.g., "I am often frustrated or overwhelmed"), while the quality of life items ask questions about *how satisfied a person is* in such things as social relationships, recreational involvement, freedom to go wherever desired, emotional attainment, autonomy and independence, and fitting in and belonging on a 5-point Likert scale (Scherer et al. 2005). The researchers conclude by suggesting that their research indicates statistical validation of the instrument and thus MPT as a useful model.

Similarly, researchers, such as Pape, Kim, and Weiner, bring attention to how "individual meanings" are assigned to AT, shaping the person's choices in using it (2002). Individual meanings and, thus, AT use may reflect social stigma and symbolize abnormality or may also symbolize a reminder of skills lost or death – "nearing the end" (2002, 15). The authors point to the importance of reformulating one's self-concept in the process of utilizing an AT. This process encompasses body image, competence, values, and goals. While AT use may enhance independence, it may not match the user's

identity. Identity, of course, is also shaped by socio-cultural norms and develops through relational processes with others. Therefore, social expectations and perceived roles, as well as cultural conditions, affect the use of AT/ADs. One study reported that in Anglo-Canadian families rehabilitative "normalization" was privileged over "the happiness and contentment" of the child, with the latter being emphasized in Chinese-Canadian families (Pape, Kim, and Weiner 2002, 17). These cultural preferences then shaped the attitudes toward AT/AD use.

Relatedly, but with exclusive emphasis on the psycho-social impact, researchers in the area of psychology draw attention to the need to examine psycho-social aspects of the design of assistive technology, recognizing the social space in which users engage as significant to how users feel about their assistive technology. Researchers Jutai and Day developed an instrument specifically to measure these psycho-social aspects (2002). Termed the PIADS, Psychosocial Impact of Assistive Devices Scale, the instrument has been validated and utilized by multiple researchers examining device effectiveness and utilization (Jutai and Day 2002). Psychosocial is defined as, "factors within the person and factors attributable to the environment that affect the psychological adjustment of individuals who have a disability" (107). The 26-item self-report scale was developed out of qualitative focused research groups with AT users, literature on personality research, and empirical explorations with the Pleasure-Arousal- Dominance scale.

Also of note in how the PIADS was constructed, is that the researchers attempted congruency with quality of life perspectives based on current frameworks in disability and rehabilitation research (Jutai and Day 2002, 108). Quality of life is defined as "the

degree to which the person enjoys the important possibilities of his/her life," a definition borrowed from Renwick et al. (Jutai and Day 2002, 108). Items on the scale include such concepts as competence, happiness, independence, adequacy, quality of life, frustration, sense of power, and sense of control. The researchers conclude that potentially personal control and self-efficacy are the most promising "psychological conceptualizations for developing a user-focused, environmentally sensitive understanding of AT adoption and retention" (Jutai and Day 2002, 110).

Collectively, these conceptual models for AT practice illuminate a needed, yet complex, path for the evolution of AD/AT design. The researchers point to an entire system of variables which need to be synchronized in order to achieve a successful person-device relationship. For the purposes of this research, I am also proposing that the use of AD/AT within a dance performance context may add relevant, complementary, and effective lenses, or even a type of methodology for future research, into how these multiple environmental, personal, and psycho-social variables coalesce in vivid and corporeal ways for the user of AD/AT devices.

Design Paradigms

As can be seen in the preceding sections, researchers are calling attention to the issues of disability construction and device use and challenging design in doing so. In addition to the conceptual models introduced earlier, there are a number of design paradigms which surfaced in the late 20th century and then continued to evolve with specialized delineations. These paradigms often share similarities to the conceptual ideas described in the preceding section, with many having overlapping aspects and terms that

are used interchangeably. In general, the paradigms emerged out of the fields of architecture and industrial design with influence from the field of psychology. Universal design, inclusive design, ability-based design, emotional design, interaction design, and human-centered and user-centered design are all often used terms within these design paradigms and further suggest useful ways of thinking with regard to both the construction of disability and assistive technology design. The terms focus on the personal attributes and needs of the individual, recognizing human diversity foremost.

Researchers Newell et al. (2011) make three distinctions regarding current approaches to design, to include mainstream design (focusing on abled-bodied individuals in general), disabled-only design (focusing on people with disabilities only), and universal design or design for all (an inclusive approach to capture the widest range and diversity of individuals). Traced to Selwyn Goldsmith's architectural descriptions in the 1960s, universal design or inclusive design, is a paradigm which seeks to include the elderly and other disabled populations in design approaches with "abled-bodied individuals." Philosophically, it seeks the inclusion of "all" abilities in the design approach. Additionally, it seeks the involvement of people with disabilities in the design process. The critique of this approach has been the difficulty of practically implementing it to attend to such a widespread notion of diversity. Instead, variants have emerged, such as "User-Sensitive Inclusive Design," which attempts to address user specifics in disabled populations and narrow the broad, grandiose brushstroke of "universal design" (Newell et al. 2011). In the user-sensitive inclusive design paradigm, Newell et al. describe certain concerns of disability for the designer to address at the outset, such as: (1) the need to

engage with medical personnel in designing for disability, (2) that users may not be able to communicate their thoughts, (3) that it may be difficult to obtain informed consent, and (4) that payments may conflict with benefit rules. To address these concerns, the authors replaced "user-centered," a traditional design approach practice, with the term "user sensitive" to refer to the fact that "it is rarely possible to design a product that is truly accessible by all potential users" (Newell et al. 2011, 237). The term is also meant to signal an empathetic, responsive relationship with the user, rather than a more sterile approach of user as "test subject." Further, the authors suggest that a "meaningful relationship" should be developed with users in the design process. This notion of user-sensitive inclusive design aligns with other approaches, which intentionally involve people with disabilities into the design process throughout, including participatory design and empathetic design (Newell et al. 2011; Norman 2013).

Ability-based design is another variant, which intentionally moves "ability" to the foreground. Two principals, amongst a list of seven, are required in this approach:

(1) Ability – Designers will focus on ability, not dis-ability, striving to leverage all the users can do.

(2) Accountability – Designers will respond to poor performance by changing systems, not users, leaving users as they are. (Wobbrock et al. 2011, 11)

Therefore, in ability-based design, binary distinctions of disability and ability are again blurred in favor of a more all-encompassing view placing the focus on ability and supporting a social model approach to environmental barriers. The researchers working in this paradigm critique some AD design approaches for the ways in which they create inefficient "add-ons" to the person, rather than examining and changing the design as a

whole. The researchers suggest that often AD interfaces, such as a mouth stick to type on a keyboard, may negatively affect a person's dignity and require the person to accommodate to the device. Instead, the researchers posit that the design should accommodate to the user's needs as opposed to the user accommodating to the device design (Wobbrock et al. 2011). For instance, reconfiguring the computer system to not necessitate a keyboard at all might be a more effective solution enabling the user to engage with another type of sensory input (e.g., voice input or eye tracking input). Although this approach is applied to ADs in the form of computer systems, it is a useful paradigm in thinking about all forms of ADs, such as mobility aids.

Several researchers also suggest that emotional and aesthetic responses are often left out of design processes, especially designs for people with disabilities (Alper and Raharinirina 2006; Desmet and Dijkhuis 2000; Newell et al. 2011). Newell et al. state: "Many products designed for older and disabled people show evidence that the design team do not engage emotionally with the user groups: assuming that older and disabled people lack aesthetic sense and unlike other user groups are motivated entirely by the functionality of the products" (2011, 237). The "function-only" priority is seen, therefore, as problematic in fully serving the user. Through these types of observations, designers both in and outside of disability have urged "emotion-driven design," and "human-centered design," which reprioritize focus from simple "function" to the unique experiences and needs of human beings, acknowledging the linkage between cognition and emotion (Norman 2004, 2013). The link between cognition and emotion is often tied by differing theorists in the field of emotional design to how humans moving in their

environments relate to and feel about the objects they use in order to function within those environments. Despite the unceremonious attitude we, as humans, might have towards the "stuff" we use, we simultaneously treat things and objects in very potent embodied and emotional ways. From cell phones, to cars, to paper clips, to pictures, jewelry, and personal grooming products, objects play consistent, compelling, and powerful roles in our lives. Sherry Turkle, author of *Evocative Objects: Things We Think With,* summarizes this notion**:**

> We find it familiar to consider objects as useful or aesthetic, as necessities or vain indulgences. We are on less familiar ground when we consider objects as companions to our emotional lives or as provocations to thought. We think with the objects we love; we love the objects we think with" (Turkle 2007, 5).

The emphasis in Turkle's book is that the "object brings together intellect and emotion" (2007, 5). However, the relationship of person to object is not solely based on good, logical functionality; instead, the object is treated as "a companion in life experience" (2007, 5). For example, in Turkle's book, a diabetic discusses his intimate relationship with his glucometer and a woman discusses the meaning of her ballet shoes to her dancing life. Objects may indicate major transitional moments in a person's life, important connections to experiences and people of the past, or they may concretize the present.

In thinking further about object/device relationships, Bruno Latour's actor-network theory is a faciliatory perspective from which to analyze the role of objects. Latour criticizes traditional sociological approaches for the ways in which objects are dismissed or forgotten as less relevant than people in a network of relationships. Instead, Latour gives equal consideration and weight to objects as the often hidden structures

influencing social dynamics and assemblages. Latour states, "as soon as you believe social aggregates can hold their own being propped up by 'social forces', then objects vanish from view and the magical and tautological force of society is enough to hold *every thing* with, literally, no thing" (Latour 2005, 70). He even suggests that objects have agency. Latour designates actor-network theory (ANT) as an approach to the social, which is "an association between entities" rather than an extracted linkage explaining social behavior and emphasizing human action primarily (Latour 2005, 65). The definition of "actor" is not isolated to a human being. In fact, the actor/agent/entity, as Latour refers to it, may be anything as long as it is the source of an action and in order to define it one must excavate its attributes — its network (Latour 1996, 373; Latour 2011, 800).

Latour asserts that the definition of the "social" ascribed by sociologists is flawed in that it privileges humans exclusively with acts of agency and the ability to have meaningful intention. For Latour, agency (the ability to act) is also revealed through objects. For example, a knife *cuts*, a fork *stabs*, a cleaning agent *removes* dirt, a railing *prevents* falling (Latour 2005, 71). Latour stipulates, however, that the attribution of agency should not be conflated with causality. In other words, the object may not be the cause of the action, but nevertheless it acts. While humans may be involved in the causation string, objects are not to be erased or de-valued in the network of relations. "ANT is not an empty claim that objects do things 'instead' of human actors: it simply says that no science of the social can even begin if the question of who and what participates in the action is not first of all thoroughly explored" (Latour 2005, 72).

Latour claims that "in addition to 'determining' and 'serving as a backdrop for human action', things might authorize, allow, afford, encourage, permit, suggest, influence, block, render possible, forbid and so on" (Latour 2005, 72). In the case of an assistive device, this concept becomes useful for recognizing how the device authorizes or permits a human being to move and occupy space.

In a parallel manner to Turkle and Latour, design theorist Don Norman draws out the impactful role of objects and things through his explicit theories of *emotional design*. Norman states: "A product is more than a product, it is a relationship that drives multiple relationships." (Norman 2015). In his work, Norman explains the ways in which cognition and emotion are inextricably linked. He asserts three aspects of design: visceral, behavioral, and reflective. Norman further asserts that all good design should be attentive to all three. The visceral level refers to visual appearance, behavioral relates to the pleasure and effectiveness of use, and reflective refers to the intellectualization and rationalization of the product or device (i.e., how it tells a story or what it represents) (Norman 2004, 5). Norman predicts of chair designs:

> Modern chairs will be intelligent, anthropomorphic, sensing, dynamic, capable of altering their shape, form, and function. Some chairs might come when called, others might lift people to reach high-up objects, and yet others might socialize with like-minded chairs, forming moving patterns across the room as they travel to wherever they might be most useful. These 21st century chairs are social, aiming to please. They will be active servants, relationship builders, and enablers of social interactions. (2015)

When thinking of the assistive device in this manner, the true partnership between person and device rises to prominence. Intriguingly, Norman was not referring to wheelchairs or assistive devices for disability in his description above; however, I find his

futuristic description resonant with the creative, embodied kinesthetic design I propose for AD design from a dance perspective to be discussed in Chapter VI.

Industrial designers Desmet and Dijkhuis also foreground the importance of "emotional design" in their article, "A Wheelchair Can Be Fun: A Case of Emotion-Driven Design" (2000). The designers in the article posit that wheelchairs in general have an unpleasant emotional impact; thus, they pursue a new design of a wheelchair for children which is emotion-driven and which assumes as its design starting point the children's and parents' emotional reactions to the design. While Desmet and Dijkhuis acknowledge the myriad differences of emotional responses individuals have to products in general, they suggest that it is still possible to develop a method for assessing users' emotions and then attend to those emotions. They employ the Product Emotion Measurement Instrument (PrEmo, a tool formerly used in assessing automotive designs and chairs) as their tool for compiling emotional responses and interview both parents and children on their opinions of various designs.

What is particularly unique and unusual in this study, compared to the majority of assessment and design measures for assistive technologies, is how the researchers chose to privilege emotion, rather than basic usability and ergonomics as the design priority and lens. The authors assert that a wheelchair for children should help children explore and play. Implicit in this statement is that the researchers recognize the spatial ways in which children interact with their bodies in connection to their environment. Different from the broader psycho-social measures, which include the use of some emotional language, this approach more directly attends to emotional words such as disgust, boredom, amusement,

fascination, and surprise. With an accent on exploration and play/creativity, the nature of "assistance" and the nature of "disability" is re-defined. In this context, the design goal is to facilitate interactive creative exploration; thus, cultural codings and neat distinctions of disability and assistive device tend to be subsumed. Also, the emphasis becomes more on the significance of social space and intercorporeality — bodies interacting and sharing spaces interdependently.

Researchers in the field of embodied cognition have similarly contributed to these current trends in design and product thinking. Embodied cognition promotes that "human thought and knowledge are inherently and fundamentally perceptual and that the meaning of objects and situations is based on how a person's body can interact with them" (Kreuzbauer and Malter 2005, 169). Thus, embodied sensory experience such as sight, smell, touch, and sound become more central to design in this view. In traditional knowledge-process views, knowledge is understood to be represented by non-sensory symbols and the world is translated cognitively as an abstract mental language of associated symbols or "associative semantic networks" (Kreuzbauer and Malter 2005). In an embodied and emotionally-based view of design, shape, touch, and bodily engagement aspects of the device become a priority.

In *The Meaning of the Body* (2007), philosopher and scholar Mark Johnson also makes the case for embodied meaning-making. He grounds his assertions in phenomenology, linguistics, and the cognitive sciences. Johnson asserts:

> An embodied view of meaning looks for the origins and structures of meaning in the organic activities of embodied creatures in interactions with their changing environments. It sees meaning and all our higher functioning as growing out of

> and shaped by our abilities to perceive things, manipulate objects, move our bodies in space, and evaluate our situation. (2007, 11)

Therefore, Johnson suggests that all thought and concept development is body-based. In this view, body and mind exist as an integrated, interdependent unit, not separate entities, and the body is in perpetual interaction with the environment, both material and social, in order to make sense of the world. When Johnson refers to environment, he is attending to spatialized experience and knowledge. He emphasizes:

> There is no movement without the space we move in, the things we move, and qualities of movement, which are at the same time both the qualities of the world we experience and the qualities of ourselves as doers and experiencers…We put things into and take things out of containers, and so we learn about containment. We experience linear versus nonlinear paths of motion, whereby we develop our understanding of trajectories. We feel various degrees of exertion and force, and we thus learn what level of exertion is appropriate for moving ourselves from one place to another and for moving objects of various weights. Feeling what it takes to cause an object to move from one place to another is a core part of our basic understanding of physical causation. (Johnson 2007, 20-21)

In the recent developments in interaction design,[36] the body in motion has become a central topic of discussion (Fogtmann, Fritsch, and Kortbek 2008; Klemmer, Hartmann, and Takayama 2006; Loke and Robertson 2013). Practitioners and researchers in what has been termed Kinesthetic Interaction Design,[37] or KI, have come to realize that stilling the body's motion potential during interaction with a device or environment is not ideal for physical health or fulfilling engagement in the world (Fogtmann, Fritsch, and Kortbek 2008). Instead, these practitioners are looking more broadly at what the whole body is

[36] Interaction Design is generally defined as the design of user interfaces for machines and software, such as computers, and electronic mobile devices. It focuses upon the design of digital experiences and environments.

[37] Kinesthetic Interaction (KI) is defined broadly as: "when the body in motion experiences the world through interactive technologies." See Fogtmann, Fritsch, and Kortbek 2008.

doing and how it is doing it, when interacting with computer-based technologies. However, it seems the emphasis is still somewhat mechanical in nature, focusing upon the science and physiology of the body: motor skills, abilities, and sensory apparatus. The emphasis on creating a *relationship* with and through the technology seems a bit sterilized in this context. Dance, in its embodied movement artistry, suggests a design approach more intensely linked to the desires, intentions, and expressions of the human soul — the deep inner landscape of a person's identity. I submit that these body and movement-centered design approaches, such as KI, strongly direct attention to the experiential landscape of dance, in which the body in motion is the primary agent of meaning-making. Because of this emphasis, this dissertation research focuses on how the performance of dance might help shape the future transformation of wheelchair design (and object/device design in general). On the dance stage, assistive devices, such as wheelchairs, are being re-fashioned through performance rigor and creativity, signaling new potentialities for design. These ideas and practices will be discussed in the following section and in further detail in Chapter VI.

A Place for Dance in the Design World

Intriguingly, the areas of concern for assistive device effectiveness such as "individualized meanings," "psycho-social" factors, and "personal needs and preferences" identified in the preceding sections, materially manifest in the embodiment of dance (Jutai and Day 2002; Pape, Kim, and Weiner 2002, 15; Scherer et al. 2005). Dance is a landscape in which unique bodies, including bodies of disability, explore their experience of embodiment with and without devices (assistive or otherwise).

Embodiment is the notion that the body, in all of its tactile-kinesthetic sensory qualities, generates meaning-making and is a central and primary source of knowledge (Johnson 2007; Parviainen 2002). Dancers are engaged in a constant act of embodying, generating and expressing ideas first and foremost through nuanced qualities of the body in motion. In this act of moving and bodily interaction, an individual comes to know self and environment (Johnson 2007). The embodiment experience in dance has been referred to as "indwelling awareness" as well as a "style of knowledge" (Parviainen 2002; Sheets-Johnstone 1999). Embodiment is an inroad to identity, to desire, to value formation, to body image, to competence and a sense of agency, many of the variables discussed with regard to assistive device use and design (Iwakuma 2002; Standal 2011). This is where the dance lens intersects with some of the contemporary ideas in the assistive device literature, and, more importantly, dance *physically* epitomizes their meanings, modeling an active representation of human-device integration through embodiment.

Additionally, in surveying the aforementioned selected design paradigms, including universal design, inclusive design, ability based design, emotional design, human-centered, and user-centered design, the common philosophical aspect they share is a focus on the personal attributes and needs of the individual, recognizing human diversity foremost. Further, interaction design and kinesthetic interaction design place emphasis upon full bodily movement as a fundamental point of departure for computer-based design. These contemporary design paradigms reside in contrast to traditional engineering design approaches which focused on utility, safety, reliability, cost and efficiency, and tended to be driven by ableist perspectives (Norman 2013, 218). Also,

with regard to assistive device design, the user-centered design paradigms are situated in contrast to a purely medical model approach, in which the body's perceived functionality is the focus, and other issues of quality of life and the expressive life of a person are largely ignored in the prescription or design of the assistive device.

Dance pushes these user-centered design paradigms exponentially further. As a moving art form comprised of human bodies, dance activates the theoretical, crystallizing design possibilities in a material way. It gives form to a concept making it visible and palpable. Dance forces us to grapple with the inevitable bodily assemblages it produces and their meanings to the mover and the viewer. Because assistive device design (and, in fact, all types of device design) involves human bodies in motion, dance can play a significant role in the world of AD/AT design. Dance paired with disabled bodies radically ignites the possibilities of design. This idea is poignantly captured in a personal email communication on April 24, 2014 with power chair dancer Frank Hull,[38] in which we were discussing the nature of disability. He queries and then discusses his insights to his query:

> What would the world be like without disability or illness? It would be tragic because I would not be the person or the dancer that I am today. For me a world without physicalities, sexualities, spirituality's and different points of view would be rather boring. Let's take the simple example of my mobility device. Why invent such a device if people like me did not exist?

For the purposes of this research, I assert that when the duet between dance and disability is placed in relationship to assistive technology design, at least three important

[38] Frank Hull has also been a research participant in my Rolling Dance Chair Project research over several years and he took part in the research for this dissertation. This research will be further discussed in Chapter VI.

aspects surface: (1) The device as “medical aid” is transformed and re-defined as a creative, embodied instrument of expression, and art-making; (2) The intercorporeal facet of AT is foregrounded, and (3) The importance of the moving body is magnified, with attention to the spatial illuminated. All three aspects confront negative stereotypes of disability and socio-political barriers while re-orienting design priorities. Therefore, I argue that dance is perhaps the most radical and the most radically positioned for inciting productive, helpful change in how design is conceptualized and how individuals with disabilities are frequently viewed.

Assistive Device as Medical Aid Transformed in the Act of Dancing

ATs and ADs, in the broad conception asserted earlier in this chapter, have been present in dance since its beginnings. Choreographers and dancers frequently sought out bodily extensions in the form of unique costumes, headwear, footwear, and transport devices, such as flying wired extensions and aerial silks to expand their movement and artistic potential. Chairs (including rolling chairs) have been regularly used in the modern/contemporary dance genre as choreographic devices. Therefore, in dance, the incorporation of objects or devices into the body is nothing new. One has only to look at the extensive use of devices and apparatus utilized in Cirque du Soleil to see a heightened representation of the way dancers can engage with objects and devices as artistic motion facilitators. In this regard, dance enacts the notion of a creative, embodied design on a regular basis. Given the consistent use of bodily extensions in dance, it would not seem unnatural to include an AD, such as a wheelchair, in a dance context.

The way in which the device is used in dance, therefore, suggests a very different conception of an AT/AD as a "medical aid." Since when have medical aids been tilted on their sides or flipped over in inventive ways to support another dancer climbing on, spinning on, or falling atop the device? *What* the AT/AD is and *how* it is *supposed to* function may be completely altered in the dance context. The wheelchair, crutch, or brace is transformed as a creative, embodied instrument completely outside the realm of traditional "rehabilitation." To exemplify the preceding points, I discuss some of the feedback from several participants who took part in the research for this dissertation.[39] The participants described the positive way in which dance influenced their approaches to their mobility devices. One participant, a manual wheelchair dancer with AXIS Dance Company, described the device as a "partnership growing over time" in which limits are constantly being explored and expanded. He stated that "dance has immensely increased my ability to control and maneuver my wheelchair." Another research participant (Frank Hull), a power chair dancer, described the desire to inject his "soul" or "spirit" into the chair. He seeks this embodied integration and this ideal in how he explores the device through movement as a bodily "extension." He also described the ways in which dance incites him to explore new moving possibilities with his chair in each new piece of choreography. His chair has further been mechanically and programmatically adjusted to better address his creative goals in dance.

[39] Further participant research will be discussed in Chapter VI, when I explain the development of The Rolling Dance Chair Project, a research-based assistive device design project, culminating in the prototype chair's development. For the purposes of the discussion in this chapter, I excerpted relevant quotes about assistive device relationships, which my research participants described through their written questionnaires and verbal discussions.

A third participant, a crutch user, described that over time he has “accepted” the device as “a part of me.” He now associates the device with pride and sees it like a “pair of shoes.” In addition to instilling confidence, dance has also supplied him with new balancing options in using the device in his daily life. A fourth participant, a classical Chinese dancer and manual wheelchair user, described her device as a “helper” and referred to the fact that working with it in dance has helped facilitate her ease of use in daily life. For these dancers with disabilities, the dance context enabled a new way of seeing and exploring their mobility devices thus obliterating the “medical aid” association and revealing the embodiment aspect of the device experience in dance.

As a point of fact, it is important to note that all the participants in my research made technological adjustments to their devices because of their explorations in dance and the desired embodiment they seek. And, in their verbal comments and written responses, they described how future design possibilities could be made to enhance their expressive and performative potential. The crutch dancer seeks a tip with less slippage and a chrome finish to reflect the movement of light; the power chair dancer seeks a refinement of oneness with his device and a desire for a hands-free control; and the manual chair user seeks a balance between stability and interactive motion with other dancers, an issue related to wheel design structure. Similarly, Bill Shannon, the “Crutchmaster,” uses shock-absorbing fuel hoses at the bottom of each crutch to provide an improved grip while mobilizing through space (Davies 2008), and Kitty Lunn, Artistic Director of Infinity Dance Theatre, describes the specialized nature of her manual wheelchair (i.e., very low back support, no brakes) to enable as much upper body

mobility, ease of motion, and bodily control as possible.[40] She is interested in an aesthetic which emphasizes the dancer and not the apparatus, so she has made changes to the chair which de-emphasize the materiality of the chair and heighten the way her body can create motion with it. The 90-degree angle of the seat and the very low back rest both contribute to making her more visible than the chair.[41] Additionally, her choice of five inch caster wheel and non-cambered large wheels are specific to her goals for accuracy in directing the chair straight forward and back, and for turning in a tight circle.

Explorations in dance with assistive devices have taken some time to evolve to the current point in which the device is used more innovatively and expressively, with abled/disabled binaries aggressively broken. In some earlier dance works and in some continuing practices, the device is used conservatively enforcing normative expectations and nothing more, aligning with traditional assumptions about what mobility devices and disabled bodies do and do not do. And, the person using the device is often led, rather than leading, and supported, rather than supporting. In many earlier dance performance practices, one would see the able-bodied dancer performing stunning leaps off the device, while the wheelchair dancer sat rather passively, enforcing ableist assumptions (Albright 2010). Rather than drawing attention to possibilities between bodies, the intent seemed to be to distract the eye away from the person in the wheelchair in favor of the technical prowess of the "able" dancer.

[40] Verbal exchange with Kitty Lunn, during a rehearsal of Infinity Dance Theatre in New York, July 8, 2016.
[41] Phone interview with Kitty Lunn, Artistic Director of Infinity Dance Theatre/NY. August 2, 2016.

Disability scholar Telory Davies expresses that dancers with disabilities who use aids create "new versions of the dancing body" as technology assisted bodies (Davies 2008, 48). Davies describes a piece performed by Nadia Adame (AXIS Dance Company) and choreographed by noted postmodern dance artist Stephen Petronio, in which she utilized her cane as an embodied partner to play with the quality and the reality of instability and imbalance in her body. Apparently, this was the first time Adame used her cane while dancing since other choreographers with whom Adame worked viewed the cane as a limitation and chose to have her supported by another dancer's body or be seated (Davies 2008, 53, 55). By combining disabled imagery, breakdancing isolations, and partnering techniques, Davies asserts that a new aesthetic sensibility in dance was created in Petronio's choreography (2008, 53). This new aesthetic sensibility embraces interdependency with the assistive technology as artistically generative. Adame's reliance on the technology is less about unidirectional dependency due to physical inability (medical aid conception) and more about a creative conversation of risk and discovery. The cane enables Adame's movement qualities, inasmuch as the cane's movement is enabled by Adame's use of it. The cane and Adame are both dependent on each other for the movement which ensues between them, and the cane emerges as another dancing entity in Adame's "solo." Petronio uses the contingent, changing nature of Adame's body with her cane as creative stimulus for conceiving the dance, and inventing the movement vocabulary (Davies 2008, 55).

The "new version" and "new aesthetic sensibility" Davies discusses could also be seen as not only challenging disability and dance perceptions but also equally challenging

AD design (and perhaps product design in general). Dancers with disabilities who use aids not only create "new versions of the dancing body," but also create new versions and models for AD design (Davies 2008, 48). There is a reciprocal effect occurring when dancers who have disabilities engage with their assistive device. Multiple transformations are being enacted, both bodily and in device possibilities. Therefore, the questions for future designers become: How can the crutch design better enable falling/leaning and weight shift? How can the wheelchair fly or jump? How can the form of the device spontaneously morph and respond dynamically to the individual's bodily movements? How can these new designs promote new ways for the human body to move in diverse future environments?

Intercorporeal Facet of AD Highlighted

In viewing the contemporary work of professional, physically integrated dance companies, such as *AXIS Dance Company*, *Dancing Wheels*, and *CANDOCO*, another important aspect emerges with regard to dance and AT use beyond the creative embodiment and transformation of the device out of its "medical aid" association. This is the interplay *between* both abled-bodies and disabled bodies and their related use of the AT/AD, or what I call the intercorporeal aspect. Intercorporeality, a notion traced to the work of Merleau-Ponty, pertains to the way in which body boundaries blend into a shared space of exchange and meaning-making between people (Flynn, Froman, and Vallier 2009). It suggests that bodies reciprocally affect one another in organically, interconnected, and palpable ways. Philosopher Lisa Käll uses the concept of intercorporeality to explain shared pain responses between people. She summarizes:

> An intercorporeal understanding of bodies shifts focus from individual bodies to the constitutive relations between them. The notion challenges ideas of the body as a self-enclosed discrete entity with distinct boundaries and instead brings out a corporeal interconnectedness as the very ground for the individuation of bodies. (2014, 2)

Likewise, scholar Kelly Fritsch urges a "relational ethics of inter-corporeality" foregrounding the importance of relational realities between bodies for all, but especially in the lives of those with disabilities (2010). She critiques independent living models, which "assert a normative encounter between autonomous and sovereign selves" (Fritsch 2010, 1). She counters negative perceptions of caregiving and care receiving and explores the "intimate assemblages" involved in attendant care, in which bodily boundaries blend and extend. She suggests that the emphasis in these relations should be "not on what you can do for me, but on what we can create together" (Fritsch 2010, 12). I extend these intercorporeal notions to dance by thinking about how the assistive device is corporeally involved not only with the user, but how the device is shared amongst multiple bodies, once again ultimately affecting design conceptions for the assistive device.

One example of the intercorporeal use of the device is in the aforementioned Bill T. Jones choreography, in which both disabled and non-disabled bodies move in and out of the wheelchair performing various movement sequences (Davies 2008). Whether this exchange is meant to signal the fluctuating nature of disability and ability, or not, I am not sure, but it certainly prompts the audience to question whether the device is strictly for one person's body. Another example may be seen in another AXIS dance in which non-disabled dancer Sonsheree Giles spins atop the wheel of Rodney Bell's chair in Alex

Ketley's "Vessel."[42] The chair becomes a shared partner in this context. Additionally, in a dance by Ihar Kisialou and Hanna Harchakova, European and World champions in wheelchair ballroom dance,[43] Ihar picks the entire wheelchair up with Hanna in it, spinning her in the air with the chair against his body while he turns. This act emphasizes the embodied nature of the chair with both bodies. All three bodies (Hanna, Ihar, and chair) become part of that intimate, emotional moment. In "Divide,"[44] a dance work by Marc Brew and commissioned by AXIS Dance Company, intricate trio and duet sequences depict the way multiple bodies thread and merge with the device as they all move through space together. At one point, two standing dancers intertwine their limbs with a wheelchair dancer so that they circle as one unified whole, then one dancer launches the front of her body across the back of the wheelchair dancer to ripple onto the other side, as another dancer follows with a seamless back walkover. All three bodies sustain a point of contact throughout, creating a moving amalgam activating and influencing the motion and momentum of the wheelchair. The chair's motions become subsumed into the activity of these bodily assemblages, thus, attuning the viewer to the connections between people.

Further images from the dance repertory of CANDOCO[45] Dance Company depict a wheelchair dancer lying on the floor with wheels upended while a presumed able-bodied dancer holds the lower frame of the chair to tilt off axis with leg extended side.

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[42] *Portland Press Herald*, August 2, 2010. "Physically Integrated AXIS Delivers Moving Performance."
[43] Live performance for "A New Definition of Dance," October 16, 2015, University of South Florida.
[44] Live performance at the Florida Dance Festival, June 24, 2016.
[45] See: http://www.candoco.co.uk/home, "Beheld"

His standing foot is anchored by the hand of the wheelchair dancer; the effect is that the boundaries of both bodies blend. Whether dancers are pulling, pushing, lifting, suspending, flying, inverting, and/or balancing with each other, they both negotiate the use of the AD together. It becomes an integral, shared partner in the entire bodily assemblage.

Interdependence between bodies is portrayed in these interactions, opposing the dependent-only view of disability OR the independent-only notions of disability. As symbol, this staged interaction of abled and disabled bodies flowing together in, with, and through various devices counters the separation systems produced in society, such as the disabled only bathroom stalls and parking spaces, which, while well-intentioned, continue to produce ideas of isolation and separation between normative bodies and others (Fritsch 2013). Instead, in dance, audiences witness the assistive device being equally used by typical and atypical bodies, those appearing with and without disability. In AD design, there is a tendency to place focus mainly on the individual user, forgetting the other bodies with whom that user will contact *through and with* their device. For instance, while a design might enclose or restrain the user for safety, how does the design also attend to the parent, friend, child, and/or spouse who wishes to have access to the person for something as simple as a hug, physical affection, physical play, or collaborative task sharing? How are both people's mobility enabled by the design of the AD? For example, in the design of most manual chairs, handles for pushing are located at the back of the chair. While logically functional, this position provides the caregiver or friend with limited interactive capacities if they are behind the chair pushing. If

interaction between bodies was considered foremost, the design might enable side by side engagement, supporting eye contact connection and easier verbal exchange.

Additionally, if enclosures for the chair (i.e., side and back support structures) and appendages of the chair's "body" (i.e., arm and foot rests) were made more porous or more easily removable and mutable, creating morphability, interactive options might be easier. There is also the issue of materiality: what types of materials would most encourage touch interactions? Metal and hard plastic is usually not the most affection eliciting material. I have seen children attempt to sit in their parent's lap in the wheelchair or a friend or spouse attempt to ride on the back of the chair as a natural tendency for human play and affections, but the chair's structure does not facilitate those efforts very well. How could the assistive device better enable those natural inclinations if it was designed from an interactive/intercorporeal perspective at the outset? For integrated dance purposes, perhaps the device design might also better facilitate the intercorporeal goals by providing more malleable contours or surface areas for physical points of contact and weight sharing, as well as new types of motion (i.e., vertical, lateral, aerial). Ultimately, integrated dance suggests that the device be seen as part of a relational matrix. These future ideas for the device design will be further discussed in Chapter VI.

Body in Motion as Impetus for Design Thinking

In this section, the third aspect of the dance and disability duet, the importance of the moving body and its spatial implications for design thinking is discussed. The art of dance is dependent upon change, specifically changing movement dynamics and changing configurations of forms in space. Dance lives within the space of change. This

ability to create dynamic change is one aspect assistive devices like wheelchairs frequently lack. The device is also not used in an inert, static way separate from the body, but rather in a dynamic, embedded way, suggesting, if not prompting, new design transformations for the device, both in and outside of dance. Bodies of disability prompt new uses for the device as dancers turn their wheelchairs upside down and on their sides, or spin them quickly and sharply in different directions, or tilt the chair off axis. Dancers move in and out of their wheelchairs to the floor and components of the chair (such as wheels) may be dismantled and reassembled as part of the choreography. Dancers do not just sit vertically in their chairs; they upset the status quo expectations. They change the action possibilities, the "affordances," and enliven otherwise static space with vitality.

Affordances pertain to the possible actions between object or environment and organism (Norman 2013). The term originated in psychology and has been applied in the domain of design. Possible actions are determined by the relationship opportunities *between* organism and object or environment. The features or qualities of an organism or object do not determine possible actions; rather, their interactive, reciprocal effects determine these actions. For example, a wheelchair is perceived to "afford" sitting and rolling. However, what dance does is radically expand the interactive possibilities of the relationship thus changing one's perception of what is possible. The wheelchair in a dance context also affords tilting, hopping, side-lying, spinning horizontally and so on — notions encompassing both what the seated dancer or the standing dancer might do. Thus, as a conceptual strategy for design, dance prompts a revision of what disability is while revising traditional expectations for interaction between the individual and the device.

Luca “Lazy Legz” Patuelli is a dancer with disability whose use of crutches aptly illustrates the relationship between organism and object as an impetus for creative design. Patuelli was one of the research participants in my study, and participated in a full-length performance of international professional dancers with disabilities in an event entitled “A New Definition of Dance.”[46] In his breakdance performances, Patuelli uses his crutches like another pair of legs. In breakdancing, dancers change their body support surface quickly and in variable ways, transitioning smoothly from back, to head, to stomach, to leg, to arms, often creating a cyclical flow of weight transition from one body surface to the next. The crutches produce an entirely new repertoire of movement within this genre of dance. Patuelli adeptly balances on them and suspends his whole lower body up in the air. He often appears freer than others who balance themselves on the ground with their hands and are not able to gain the kind of spatial height Patuelli can due to the height attribute the crutches enable. The crutches also enable a pendulum-like bodily swing of the whole lower body, a movement not usually seen by typically-bodied dancers. Acting as alternate points of stability and balance, the crutches enable his body to variably swing, wrap, hop back and forth between legs, and traverse space quickly. In one of his signature moves, he nimbly releases both crutches and hovers in mid-air, letting the crutches fly away. He sweeps down to the ground, catching himself with the weight of his arms. Rather than appearing at all limiting, the crutches become quite obviously beneficial and desirable as a movement extension, supporting new forms of motion.

[46] The New Definition of Dance Event occurred at the University of South Florida in Tampa, Florida on October 12-17, 2015 and the following year as well on October 14 - 26, 2016 covering three cities: Tampa, Jacksonville, and Miami.

Therefore, Patuelli's dance engages rigorous risk-taking, which subsequently requires a certain robustness for the device through which he is working. Of import to the focus of this dissertation chapter, is how this need for robust assistive devices in dance could also support the robust goals in device design for daily living activities: Dance promotes possibilities for full bodied action in everyday life.

Conclusion

This chapter involved a three-part inquiry process. The purpose was to first investigate the major shaping forces in the evolution of wheelchair design and technology, to second examine current assistive device (AD) conceptual models and relevant design paradigms, and, finally, to contemplate how integrated dance, through the use of assistive devices, interjects a complementary and generative force for conceptualizing AD design in relation to these knowledge domains and, therefore, more robust use in everyday life. In exploring wheelchair development, I surveyed various histories to identify that the major socio-political forces shaping wheelchair evolution included war/government, activism, capitalism, sports, and medicine. Tensions were evident in the discussion of wheelchair evolution, pointing to the device as both enabler and limiter. It enables some bodies and not others, and the device itself poses barriers for users in its incongruency with the environment as well as the desires of users, even as it makes mobility possible. This constant tension continues to propel the technology in new directions.

Dance, therefore, inserts a new socio-political shaping influence, sharing similarities with sports and activism influences, yet charting new terrain due to its

emphasis on creativity, individual expression, intercorporeality, and sophisticated motion dynamics. In the integrated dance domain, disabled bodies and abled bodies of many types negotiate their relationships in space, revising hierarchical divisions and expectations while pushing the devices to do more and be more. The union of dance and disability, through the genre of integrated dance, suggests new design conceptions for assistive devices both in and outside of dance, while it simultaneously re-frames negative perceptions of disability.

In examining the conceptual models and design paradigms, I surveyed the main tenets and premises in these approaches to understand what priorities are considered foremost. There is a clear struggle for design to adequately meet the diversity of disability for a variety of reasons. My point of research inquiry sought to find linkages, parallels, and differences amongst the models and paradigms and explore how dance and disability practices interject new possibilities into how these models might be reimagined. Design paradigms of note which seemed to resonate with the body-based meaning-making emphasized in dance, due to the ways they address personal uniqueness, environment, and identity, were: emotional design, human-centered design, and interaction design. While my research illuminated intersecting and complementary points of resonance between dance and these paradigms, I continued investigating whether any distinctions could be found within the dance domain, which would make it relevant and radically generative to existing design paradigms. This pursuit led me to three main ideas as elicited through my research. First, I examined how dance and disability interact to transform the device from medical aid to creative, embodied instrument of expression,

and what this implies for design. Second, I examined the intercorporeal focus of the dance and disability duet pointing to how the device design should attend to *all* the bodies who might interact with the user (e.g., spouse, partner, friend, child). And, third, I examined the way the *moving* body *in space* in dance transfigures how the assistive device should respond and interact with the human body. The centralizing idea is that the device enacts an *embodied relationship* between person and environment.

In order to consider dance as a propulsive design generator for devices/objects, the role of the device needed to be understood for its impact and influence in conditioning and shaping human relationships. I drew from the writings of Turkle, Latour, and Norman to ground and theorize what role the assistive device plays in the lives of individuals. By looking at what dancers with disabilities are doing with their assistive devices, and foregrounding the agency of the device, as another "body," new conceptions for what the device can enable rise to the surface. The words of "partnership," "bodily extension," and "helper," were all themes which surfaced in my research defining the device relationship. From a dance lens then, one might ask the following questions: How does the AD design enable creative embodied expression rather than just "function"? How does the AD design attend to and support dynamic and intimate relationships with others? How may the AD design be transformed aesthetically and tactilely to better match identity, interests, and desires of users? How is the AD a responsive entity, supporting the body in motion?

In the next chapter, I describe a design intervention based on my research and work in the integrated dance field which critically probes these questions and raises

concerns regarding the prioritization of AD/AT design development and application. I worked collaboratively with engineers to create a dance specific wheelchair incorporating new possibilities for materiality and motion based on kinesthetic and embodied practices. Important to me was a view that specifically embraced the notion of interaction with the wheelchair user. In Chapter VI, I discuss the advent of the *Rolling Dance Chair Project* and the research involved in its development and on-going design explorations of the prototype chair. In conjunction, I propose and articulate a dance-based Embodied Socio-Spatial Design paradigm (ESD) with connections to the design paradigms articulated in this chapter, specifically Emotional Design.

CHAPTER VI

A PROTOTYPE INTERVENTION: TOWARDS AN EMBODIED SOCIO-SPATIAL DESIGN PARADIGM

> In the 21st century designers will produce many things besides chairs, many of which will not be objects. Some will be services and experiences, such as healthcare and wellness. Some will be ideas. Is an idea a thing, a product, a service? Whatever they are called, they need to be designed not as isolated things but as complex, interrelated systems, as total experiences. As relationships. (Norman 2015)

Introduction

The former chapter concluded with a research-based analysis of how the dance and disability dyad re-imagines assistive technology design. This analysis highlighted the creative transformation of the device and its intercorporeal, spatially dynamic, and disruptive possibilities emerging out of the embodied nature of dance. In this chapter, I consolidate the ideas generated in Chapters III-V to propose and explore the notion of a dance-based Embodied Socio-Spatial Design paradigm (ESD). I will extend the concepts of embodiment and socio-spatiality, which emerged as major themes in disability and dance contexts, and apply these concepts to the assistive device design. The embodiment aspect highlights the central role of bodily interaction in meaning-making, acknowledging the emotional, felt nature of experience. The socio-spatial aspect highlights the organization and design of space as imbued with meaning due to social conditions.

Dance, as a body-based art form, communicates through embodied kinesthesia. In surveying current design paradigms which were introduced in the previous chapter, there seems to be a growing interest in the body's role, with designers attempting to establish frameworks for integrating the body more fully into products and systems (Fogtmann, Fritsch, and Kortbek 2008; Klemmer and Hartmann 2006). In particular, these paradigms have emerged in the field of Human Computer Interaction (HCI). Theoretical frameworks such as Kinesthetic Interaction design (KI) and Kinesthetic Movement Interaction design (KMI), which are subsets of interaction design, reflect concerns for body and movement in design (Fogtmann Fritsh and Kortbek 2008; Loke and Robertson 2013).

Additionally, the philosophical perspective of approaching disability as a positive invitation for creative invention has generated interest in the design community at large. Graham Pullin's popular book, *Design Meets Disability*, signaled this emerging perspective (2009). In his text, Pullin suggests that disability is a key to design innovation with designers learning from the uniqueness and perceived limitation of disability. He rallies and invites designers (e.g., fashion, product, furniture, and digital designers) to take a deeper look at the various technologies and products for disability and the choices surrounding those products. He encourages designers to see the expressive aspects of the users, to engage more directly with the user, and in general to seek more qualitative (versus clinical/functional) approaches in designing for disability (Pullin 2009). By citing the evolution of eyeglasses as a successful example of a disability product which has in fact become "fashionable" and seamlessly incorporated into the culture at this point,

Pullin challenges designers to engage with disability as an enhancement, not a binding limitation to their creativity.

In thinking further about dance and design intersections, a known hallmark of design thinking is "human-centered design," meaning the design is centered around the needs of people and it is cultivated through studying and observing people, to include how they navigate the world and what they find meaningful within that navigation. Design thinking[47] emphasizes highly creative modes of thought in order to generate many ideas. It also encompasses collaboration, integrative thinking, and a sense of empathy. Similarly, in the dance field, professional choreographers often engage in collaborative modes of art-making, seek nuanced and complex understandings of human experience (integrative thinking), and seek to understand deeply the positions, contexts, and psycho-emotional experiences of other people through physical embodiment (empathy). Therefore, there is the possibility of commonalities between how design thinkers approach their work and how choreographers and dancers approach their work.

As I discussed in Chapter IV, disability offers dance an entirely new means for viewing, teaching, and creating movement repertoire, thus re-defining traditional norms. However, these explorations and redefinitions also require an acknowledgement of the technologies which can mediate disability experience. For dancers with assistive devices (i.e., wheelchairs, crutches, canes), the device has also been creatively incorporated into some, although not all, of this push for artistic rigor. What has not been fully called into

[47] For more information on design thinking see Brown 2009, and Dorst 2011.

critique and effectively analyzed more thoroughly is the device itself. The device design is the subject of critical analysis for this chapter.

Through informal discussions with several dancers and choreographers, I have noted that, at times, the dancer's device, whatever *it* happens to be and however *it* works, can be unquestioningly accepted as an inherent part of the body. I agree that the device is an extension of the body, and it, by itself, may also be considered a body in its own right; however, it should not be completely conflated as THE dancer's body. When conflated as the dancer's body, one loses the finer detail that the device is also its own entity. It has the capacity to separate from the dancer's body. It has the capacity to be altered. It has the capacity to connect with other bodies. It has the capacity to be re-designed to better enable the dancer's goals. It is a distinct entity. Thus, acknowledging the device as a distinct entity, designed by human beings, brings me to a discussion of how I began the process of re-imagining a chair designed with dance and dancers in mind.

My research aligns with the existing momentum in the design field by outlining a dance-based design paradigm attentive to the meaningful nature of movement experience as bodies with and without disabilities dwell and interact in space. In the sections which follow, I employ an explicit design intervention, a currently developed patented prototype wheelchair for dance as the means for theorizing a dance-based Embodied Socio-Spatial Design (ESD) paradigm. Further, I compare the embodiment capacities and spatial implications of traditional wheelchairs with the prototype omnidirectional dance chair using a dance-based Laban Movement Analysis (LMA) framework.

Concepts from LMA serve as a tethering foundation for the dance-based analytical theorization. LMA is a movement observation and analysis framework used in both dance and theatre domains as a valid and useful lens (Barteneiff and Lewis 1980; Newlove 1993; Hackney 2003). Included in this analysis are research participant responses and researcher observations. Participant responses from the research are threaded throughout the following sections and are also incorporated in earlier chapters where relevant to the discussion. The experience of working with participants in the chair,[48] therefore, led me to the development of this proposed design paradigm.

Description of the Prototype Chair's Design

In 2011, I led a team in designing a dance-specific, wireless controlled, omni-directional powered wheelchair over a two and half year period[49] informed by a dance lens and methodology (Morris, Lodato, and Chou 2011; Morris and Rumsey 2014; Morris et al. 2015). The current chair prototype[50] addresses spatial accessibility in the vertical dimension through a manual hydraulic lift and adds sideways and diagonal traveling directions to the existing forward, backward, and turning abilities of the chair through custom-made omni-wheels. Additional movement and design features include:

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[48] It is important to note that the most recent research with participants presented here builds on a ten-eleven-year history, to include prior participant feedback, chair testing, practitioner experience in the field, and formal and informal conversations with those in the dance, disability, and design fields, as well as collaborations with engineers, physical therapists, and other designers. I began the Rolling Dance Chair Project™ in 2005. Multiple phases have occurred in the project over time with several prototype iterations.

[49] Multiple phases have occurred in the project over time with several prototype iterations. This prototype, however, was the first one which integrated the majority of features I had conceived. The prototype on which this research is based came to full fruition in 2013, during the course of my doctoral work.

[50] Another chair prototype design iteration is in progress, which expands and improves upon the current chair prototype.

rotation of the seat independent from the base, four footholds or handholds for other dancers, and the ability to easily remove and exchange seats. In terms of control, the freely mobile wireless control can be placed virtually anywhere on the body (e.g., head, torso, back) or held by hand. The wireless control platform utilized is a smartphone. The simple tilting action of the smartphone propels the device through Bluetooth connectivity (AUTM 2013). When worn on the body, the dancers are hands-free and lean their body to direct the chair's motion. The speed of the chair gradually increases with further tilt of the mobile phone. The phone may be programmatically customized per user with regard to responsiveness and speed. The base of the unit is particularly compact so as to allow close interaction with other dancers (and easy passage through doorways). It is also very stable (non-tipping) with wheels situated securely on four sides to handle the uneven weight distributions and rigor which dance often demands. For instance, several bodies might move together on and off the device, or a dancer might lean back in the chair without concern of tipping. Two safety switches on the device allow the user to quickly cut the power if needed, and the chair may be stopped by the phone controller as well.

Concept of Embodiment Applied to Assistive Devices

The wheelchair serves as a bodily extension one navigates with and through in connection to environmental structures including buildings, stairways, and people. The device, the body, and the environment/space are all aspects of embodiment in the entire socio-cultural relationship when discussing the practices associated with wheelchair users (Gleeson 2012; Pazzaglia and Molinari 2016). Disability scholar Miho Iwakuma further describes the embodiment of assistive devices: "As a process of embodiment, an object

becomes part of the identity of the person to whom it belongs" (2002, 79). The key point of relevance here is the recognition of embodiment as a *process* requiring time with the object (or device) and relating to *personal identity*. Researcher Ovid Standal describes the wheelchair embodiment process in this manner:

> …the process of learning the skills necessary to control the wheelchair is not merely a matter of object manipulation, because in the process of learning these skills, the wheelchair as an experiential object is transformed. In the beginning of the learning process, the learners must attend to their wheelchairs and the movements of their bodies, for instance by controlling the position of the arms on the wheels or the posture of their upper bodies. This makes their efforts somewhat clumsy. But, through sustained practice they are gradually able to attend less and less to the details of the skill, so that the wheelchair becomes a familiar instrument. (Standal 2011, 181-82)

Personal identity signifiers on the wheelchair also reveal and enforce the embodiment process as users gradually adorn their chairs in specific ways, make unique adjustments, and add other visual or comfort-related features to the chair (e.g., lights, stickers, colors, cushions) (Smith 2005).

Another important aspect of the process of embodiment is that it is not only limited to the user, but also occurs in some manner for the spouses, friends, family members, or other dancers who engage with the device as an extension of the individual and an extension of *themselves*. When the wheelchair is touched, several research participants' discuss it feeling as if they are also being touched. Similarly, a friend, or partner/caregiver often feels the chair as a part of their intimate connection to the person (Iwakuma 2002). Thus, the wheelchair is much more than simply a dissociated, neutral "object" of spatial transport from point A to point B; instead, it frequently exists as an

embodied, dynamic socio-cultural shaping force linked to the user's identity, informing his/her psycho-emotional landscape and those with whom he/she interacts.

What interests me in relation to my research into assistive device design is the *level* of embodiment, or the level of bodily[51] congruency which some devices might enable more than others. Perhaps this issue is both a condition of the individual's capacity for embodiment and a condition of the assistive device's capacity for organic interaction with the individual. For instance, it is a common human experience to have felt moments of disjunctive or incomplete embodiment, such as working with a broken or faulty device or using an awkwardly shaped utensil whose contours simply do not conform naturally to the body. Another example might be attempting to wear clothing or shoes that are too small or too large. When the device limitations outweigh its possibilities, the level of embodiment seems limited. However, perhaps some bodies are better able to adjust or adapt to the device, even when it malfunctions or possesses a non-ideal congruency with the body. These are points of intrigue to continue exploring in the body-device-environment embodiment ensemble.

Researchers in the field of embodied cognition and assistive technology have shown that some types of devices become more embodied than others based on their materiality and sensory input, as well as the person's type of impairment and psycho-emotional stance to the device (Pazzaglia and Molinari 2016). Other researchers have similarly noted that the degree to which the assistive device is simply a tool for mobility,

[51] In using the term "bodily" I intend for self-hood and identity to be understood as part of bodily experience, not as a dualistic term separating body from being.

versus a part of one's experiential body, varies amongst individuals and may be attributed to the level of importance and relevance the person associates with the device (Standal 2011). The dance context is uniquely positioned to help reveal and challenge issues of embodiment with the assistive device, enlivening the intersections between bodies and devices. Thus, I ask, how can dance facilitate or train embodiment with the assistive device, as well as serve as a lens for understanding and "reading" levels or types of embodiment?

Concept of Embodiment as Evidenced in Participant Research

In my research with the dance participants working with differing assistive devices, the theme of embodiment surfaced in several ways. First, the way that each participant referred to the device implied that it was more than just an emotionally neutral aid for mobility. It was referred to as, "a helper," "a part of me," "a partnership growing over time," a "good, reliable friend," "an extension of my body," and "support for my expression of artistry." One participant, power chair user Frank Hull,[52] referred to the desire to put his "soul into the chair." Participants also described that the relationship with the device developed over time and involved a process of discovering "possibilities," "opportunities," or "different ways." Luca "LazyLegz" Patuelli[53] referred to the fact that with maturity he "learned to accept" his crutches as a part of him.

Another participant similarly expressed that while his device possesses "limits," it also has created "possibilities." He described that after his injury, he had to discover his

[52] Participant gave permission for his name to be disclosed, and preferred that his name was disclosed in this research rather than remaining anonymous.
[53] Participant preferred to be named.

“new bodily limitations” and “new capabilities” as well as his device’s limitations and capabilities. He discussed the various changes he made in his devices to try to maximize agility, while also retaining the support he needs (i.e., seating angle, and type of cushions). He also described that of the various types of chairs he has tried, no chair has (or will) ever quite meet all his desires and expectations for mobility. He expressed: “There is always an issue of sacrificing one thing for another. It is my experience that no one chair will ever provide me with every movement option that is available to the typical person.” These statements suggest there is a tension that individuals negotiate as they try to embody a bodily extension, such as an assistive device, and that the embodiment process takes time. It also suggests that some devices might promote more embodiment possibilities than others, and some may be more conducive to a fuller embodiment.

Within the participant research, similar, yet slightly different, views pointed to a more nuanced spectrum of embodiment experience. For instance, in terms of level of embodiment, Hull described the desire for a deeply felt soul connection to his device, whereas another participant described that he did not see the device as a part of him; instead, he positioned the device as “a good friend.” Here, there is still an aspect of emotional connection, but with clear boundaries between self and device. Another participant described being “proud” of his device, which indicates a deeper emotional relationship involving self-investment. Conversely, another participant seemed to create a more distant relationship between the dancer and the device, using non-emotional language and stating: “It is my tool and form of mobility that extends my movement

possibilities…. I consider the artist the dancer and the chair an extension of that artistry." In this statement, the participant seems to direct attention to the artistry or expressive abilities coming from the person foremost, with the device positioned more passively as a consequence of the person's intentions. In the following, I discuss the prototype chair explored by the research participants which was conceived and designed with notions of embodiment and socio-spatiality in mind.

In my observations of the research participants using the prototype chair, I saw differences in levels of embodiment. I noticed that all participants worked towards a kind of congruency between their bodily inclinations and the chair's movement. However, this congruency took time and participants had varied approaches. Often, in the beginning, the participants held onto the sides of the seat with their bodies more rigidly held and their torsos often sinking back and down to assume a more protective, bracing posture. For some, there was a more obvious struggling period in trying to negotiate bodily control with the chair's movement. This was also due to variations in types of disability with some individuals needing more supportive features (i.e., back support) to help them gain mobility.

As they began to learn the feel of the device and the control system, I observed a sense of continuity and connectedness developing between person and device. This was manifested in the gradual smoothness of their transitions, their facial and verbal expressions, their bodily postures, and their levels of risk taking. After becoming more familiar with the motion and speed of the chair, the participants would release their hands—often one hand at first, then the other. They seemed to be gradually "trusting" the

device and settling into its capacities, even its agency. At times, smiles or laughs would begin to appear as participants eased into the motion of the chair. One participant remarked:

> There was insecurity in the beginning. It took a few minutes to feel the way I could sit on the chair, the way my body could be positioned. It took a while for me to breathe and let go. It always takes times with a different chair. After a short time, it felt safe. Wrapping my legs and having the cushion also helped.

Further, on the questionnaire the participants were asked to mark the following elements concerning the difficulty level of control for the chair: (1) not difficult at all, (2) moderately difficult, or (3) very difficult. Most of them marked moderately difficult. This was congruent with what I observed in watching them learn to use the chair.

In the sessions in which the participants explored the chair with me in attendance, we always began slowly, working with the chair at a low speed and using simple movements to acclimate the participant to the device. Participants were shown the stop buttons so that they knew they also had control of the device and could stop at any moment. One participant was concerned about safety and listed it as a top design priority on the questionnaire. Given this participant's history, which involved malfunctioning equipment causing severe spinal cord injury, her heightened attention to safety throughout the process made sense. For her, part of the embodiment process was linked to how safe she felt in the device.

As the participants became more familiar and comfortable with the device, I could see a gradual sense of confidence emerge as movement became more expressive and spatially expansive: they began to let their movement instincts manifest through the device. New body orientations in the chair were explored, such as placing the legs over

the back of the seat and hanging upside down or leaning back in a nearly horizontal position. There was a concentrated, almost internal focus I noticed during the process as body and device formed a relationship. I realized I was watching the embodiment process in action.

While many of the participants were initially quiet as they worked with the device, power chair user Frank Hull was more verbal. His verbalizations throughout the process helped me understand what he was doing and how he was feeling. He also had the opportunity to work in the device longer than any other participant, so we had more time to experiment. Consistent exclamations of "oh, wow" and "okay, so if I try. . ." illustrated his bi-directional relationship with the device in which he essentially carried on a dialogue with the device as he figured it out. He was not directing the dialogue to me; rather, he was spontaneously reacting and responding to the motion and feel of the device.

One fascinating aspect of Hull's exploration was how he engaged with the control system. He seemed to be enjoying the complexity of the control rather than becoming frustrated or fatigued by all the potential options the controller might enable. (My hope, as designer, has been to simplify the control to enable it to be as organic and intuitive as possible for the individual.) Currently, the chair controller can be challenging to navigate in some ways and it requires sensitivity and an attentive focus. Thus, Hull's willingness and interest in indulging the complications and the nuances of the chair as it currently exists were surprising. This observation was supported through his written questionnaire feedback, in which he stated:

> The complexity of the controller for this dance chair is wonderful. I love that I have to practice to control this chair. The beautiful fact is that depending on where the controller is placed on your body you need to relearn how to move and dance in the chair. This creates a world of infinite shape within your own body and changes the relationship with the chair. So a dance with the controller on my head will be a totally different kind of dance than if it is in my hand or on a different part of my body and so on. Or, even if my partner is controlling the chair. This creates infinite choice.

It is worth noting that Hull is a lover of dance/contact improvisation and the act of yielding control and responding to the moment, as well as investing in a perpetual process of discovery, is embedded in the practice of dance improvisation. It is perhaps important to consider how training in a particular dance form may predispose a person's ability and comfort when embodying a device, prop, or object. I noted Hull's willingness to adapt and to continue investing in the art of exploring creative movement possibilities throughout the process.

Embodiment experience was further evidenced in how participants described or physicalized their relationships with the device and other partners. I have noticed through past experiences working with dancers in mobility devices that when multiple dancers interact together with a mobility device, such as a wheelchair, the texture of the relationship develops concurrently through the chair's motion and form. If the chair interrupts the sense of connective flow and contact through its incongruous materiality or movement incapacity, the dancers may innately feel this sense of disconnect as an interruption in embodied experience with the partner. In this dissertation chair research, one of the participants referred to the interruption in embodiment he sensed when manually pushing his chair. He described the movement of rolling the wheels as a functional movement which was "not dancing" and "not in place." He expressed

frustration in wanting to move to another place in space, but not wanting to interrupt the movement flow by the necessity of pushing the wheels to get there. He spoke of artificially finding ways to "cover up" that basic functional movement to make it work in the dance. He also described removing the arm rests of his chair because of their barrier-like nature which prevented connective flow with a partner. This participant then noted appreciating moving in the prototype chair specifically because of the way he could maintain a connective flow with his partner and his own movement, without an "interruption," as he called it. It is important to note here that this participant's primary genre is, like Hull's, contact improvisation, where maintaining and evolving contact with other dancers is a priority. The wheelchair, as a formative, interactive, intermediary "body" affects the quality of the dancers' relationships; it affects how they know each other on a sensory level. As a participant-observer in the chair experience, I interacted physically with the participants as they moved on the chair. These improvisational interactions engendered more of a flow when the chair followed the intuitive choices our bodies were co-initiating. However, there were several times in which the chair suddenly stopped and this created a disjunctive feeling—a halt in the embodiment process. It sometimes felt as if there were three distinct bodies: my body, the chair's body, and the other dancer's body, with the boundaries between each more pronounced. However, when the motion became more seamless and transitions smooth, the bodily boundaries began to blur again and the embodiment level intensified. The highest level of embodiment I experienced was working with one of the participants while being seated in the chair as well. I wore the controller on my torso, and sat in the chair with the other

dancer. The participant also described the heightened sense of flow and movement connectivity in this experience. It truly felt as if we were moving as one entity through space, and the notion that we were even in a device disappeared from my own cognition. It simply began to feel as if we were revolving, gliding, drifting, and coasting through space in a constantly shifting fusion of form. Gravity was less apparent in this experience, evoking the feeling of weightlessness.

Another specific moment I recall as a higher intensity level of embodiment involved my interaction with a participant on the chair and one other standing dancer. The chair controller in this case was held by a person who did not physically make contact with us, but who controlled the chair remotely. Thus, there were a total of four people involved in the improvisation: me, the chair dancer, another standing dancer, and the person holding the wireless control while controlling the chair at a distance. The interactions between the three of us making direct physical contact (me, the dancer in the chair, and the standing dancer) was very fulfilling in the way one moment threaded to the next and the way we all explored and talked about new ways of interfacing through touch and shared weight. We were continually surprised by how seamlessly the outside controller directed the chair influencing, yet not dictating our movement evolutions. The chair controller also described the way he attempted to react or respond to what we were doing and how he refrained from abrupt jarring motions. Thus, the experience amongst the bodies and the device were in conversation, listening and responding to one another. We did not encounter the type of awkwardness or discontinuity associated with

interrupted embodiment. The chair in this instance served as a motion initiator, facilitator, and responder, enabling a full embodiment experience.

This experience also introduced an entirely new sensation for how contact improvisation might be experienced. Contact improvisation, as the name suggests, implies that bodies are in direct contact with one another. However, in this case, one of the bodies (remote control operator) was not in direct contact with the other bodies, however, he was still involved in relating and connecting with the dancers through the chair's movement. Thus, his contact was experienced indirectly. His presence was felt intuitively by me through the motions of the chair but, since he was not directly interacting with us, he also receded from my consciousness in exchange for the more palpable, immediate presence of the other bodies. The person with the remote, wireless controller (the Android smartphone) discussed experiencing a kind of distant or virtual "contact" improvisation as he responded and reacted to our movement activity together while directing the chair carefully and smoothly. He verbally expressed this distant, yet intimately involved sensation. Interestingly, we as dancers also felt this distant, yet intimate, contact improvisation as well.

In another experience in which I was directing the chair remotely while two other dancers worked together in and with the chair, a similar sensation was described by the research participant in the chair. The chair participant described that, "although you [the researcher] were controlling the chair at a distance, the chair motions and the partner interactions felt organic and did not feel prescribed." This remote-controlled action described as a contact improvisation experience potentially opens an entirely new area for

dance both theoretically and practically. How does this form of virtual/cyborg dance reflect the technological culture at large? What can be explored in these relationships? Could this notion be useful when considering those for whom direct, live dance interaction is impossible or unlikely? For instance, telepresence robots are a wireless technology which have successfully been used in museums by individuals with significant paralysis.[54] Similar to a Skype interaction, the person's image is displayed live (real time) on a screen which is attached to a rolling robot. The person then can control the movements of the robot from their remote location (could be in another state or even country) to make the robot move and interact in the museum space. They are also able to talk to or relate to a person near them in the museum. Thus, like the telepresence robots which enable a real-time remote interaction of people in distant physical places, perhaps the prototype dance chair, in its wireless, remote-controlled, programmable capacity, pushes this idea further. Individuals from diverse parts of the world, with significant paralysis or other mobility obstacles, could dance together on a shared stage with other dancers. They would be able to control their assistive devices or a "dancing robot" in real-time with their live image projected on the device so as to glean a similar movement sensation. It would be as if they were moving together in a shared space. These types of re-imaginations of dance and technology artistry surfaced for me during the course of the research and, more importantly, surfaced because of direct movement experimentation with the prototype chair.

[54] Telepresence robots are a commercially available product and I witnessed the successful use of one at a conference for which I was a guest speaker. The conference was the ADA Silver Anniversary Summit September 24, 25, 2015 held in Miami, Florida at the Adrienne Arsht Center for the Performing Arts.

In sum, the wheelchair, in its contours, its hardware, its responsiveness, its directionality, its control system, its size, its overall form and parts, plays a significant role in conditioning the embodiment possibilities of the user and those interacting with the user. It conditions how movement qualities are negotiated and how space may be experienced. I now ask, in which ways can the materiality, the form, and the motion of the chair more significantly facilitate the sense of embodied movement connectivity for dancers? However, before continuing an in-depth analysis of the prototype chair and its imaginative future, I next briefly describe the general concept and significance of socio-spatiality in relation to the assistive device.

Concept of Socio-Spatiality Applied to Assistive Devices

The unique spatial stories of wheelchair users and different bodies often color outside of the lines of a planned geography: these stories inscribe new geographies and, in so doing, reveal the socio-cultural nature of a place. Access to things, people, places, services becomes an issue for how social space or socio-space is constructed and negotiated. Sociologist Peter Freund asserts from a "universal design" perspective that, "In a fully accessible society, the main feature would be the 'universal recognition,' that all structures have to be built and all activities have to be organized for the widest range of human abilities" (Freund 2001, 705).

The crucial role of spatiality in the interrelated embodiment complex of person, device, and environment, may be more specifically illuminated through the notion of "spatial disablement," a condition in which the production and development of space can create disabling situations for people with disabilities (Gleeson 2012; Hansen and Philo

2007). For instance, narrowly designed public spaces can be disabling spaces for wheelchair users as they privilege thin, agile walkers over those who are differently bodied or who have bodily extensions which move differently through space. In narrow spaces, wheelchair users may feel awkward and unwelcome in trying to maneuver into a tight space. The aspect of disability in this situation becomes the central focus, because the space design is preventing any kind of natural social flow. The wheelchair user literally "doesn't fit" the parameters of the space design causing one type of culture to have privilege to spatial access over another.

Stairs present a similar signifier of cultural expectation when one assumes that all people at all times in their lives can climb stairs. For wheelchair users, stairs can signify no access, no engagement, no passage, and ultimately non-acceptance. The addition of a nearby ramp or elevator in the stair climbing condition is more inclusive, recognizing different types of bodies and promoting a sense of belonging rather than alienation. Therefore, from a universal design perspective, the ramp or elevator further permits many other types of "rollers" (e.g., people with baby strollers, rolling carts, rolling suitcases) and is thus a more inclusive design choice in general, embracing multiple possibilities.

Conditions of control and power also produce spatial disablement. The crafting of spaces often involves separation and isolation, so as to exert a particular form of societal control by institutional, governmental, or socio-political powers. In *Discipline and Punish*, Michel Foucault illuminates this idea:

> In organizing 'cells,' 'places,' and 'ranks,' the disciplines create complex spaces that are at once architectural, functional and hierarchical. It is spaces that provide fixed positions and permit circulation; they carve out individual segments and establish operational links; they mark places and indicate values; they guarantee

> the obedience of individuals, but also a better economy of time and gesture. (Foucault 1977, 148)

The social model of disability shares a relevant relationship with Foucault's examination of spatial configuration as a condition of power/control in that the social model attends to disability as a social construction and addresses how design enacts or produces disablement. This includes the design of spaces, places, objects, and systems, everything from cities to homes, to appliances, to cell phones, to educational curricula, to wheelchairs.

With the previous concepts in mind, I further question how and in which ways do AD/wheelchair designs create or enforce "hierarchical" space, "carve out individual segments," "mark places" and "indicate values." How is the assistive device addressing spatial access and what does that spatial access imply socially and politically? Issues of both movement and form of the device suggest aspects of isolation and power in what the wheelchair itself might evoke. Movement features include such considerations as height change, directionality, and control system; form features include structural shaping of the whole chair and the materiality of the wheelchair. While spatially containing an individual for safety, how might the enclosed form or restricted motion of the chair also produce more isolation? How does one hug a person in a wheelchair? By having limited vertical motion, and existing in a rather fixed position in space, how are power relations enacted? What are the issues of agency? These types of socio-spatial questions will be addressed in the forthcoming sections by applying an analytical movement framework to the assistive device analysis. This analysis, like the examination of embodiment, will be informed by participant responses.

Method of Analysis for Assistive Device

As was discussed in Chapter II, the methodology section of this dissertation, Laban Movement Analysis is a comprehensive, multi-layered approach to the observation, interpretation, performance, and experience of human movement (Bradley 2008; Hackney 2003). It has been regularly utilized in dance and theatre contexts, as well as in business, industry, and robotics. As such, it is a useful system from which to analyze not only human movement, but also the movement of the assistive device.

The system was developed by Rudolf Laban, dance theorist, choreographer, and dancer, in the early 20th century (Bradley 2008). Laban posited that the exploration of movement in its full spectrum was central to human experience and human development. The system was premised on the belief that expanding one's access to a wider array of movement qualities is a healthful means of internal development, an inroad to self-awareness and self-expression (Bradley 2008). Although the system has been largely utilized in dance and theatre domains, Laban viewed it as applicable and beneficial to anyone. He believed movement literacy was as important to human development as any other form of literacy, to include math, science, language, etc. (Bradley 2008). There are four main areas of analysis in the Laban framework in its contemporary form: Body, Effort, Shape, and Space[55] (Hackney 2003). *Effort* is defined as the "dynamic quality of the movement, the feeling-tone, the texture" (Hackney 2003). It relates strongly to the nuance of precisely how the movement is occurring. It is manifested through four Effort

[55] Terms will be capitalized throughout the discussion due to applying their specific meaning in the LMA framework. However, it is important to keep in mind that these movement concepts are generally applied and referred to in dance practice.

Factors: Time, Weight, Space, and Flow. Each Effort Factor exists on a continuum and is delineated by two polar extremes termed Effort Qualities or Effort Elements. When analyzing human movement, the Effort Factors are related to an inner attitude. The movement quality is felt as a direct linkage to an attitudinal approach/motivation.

The *Body* category of the LMA framework looks at how the moving entity organizes its parts and how the parts are linked together. The Body category analyzes how parts are initiated, aligned, and sequenced as well as which parts are still and which are mobile. *Shape* relates to the body's form and how it changes in relation to self and environment. The emphasis is upon the process of shape change (Hackney 2003). Lastly, the area of *Space* is concerned with all aspects of where the movement is going. This includes considerations of low, middle, or high space, the spatial facing of the mover, the spatial pulls, the way the mover reaches out to space (near/mid/far-reach space), and the tensions and relationships developed spatially through the placement of the body and its limbs in space (Bartenieff and Lewis 1980; Hackney 2003). Space also attends to the differences between one, two, and three dimensional spatial experiences. Shape and Space have overlapping connections due to the fact that as soon as the body/entity changes form, there is also a spatial change. Space will be a predominant focus of the analysis used in this dissertation, as this area has formed a core interest in the research and in the development of the prototype chair design. I will illustrate how spatial concepts in the LMA framework apply to the assistive device design thus impacting socio-spatial conditions. Additionally, space and socio-space are areas of focal importance in the disability and design literature. I will also address concepts from the

Effort and Body areas as further considerations for theorizing the design evolution and re-imagining of assistive technology.

Connecting Laban Movement Analysis Theory to Practice in the Prototype Chair: A Space Analysis

In the LMA framework, the category of Space relates to all aspects of where the movement is occurring, with this category having high relevancy for the spatial implications of assistive devices. Rudolf Laban clarifies:

> Dance is the transition into a world in which the illusory, static appearances of life are transformed into clear spatial dynamism. Awareness of this spatial world and its exploration open up a horizon of unexpected breadth. From the simplest motion to the artistic creation of dancing, the flowing stream of movement expresses dynamic space, the basis of all existence. (Laban 1966, 93-94)

From an LMA perspective, therefore, traditional chairs[56] possess limited spatial possibilities and, thus, limited capacities for embodiment. In general, the utilization of space is limited to three spatial directions (forward, backward, and rotation). These chairs only provide the user with a one-dimensional experience of movement, rather than a two or three dimensional, planar experience of movement. For example, the wheelchair user can travel straight forward in the traditional chair but the chair does not enable a forward and up motion or a forward and down motion (planar experience). Also, the wheelchair user can travel to some degree in the horizontal plane (i.e., circling or rotating in the

[56] First and foremost, I want to recognize the value of wheelchairs to begin with; their initial introduction as an assistive technology has been a significant advancement to assist and improve the isolated conditions many individuals with disabilities have experienced in trying to become mobile in society again, and I am in great appreciation to the designers who have worked to enable accessibility in this manner. It is not my intent to disparage these efforts in the least; but, rather to encourage a more expansive examination and more intense, higher priority focus towards improving existing technologies by attending to embodiment aspects. Advancements in this area are necessary in order to continue moving towards inclusive practices and processes in an ever-growing world of notable diversity.

space) due to the turning capability of the chair; however, this traveling action usually requires the users to turn their bodily facings as well. Thus, the whole unit of the chair and body must turn due to the wheelchair structure and the users' torsos must face the direction they are going. This may be compared to a standing individual who, rather than being able to rotate his or her torso in a particular direction while their lower body moves another, must move the entire unit, torso, pelvis, legs, all in one particular direction.

One problem engendered by these spatial restrictions is that it may produce an embodiment experience which is more static and roboticized due to the predominantly one-dimensional orientation and engagement in space. The chair user is persistently in mid-level space and often moving strictly in a sagittal (forward-backward) manner. Other options are not easily available because other spatial options were not designed into the technology. This is why, I believe, some dancers and choreographers have sought to turn the chair upside down, tilt it on its side, or use wheelie techniques (lifting the bottom part of the chair up): they are seeking new spatial orientations and greater spatial dimensionality.

The prototype, omnidirectional dance chair discussed in this dissertation was built to enable spatial movement in all directions: forward, backward, sideward, diagonal, and rotation left/right. The purpose of omnidirectionality was to foster the potential for full spatial coverage/access or the ability to go everywhere in a fluid, organic manner. An enlarged capacity for spatiality produces the potential for expanding one's possible embodiments and possibilities for expression as a three-dimensional moving being. According to the underlying philosophy of the LMA system, the more a human body can

employ its many bending, extending, rotating, rising, sinking, advancing, retreating, spreading, and enclosing possibilities, the more capacity it has for expansive, all-encompassing spatial involvement (Bartenieff and Lewis 1980).

During my research with participants exploring the prototype chair, there were three features discussed and/or commented upon by the participants which dealt with the use of space: the hands-free capacity induced by the mobile wireless control, the omnidirectional aspect of the chair, and the height feature. In one of the written questions which asked for the participant to prioritize certain chair features, the omnidirectional aspect, height aspect, and the hands-free/mobile control aspect were all marked as high priority features. These features all effect spatial access. Participants commented that the hands-free aspect would be useful in both dance and daily life situations, such as the need to carry things. One of the participants even stated that the chair would offer her a sense of freedom which her current chair does not provide.

The narrow base of the chair was also noted favorably due to it allowing close proximity with other dancers. Relatedly, a participant who described his history of using different devices mentioned having switched from wide-angle cambered wheelchairs to those with much less of a camber angle in order to better partner with other dancers. For me, this was important to hear as it reiterated the importance of socio-spatial concerns focused on the relationship between people. Logistically, with too wide of a base, intimate interactions with other dancers or other individuals in daily life are more challenging. Navigating narrow spaces is also made more difficult with a wider base.

Thus, the prototype was specifically designed with a narrow base to more easily navigate space and enable closer interactions with others.

Power chair user Frank Hull, who worked in the chair the longest, was the most detailed in expressing precisely what he found the most liberating. His comments linked to issues of agency and creative liberation. He stated that the chair's spatial possibilities enabled, "A new and more powerful way to feel the dance not just do the movements." He described that his current chair lacks the ability to move in all directions and he further expressed, "the joystick control forces me to lose my one hand and side." He also stated that the chair opens a new world of movement choices and ways of connecting and partnering with both "sit down" and "stand up" dance partners. In my own experiences improvising with Frank, I also found more points of contact were possible spatially due to his not needing one hand or body part affixed to the joystick.

Therefore, the new possibilities engendered by the omnidirectional movement capacity in the prototype chair may prove to be extremely liberating for dancers. Consider the many movements in dance which travel side, or require a diagonal rather than strictly forward/backward mode of travel[57] (i.e., chassé, tombé pas de bourrée, side roll, cartwheel, etc.). By increasing the spatial range of the device, the wheelchair dancer can engage with and embody new possibilities of spatiality. For instance, the wheelchair dancer is able to maintain a front facing torso in connection with the audience if they

[57] To be clear: I not suggesting that integrated dance needs to adhere to traditional dance styles or forms, or follow an ableist rubric. I am suggesting that from a spatial access perspective, limiting the device design to minimal spatial options is a type of discrimination (intended or not). In traditional chairs, movement in the vertical plane is minimally available. Notably, dancers (and basketball players) radically challenge manual chair designs by attempting to tilt up and onto their wheels sideways.

would like, or in connection with another dancer, while traversing the space in a sideways manner. This feature could be particularly useful in ballroom dance. New relational facings (as referred to in dance) and thus, new interactive relationships are supported for the wheelchair dancer. The wheelchair user may also cut through the space on diagonal paths, with or without moving the torso facing. In reference to the omnidirectional feature, one of the research participants stated:

> The chair can move in all directions and depending upon where the controller device is put on the body you get to re-experience a whole new way of moving the chair. Very exciting for creating dances with lots of movement vocabularies and shapes. My every day power chair does not move in all directions, such as diagonals front and side to side.

Additionally, in consideration of the design aspect of height change, most wheelchairs, both powered and manual, usually do not incorporate height change. It is not considered an essential feature, but rather, an add-on or embellishment. More recently, top companies such as Quantum Mobility, have begun to embrace the importance of height change in their wheelchairs, recognizing the social and functional aspects.[58] However, funding sources, such as Medicare, do not view height change as an essential element. Because of the lack of height change in most chairs, the wheelchair user frequently exists in a static, lowered position in space. Those engaging with the wheelchair user either tower above the seated person, in a panopticon-like position, or kneel down in order to meet at eye level to connect. The bodily positioning in space asserts particular meanings, reinforcing a system of hierarchical marginalization (Butera

[58] I was an invited guest speaker at National Seating and Mobility's Annual Wheelchair Symposium in July 2015 (Nashville, TN) where I saw a live demonstration of Quantum Mobility's latest powered wheelchairs specifically their "iLevel" wheelchair.

2008; Feldman 1975; Gilmore 1996). If wheelchairs were built to raise the user above most standing individuals, how might the perceived power relationship shift?

The prototype dance mobility chair also possesses height change, adding another key dimension of socio-spatial access. Research participants who tested the chair commented that they enjoyed being at eye level with other dancers. Additionally, with the dynamic change of height, two and three-dimensional movement is possible. For instance, as the wheelchair user propels forward in the space he/she can rise as well, or while propelling on the diagonal, he/she can rise and/or lower to experience two dimensions of movement experience (planar experience of movement) simultaneously. Height change enables level change in vertical space, so the wheelchair user can engage at eye level, and can experience shifting out of mid-level space. This embodiment experience potentially produces more spatial access to the environment and others, more opportunity for emotional connection through eye contact, and more autonomy. The flexion/extension capacity of spine, hip, knee, and ankle joints for a typically-bodied individual similarly enables this possibility of vertical spatial change and embodiment potential, and many of the dynamics created in dance are due to moving fluctuations between low, mid, and high levels in space. In manual wheelchairs, I have seen individuals tilt the manual wheelchair off its axis, and I have choreographed pieces where the wheelchair is tilted side or back, causing the dancer to change level in space. I have also choreographed pieces in which the wheelchair (with dancer) is lifted high into the air. This is, in my interpretation, an effort to deal with the otherwise spatially restricted design of the wheelchair. It is evidence of how dancers and choreographers creatively re-

imagine the device design. Thus, what if the device were better designed to enable these capacities from the outset?

Many spatial combinations are possible in simply combining the omnidirectionality with the height changing dynamic. Adding other individual bodily capabilities to the design capacities of the device would further open even more spatial access opportunities for engagement with other dancers and other forms of expression. Explorations in prone or side-lying positions in combination with the chair's movement capacities may produce other spatial embodiment permutations as well, lending a versatile experience of movement and bodily orientation.

As another aspect of spatial disablement, consider the way the user is expected to control the device: either hand grasp on the wheels or hand grasp on a fixed joystick is the common mode of control. Several difficulties are presented in this system of control. Firstly, with hands fixed in space and attending to the control of the device, the ability for physical engagement on a social level is limited. For example, individuals might want to move together side by side and hold hands or engage with arms otherwise connected in some manner (around waist or shoulders). The wheelchair user is unable to fluidly engage in this type of embodied movement interaction which serves psycho-emotional needs, due to the need to appropriately navigate the device. Additionally, a caregiver, friend, or spouse must frequently position themselves spatially behind the wheelchair user if pushing the user's chair (in the case of manual chairs); yet, one must ask how this re-positioning then ascribes a differing embodied connection and may create a sense of disengagement between the two people. In most situations of social engagement people

stand next to each other or in front of one another in order to interact and elicit eye contact, not behind one another. This type of control system also presupposes only one type of disability—a disability in which the user has the full use of hands and arms for control. It also does not take into account long-term effects on the user in this system of control (i.e., shoulder wear and tear in the case of manual chairs, postural considerations, etc.).

In a dance context, the exclusive type of hand/arm control is particularly relevant, because the dancer's upper body movement becomes limited to operating the device predominantly, restricting interactive engagement with other dancers and expressive freedom. There have been tactics adopted to deal with this issue, such as gaining enough momentum for the wheelchair so that the dancer can briefly sustain their arms in the air or having a standing dancer push or propel the wheelchair in some manner to enable the wheelchair dancer's upper body to engage in other ways. However, again, this does not enable the wheelchair user/dancer to be autonomous in their approach to controlling their mobility and engaging with others. In either case, the wheelchair dancer is not situated to fully manage their movement choices or become leaders/initiators versus perpetual followers.

Several research participants in my study mentioned the value and desire for hands-free movement. It was also a feature that was rated as highest priority on the questionnaire for the majority of participants. One participant remarked:

> Finally, a power chair designed for dance. I was not tied to a joystick and my whole upper body was free for expression. The chair being designed for dance takes dance for a power chair user to the next level because of how the chair is controlled through a smart phone.

Yet another participant described that the feeling of not employing his hands to move his manual chair felt liberating. He stated that he was happy to be free from rolling the wheels and that it was the most significant characteristic of the chair that he noticed in comparison to his current chair. He described the sensation of being in the prototype chair and not using his hands to propel the device as "a bit like floating, like being in space without gravity."

In contrast to a control where hands and arms are affixed in space, the prototype chair enables hands-free movement, spatially unfixing the control. The prototype chair control is a mobile wireless remote in the form of a smartphone. It may be hand-held by the user, it may be held by a caregiver or friend or fellow dancer a distance away from the user or it may be placed on the body as a wearable device (i.e., torso) for hands-free operation. It also may be programmed differently for different users in terms of sensitivity and speed. When the controller/the phone is tilted forward the chair moves forward, when it is tilted back the chair moves backward, when it is tilted side the chair moves sideways, and so on and so forth. Thus, like the omnidirectional feature, this control feature is meant to spatially unfix the control, offering a greater capacity for socio-spatial mobility, and increasing the capacity for interactivity. The control is also designed to be user-friendly without complicated buttons to push, etc., which might require fine hand motor skills. It is this control feature which enables a wheelchair user and their spouse, friend, partner, etc., to embody a closer relationship side by side (i.e., hand-holding, etc.). The spouse, friend, partner may simply tilt the remote control/phone

forward while moving, or the wheelchair user may wear the control and utilize their torso to direct the chair, forward, etc., freeing the upper body.

This feature also produces additional creative possibilities in the dance context, as the control becomes as mobile as one's imagination, producing a number of movement possibilities and configurations. In the research, when participants mentioned "freedom" it was often related to the fact that their arms and hands could be free to do other things due to the mobile control which could be worn on the body or held by another person as described above.[59] For instance, while traveling in space, the chair user can place *both* arms above the head. Wearing the controller on torso or head also created a different, perhaps more dynamic, connection for the users to the device. Thus, one user described this hands-free experience as "natural," another as "amazing," and another as "something I have always wanted to do."

Due to the spatial mobility of the smartphone control (it is not fixed in space like a joystick or wheels), the non-prototype chair dancer or the chair dancer may direct the chair's motion either in close proximity with one another or at a distance. Unlike manual and powered chairs, the non-chair dancer need not be in physical contact with the chair in order to cause it to move. This produces a kind of remote-controlled contact improvisation (refer to former embodiment section for thorough discussion of this experience in the participant research). For instance, chair dancer and non-chair dancer may be located across the room from one another and through a simple tilt of torso, tilt of

[59] I further discuss this notion of "freedom" in the research participants' responses in the concluding chapter (Chapter VII).

head, or motion of hand, the chair can be activated by either dancer as they move towards each other in a mirroring activity or any other type of lead/follow movement. If the non-chair dancer is wearing the control on torso or head and circles his/her torso or head around, he/she simultaneously effects the movement of the chair which would circle as well. Or, if the dancer wearing or holding the control tilts the phone sideways, the chair partner would move sideways as well. The degree to which one dancer leans (or tilts the phone) produces a simultaneous and comparable movement of the chair partner. The degree/magnitude of one dancer's leaning action is proportional to the speed of their partner's "body"' (referring to chair and person combined) so the two are sharing in a danced relationship of time and direction. They are sharing an embodied relationship in which the partner wearing the control is responsible and innately connected to where and how fast his/her partner moves. However, the chair partner is also able to take control by stopping the chair motion through the stop buttons on the chair at any time.

Interestingly for some of the research participants, having another person control the chair evoked a sense of ultimate freedom; whereas, for others, there was a feeling of restriction evoked by not being fully in control of the chair's motions. Research participants also commented upon the trust needed to relinquish chair control. These different perspectives surfacing in the research were interesting, pointing to the differences in how individuals perceive freedom. In thinking about the chair's design development, these different perceptions signaled a reminder that a flexible, versatile control system would be most ideal to accommodate differing approaches to agency and notions of freedom.

In sum, examining the spatial aspect of wheelchairs as rooted in a dance/movement-based LMA Space perspective provides a new way for envisioning and analyzing the assistive device design. The prototype chair design grew from intentional focus on the Space aspect, both as a means of broadening choreographic possibilities and empowering the wheelchair user. The types of new embodiment possibilities presented with an omnidirectional, mobile controlled, height adjustable device are significant in contrast with traditional chairs. The new ways in which wheelchair dancers may discover and re-create their socio-spatial embodied selves through a different type of mobility device could lend significant change in perceptions of able-bodied and disabled dancers as well as impact the identity of wheelchair users.

However, there can be no "one size fits all" solution, and there are multiple concerns to attend to in future designs. Yet, by paying close attention to how bodies relate with one another in space through their daily lived experiences, and how these insights might be further enacted on the dance stage, new possibilities for this prototype device and/or any device may become realized. It is here at this pivotal threshold of interaction, of spatial junctures, of unexpected dynamics and change, that the real notion of disablement is tested. In the next section, I examine another dimension in the LMA framework as a method for further re-imagination of the device design: Effort.

Connecting Laban Movement Analysis Theory to Practice in the Prototype Chair: An Effort Analysis

> This chair took my physicality to a whole new level. It enabled a different kind of movement vocabulary to play with. The chair gave me a lot more options. I could actually begin creating a dynamic; I could actually feel the dynamic of the movement in terms of speed. I was able to feel that connection between body and

> device. In essence, I felt that I could put my soul or spirit into the chair, a lot more easily than the current chair I use.[60]

Time Effort

The above quote from one of the research participants who tested the prototype chair illustrates the subject of the next analysis: the use of LMA Effort. The participant specifically is referring to how the dynamic quality of the movement was experienced through Time Effort. Effort is defined within the LMA system as the dynamic quality of the movement, feeling-tone, texture (Hackney 2003). Regarding human movement, it reflects an inner attitude towards investing energy. It is manifested through four Effort Factors: Time, Weight, Space, and Flow. Each Effort Factor is delineated by two polar extremes termed Effort Qualities or Effort Elements. In order to analyze the assistive device in terms of Effort, I will look at how the assistive device might embody a full palette of dynamic qualities, attending to both of the polar extremes. Each Effort Factor will be explored separately. I now discuss the ways in which the assistive device design may support a wider spectrum of Effort dynamics, both for creating positive perceptions of disability and for enabling a greater canvas of movement choices for the user.

Time Effort refers to how the movement changes in speed and, more specifically, how the mover or object experiences time changes. On one end of the continuum, Sustained Time indicates movement which is experienced as more leisurely, gradual, lingering, or prolonging. While, on the other end of the continuum, Sudden/Quick Time indicates movement which is experienced as more urgent, quick, instantaneous, or

[60] Direct quote from research participant.

staccato. How does the assistive device change in Time Effort? How might the wheelchair embody and manifest a sense of urgency and, conversely, how might the wheelchair embody and manifest a sense of lingering or prolonging?

The majority of research participants all referred to speed changes as being a very high priority for them either through the written questionnaire or verbally. One participant remarked that he would like to see the prototype chair possess "more rigor for its attack and execution." Another participant's first question upon seeing the chair for the first time was: "how fast can it go?" Yet another participant remarked that he would like to use the chair to "go fast across the stage." Clearly, this was an important aspect for the dancers who participated in my study and thus led me to imagine how I might in the future refine the control system to address Time Effort in its fullest range.

Wheelchairs, both manual and powered, generally do have some capacity to embody both Quick and Sustained Time. However, not all bodies are able to regulate these differing time ranges and the more sophisticated regulation of time in wheelchairs is difficult for most wheelchair users. Additionally, more nuanced rhythmic possibilities are often not accessible. For instance, a dancer may begin with a quick initiation of the chair or stop the chair abruptly, but the ability for the chair itself to be continually percussive or diversely rhythmic is minimal. This lack of range in timing becomes an issue within dance performance since the finessing of time is important in the dance context as it contributes to the expressive, communicative whole.

The perception of time in the chair, I believe, is related to the chair's static shape; the momentum in the rolling action of the wheels; and the degree to which the control

system enables acceleration, deceleration, and stopping. It is difficult to produce a sharp attack with the continued rolling momentum in the chair's wheels. Further, the static shape of the chair does not allow for how bodies/chairs might change when moving with different Time Efforts. The dynamic quality of wheelchairs is frequently gliding and spinning; this is what they do well. Gliding is one of eight basic effort actions identified in the LMA framework and it is composed of Sustained Time Effort, Direct Space Effort, and Light Weight Effort. However, most wheelchairs do not have the capacity to enact the other seven LMA basic Effort actions: Float, Thrust, Slash, Dab, Wring, Flick, Press, or produce aerial-related actions like hopping, jumping, leaping, or rising. I have seen performers attempt small hopping actions with the chair in an effort to employ a differing dynamic, but the chair, unfortunately, was not designed to assist this movement option. Changes in Time are often produced best by the chair when a long gliding series is halted with a sudden stopping motion, or a turning series is halted abruptly. Or, the wheel chair user might employ noticeable contrasts in bodily movement for a more diverse time dynamic.

Eliciting Quick Time with more complex movement phrasings is also challenging in wheelchairs due to the fact that the chair is a compact unit, moving generally as one undifferentiated whole. If components of the chair could be differentiated in their movement timing, the potential for other layers of time dynamics could emerge. For instance, a possibility might be the movement of the seat moving at a different timing than the base of the chair, or a leg or arm support being activated sharply, or wheels possessing actions apart from moving the chair through space (i.e., pivoting back and

forth, without moving the actual chair). Notions of parts of the chair bending/folding or extending might also lend towards more complex time dynamics. Lighting effects (e.g., LEDs) on the chair could additionally support a broader rhythmic spectrum. Flashing or pulsing of light, or color shifts could become accent points in the choreography, enhancing the phrasing of time. These lighting effects could be embedded in the wheels, under the seat, under the base of the chair, or in the back of the chair. Further, devices could be included to allow the chair user to control these lighting effects.

In the prototype chair, due to its programmable capabilities, speed may be increased to a very high rate and it also may be decreased significantly. Thus, accessing the extreme points of Quick Time and Sustained Time is potentially more possible in the prototype chair than in traditional power chairs or manual chairs. However, finding rhythmic precision such as a quick-slow-quick phrase, or a quick initiation which then drifts into Sustained Time, is more challenging due to the reaction time between the mobile controller and the chair. The responsiveness of the chair to the controller also needs to be regulated for safety. In other words, it is jarring for an individual to be immediately jerked into motion when the controller activates the chair. Instead, it feels better for the acceleration to gradually climb. Thus, the chair often gives the effect of Sustained Time more often than a sense of percussive or staccato Time Effort.

Additionally, there is another time dynamic in the prototype chair created through the differentiation of movement between the seat and the base of the chair. The seat may rotate independently of the movement of the base. Thus, each can move at different timings. For instance, the seat may rotate slowly while the base is rotating or moving

through space quickly. This is an example of the differentiation of parts I suggest may be one method of creating more complex timing capacities in the device.

One of the research participants worked extensively to attempt to regulate the time dynamic with artistic prowess. He chose to hold the mobile control with one hand while spending a large part of his time in the prototype chair working directly with the time dynamic through the mobile control. He tilted the wireless control back and forth repetitively with small motions and then larger motions in order to discover differing response possibilities. Then, once he learned how precise the response from controller to chair could be, he began taking more risks in stopping and starting, sometimes in very short bursts, sometimes in longer phrases. As researcher, I observed this activity with intrigue, realizing how the dancer was attempting to learn the time dynamic of the chair and then finely regulate it to his desired goal for precision.

Weight Effort

The *Weight Effort Factor* is associated with the assertion of pressure/force. Light Weight movement is more of a floating quality while Strong Weight is more of a punching, thrusting Effort quality. Additionally, Passive Weight is how the body succumbs to gravity, appearing limp or heavy in nature. Weight-Sensing is related to a softening of weight, readying the body to exert lightness or strength similar to the motions of a tap dancer sensing rhythm or yielding weight to the rhythm felt in the body (Hackney 2003). By reflecting on these ideas within the LMA system, I asked the following questions: How does the wheelchair device express Weight Effort? How might a changing sense of Weight Effort be created? In answering these questions, I speculated

that there are two primary aspects influencing the perception of Weight Effort: the form/shape of the device[61] and the motion of the device.

While the wheelchair does have a gliding motion to it, and gliding is generally understood in the LMA framework as encompassing Light (Weight), Direct (Space) and Sustained (Time), the form of the wheelchair can project a heavier or more passive sense of weight in its feel of physical groundedness. However, in contrast to power chairs, manual wheelchairs may create a more airy, less cumbersome perception due to the transparency enabled by the spokes of their wheels and their smaller sizes. Power chairs, specifically, can appear heavy due to their large sizes and the solidity of their builds. In addition, many wheelchairs often include features to stabilize a person, such as Velcro straps, cushions, postural supports, and foot rests. Some of these features might also contribute to heavier weight perceptions.

To combat this overall sense of heavy weight, one could imagine how transparent materials or light sensitive materials (i.e., clear acrylic, clear polycarbonate, luminescent fabric, color responsive, reflective surfaces) might provide a Light Effort effect when the chair is moving, especially if the materials are used strategically throughout the chair's body. Additionally, when the orientation of the chair is changed (i.e., turned upside down or on its side) it begins to shift the chair out of its predictable groundedness, enlivening a lighter weight dynamic. Further, if the wheel chair user can make the wheels of the chair

[61] Note that this an example of overlap in the LMA framework, where aspects of form or Shape may effect the perception of the Weight Effort.

leave the floor, this aerial moment can provide a sense of lightness (similar to a standing dancer's feet leaving the floor if only for a split-second).

On the other hand, wheelchairs, when in motion and when gaining higher speeds, can portray a sense of power associated with an active Strong Weight Effort. This is particularly in the case of power chairs. When one sees such a heavy-looking, solid machine bolt through space, it may feel and be perceived as possessing a strong power.

As designer, I have struggled with ways for endowing the device with a wider spectrum of weight dynamics in order to yield more nuanced expression. For example, I intentionally chose to mount a clear, translucent seat on the chair base to elicit a sense of lightness in appearance, which would, hopefully, also primarily place focus upon the dancer's movements. I further intentionally kept the base of the chair small and had it painted black in an effort for it to blend with most stage floors and not appear as a cumbersome, overwhelming, and bulky machine. Research participants noted the compactness of the prototype device and one participant described it as "modest" and uncumbersome looking. But, what I have struggled with most is broadening the movement repertoire so that gliding is not the only movement choice when trying to elicit a weight dynamic. My goal for the future then is to attend to different portrayals of Lightness and Strength. Questions guiding this goal include: Are there any suspension features or elements of the wheelchair by which it can float, fly, jump, soar, or hover? Can there be a sense of rebound in the device (perhaps springs/spring-loaded wheels, responsive spring-like seating, or translucent materiality which reflects light to change the notion of weight)?

The Weight Factor was not an element that research participants discussed in length concerning their prototype chair experience or their own devices. However, one participant did remark specifically about how he sensed the motion of the prototype chair as light. He described his experience in it as a floating sensation. I also have experienced this feeling when moving in the chair, and I believe it may be largely connected to the hands and arms being free in space, instead of being attached to the chair in some manner. Thus, by continuing to focus on how I might further free the dancer's body for fuller expressiveness when using the prototype chair, I might develop new ways to elicit and portray a Light Weight sensation.

There is also a practical aspect of weight to consider in the chair design as well since ease of transportation is a top consideration for most wheelchair users. This is one advantage of manual wheelchairs. The lighter carbon fiber frames many now have enable a great ease of transport. Power chairs are typically large and heavy to transport (thus, the need for automatic van lifts). I designed the current chair prototype with the idea of transport needs in mind. Thus, because the seat disconnects easily from the base, its transportability is possible in a car. However, the chair base is heavy, like most power chairs, making it very stable, but also challenging in its ability to travel with ease. In the next iteration, I am striving for a lighter overall weight and modular configuration of the base to assist transportability issues.

Flow Effort

A third dimension of Effort in the LMA framework is *Flow*. Flow is described as the "baseline goingness, the continuity of the movement out of which the other Effort

elements emerge and return" (Hackney 2003). Flow refers to a sense of control and is defined on one end of the movement continuum as Bound or on the other end of the continuum as Free. To provide a point of reference, when I refer to Free Flow, I associate this to the releasing of energetic tension as seen in the frolicking play of puppies and children. The dance movements of a fall, leap, or drop-swing, which appear to be unstoppable once initiated, are also considered Free Flow actions. When I refer to Bound Flow, I associate this to the approach a surgeon might use in performing a surgery or the controlled regulation needed for carrying a full, hot cup of coffee. Movement which appears as if it could be easily halted or re-directed at any moment in its trajectory is more Bound than Free. A dance movement example might be a ballet fondu or a Martha Graham contraction.

I observed the most Bound Flow use of the traditional, manual chair by one of the participants whose practice is ballroom dance. In this participant's ballroom dance movement, such as tango and swing, she mostly engages in tight regulated control of the chair in order to sharply change directions and align with specific timing expectations in the ballroom genre. Intriguingly, this participant also demonstrated what I perceived to be the most Bound Flow approach to using the prototype chair. The participant sought constant limb and postural control (upright). This approach contrasted with other participants who were more willing to let their limbs and/or bodies fall, release, swing, or drift in connection with the movement of the chair.

The research participant who was a power chair user commented that he envies manual chair users since, in traditional joystick controlled power chairs, the ability to

release the control and simply drift or coast without continually regulating the joystick is not possible. When he lets go of the controller, the chair stops instead of having the capacity to stay in some form of motion. For this reason, he enjoyed moving in the prototype chair where the chair could stay in a constant perpetual motion without him using one hand to manipulate a joystick.

The word “free” was used by multiple participants to denote their experience in the prototype chair. It is interesting to analyze what about this experience seemed free to them. My interpretation is that the hands-free aspect of this chair may have developed more possibilities for creating a feeling of Free Flow. However, the term free may not be an indicator of the Flow Factor at all. Instead, it may have been more about the freedom to find different spatial possibilities. Additionally, one participant described how, even though his arms were free to move, controlling his core proved difficult in the chair given his injury level. This lack of core support then restricted his ability to attain further mobility. However, throughout my observations, I did notice a great deal of movement invention by the participant, including hanging upside down off the chair seat.

When creating the prototype design, I asked myself the following question: How could a sense of Free Flow be more enabled? Part of the way I accomplished this was to change the locus of control and to de-emphasize the appearance of constraint features that might create spatial hindrances or overshadow the dancer’s own presence (i.e., arm rests, tall back rests, large cushions). My focus was to place more emphasis visually on the

dancer and less on the device. Hence, the circular,[62] rather than square, shaping of the seat and the seat's transparency were two ways for developing a greater sense of freedom of motion for the user and viewer. Also, rather than having distinctly separate arm rests jutting out in space, the seat is made to curve around the person allowing a place for resting the arms while also providing a sense of security for the user. The translucent/ invisible nature of the seat allows the viewer to see the chair dancer freely moving. However, most importantly to developing a sense of Free Flow, was how moving the locus of control from the arms and hands to the moving torso enabled a freer use of movement to the majority of the research participants. This sense of freedom was further enhanced when control of the wireless device was given to another dancer.

In observing participants, I noticed a sense of Bound Flow being demonstrated in the beginning of their prototype chair exploration as they employed more restrictive, cautious, careful effort at regulating motion. After this initial phase of exploration, I observed more Free Flow as participants allowed their bodies to release into space. Again, I observed the most Free Flow Effort when I operated the chair and there was no need for the participant to control the chair's motion at all.

When the chair is in motion it also appears to have a kind of non-stop continuity as it glides and drifts through space. This gliding action is similar to what I noticed when observing the users in their manual and power chairs. However, the omnidirectional aspect of the prototype chair seemed to contribute to an enhanced sense of Free Flow.

[62] This is an example where other aspects of the LMA framework, such as Shape, overlap and inform notions of Effort.

The more expansive spatial directions supported the notion that the chair is unbound in terms of space. This was an interesting self-reflective observation as it pointed to the way aspects of space use and Space Effort (to be discussed in the next section), inform the perception of Flow Effort.

Although my desire as designer was to create more access to Free Flow through the hands-free control system, I noticed a contrasting experience when I wore the controller rather than the chair user. During one of the movement experiments in which I worked with a participant in the prototype chair, I wore the controller on my head. With the controller strapped to my head, a yes-no motion of the head would produce forward-backward movement of the chair partner, a side-side tilt of the head would produce sideways movement of the chair partner, a rotation right or left would produce corresponding right/left rotation of the chair partner, and a diagonal tilt of the head would produce diagonal chair motion. The slightest movement of my head produced movement. Thus, I felt the need to tightly regulate my movement, otherwise, my chair partner could easily move too abruptly or too far across the room with a mere incline or turn of my head. This realization made me restrict my improvisational range, which further restricted my freedom of limbs and torso. The chair user I was working with remarked at being intrigued by the scale of movement difference between him and me and suggested that this disparity of movement freedom and range might create the basis for a very interesting piece of choreography. With further practice and familiarity with the control, it is possible that a sense of Free Flow might also develop for the person not in the chair but wearing the remote. Further, it may be that enabling a dual ability to both manually

control the chair at times (push/pull) and electronically control it by an outside user could provide greater access to the Flow dynamic. Therefore, a future multi-modal control system might offer the most versatility in terms of Flow.

Space Effort

Space Effort relates to how the mover gives attention to space rather than where the user moves in space. The continuum for this Effort is defined by Direct Space Effort on one end and Indirect Space Effort on the other end. Directness in the LMA concept is about zeroing in, pinpointing a focus. Indirectness is linked to the notion of multi-focused or an all-encompassing spatial dynamic. Circularity, twisting, and curving is often understood as more of an indirect spatial dynamic. My question then became: To what extent can the AD design enact spatial directness and indirectness?

Generally, when one looks at the movements of traditional wheelchairs, the eye is not drawn to multiple places in space. The contained, unchanging nature of the wheelchair "body" draws the eye to mostly one directional pull in space. Directness is generally sensed in how the sagittal movements of the chair (forward and backward) mobilize the whole chair/device as a directed unit (i.e., wheels don't move in one direction while the seat moves a different direction, etc.). However, Indirect Effort can be found in the chair's rounded, circular motions. Winding and circular turning movements in space are possible, lending to a sense of Indirectness as the user takes in many points of focus. This variation between Directness via straight forward/backward tracking and Indirectness due to circular motions adds a useful dynamic to the device, giving it more

intrigue as a moving object. But, through deeper consideration of how to expand the Space Effort, further technological innovation could occur.

In hand propulsion of manual wheelchairs, spatial Directness is limited by the fact that the device itself has no ability for its form to morph, or for its parts to change in prominence (i.e., for one wheel to jut further into space). In either case, if the form could morph (i.e., narrow/widen/re-organize its parts) or if parts of the chair could become illuminated, spatial Directness or Indirectness could be heightened. Spatial Directness is also limited by the fact that if either wheel is pushed independently, the chair veers off and begins to turn. Two arms must generally control both wheels with equal pressure in order to make sure the chair maintains a direct focus.

In the prototype chair, other options for Directness have been added through side-side and diagonal movement capacities. Also, one possibility explored to enact the effect of Directness is through lighting, specifically the way lighting bounces off the seat and the way LEDs can be applied to create a distinction in focus may assist this issue. Additionally, another layer of Indirectness has been added to the prototype chair by creating a seat that rotates independently from the base. Thus, while the chair base circles or curves one way in space, the seat may be spinning or circling the opposite way and circling with different timings compared to the circling of the base. In this instance, the eye becomes drawn to multiple places and foci in space.

In the explorations with research participants, a new type of Indirectness was achieved in the chair when one dancer began spiraling in tandem with the circling of the chair base. This was largely possible because the dancer's body could lean far back,

almost horizontally in the seat. Thus, a tilting seat enabled a new body orientation, which led to another type of Space Effort possibility. Further self-reflection upon the Space Effort has caused me to consider how the vertical height motion could become more Indirect (i.e., floating or spiraling up or down) rather than following such a direct path up or down in space. The tilting action of the seat combined with the height change and the seat rotation collectively may produce this new type of Indirect Effort manifestation within a vertical spatial pull. These enhancements to the prototype chair are very much in the future, but may provide exciting possibilities for how dancers utilizing wheelchairs might expand their movement options.

Thoughts and Future Possibilities for Incorporating Effort Analysis in Design

In sum, examining the LMA concept of Effort adds yet another design dimension for thinking about the device as a moving, expressive entity interfacing with a human body. Analyzing the Effort dynamics of Time, Weight, Flow, and Space focuses attention upon the qualitative dynamism of the device, fostering new creative permutations in dance while deconstructing stagnant, passive, and disempowering representations of disability. While current devices do provide the opportunity for producing some contrasting dynamics, such as Direct and Indirect Space Effort, these dynamics could be expanded to provide access to more sophisticated, multi-layered movement qualities for device users. Expanding Time and Weight Effort qualities is potentially the most compelling area of focus for future device iterations due to the limited range of Weight and Time Effort current devices possess. This is an area I continue to work towards expanding in the prototype chair development.

Connecting Laban Movement Analysis Theory to Practice in the Prototype Chair: Body Analysis

The Body category of the LMA framework looks at how the moving body or entity organizes its parts and how the parts are linked together. Several concepts may be useful to consider here. Successive, Simultaneous, and Sequential movement distinguish three different ways in which parts may move (Hackney 2003). In the LMA concepts, the term Simultaneous movement denotes how movement of the body's parts, or for the purposes of this research an entity's parts, move together at the same time. For instance, in a human body the head and tail of the spine may move away from each other in an arch or towards one another in a curve at the same time. On the other hand, Sequential movement denotes the movement of non-adjacent parts moving in a sequence one after the other (i.e., head, hip, shoulder), while Successive movement denotes the movement of adjacent parts moving one after the other (i.e., imagine a slinky's movement or the succession of elbow, wrist, then hand in the British queen's wave).

In wheelchairs, motion is frequently Simultaneous. One sees a mostly compact single unit moving through space. Parts are differentiated to some extent through their various materialities (i.e., the look and feel of the chair's wheels versus its seating construction). Footrests are further differentiated visually, spatially, and tactilely from arm rests. However, from a movement perspective parts of the chair are not differentiated when the chair is in motion; instead, all parts move together as a single unit. In the past, to challenge the mostly undifferentiated compactness of the manual chair's movement, I have explored choreography where the dancer removes wheels from the manual wheelchair or where other dancers remove and replace wheels. I have also seen

choreography where these actions occur. Here again, the explorations in dance are pointing new ways forward for design of the device. My questions for future design now become: How might the chair embody Sequential or Successive movement? Would it be possible to have the mid-portion of the chair or the seat move and then the base of the chair? Or, could different wheels move at different times enacting a kind of "sprawling" action like in the game of Twister where one limb then the opposite limb moves to reach another place in space?

To explore these questions, I conceived how the prototype chair seat rotation may occur independent of the movement of the chair base, thus enabling the action of non-adjacent parts moving (Sequential movement). Or, the seat could be made to rotate opposite to the direction of the base/wheels creating a different rotational organizational pattern. Additionally, due to the easily removable configuration of the seat, it could be potentially lifted out of the base by another dancer, separating base and seat. In the next iteration of the prototype chair, I can also imagine a removable, adjustable foot/leg rest which will also provide possibilities for Sequential movement and new bodily/object arrangements. This type of removable, adjustable foot/leg rest design is, in fact, already in progress.

Further, regarding Successive movement, might the chair's wheels reach out in front with the back wheels following in a kind of lead-follow action? Could some parts linger in space or leave some type of imprint, while others move ahead or sideways? Could the bottom of the chair become the top or the sides become the front? One inventive example to point to here is the IBOT (Cooper et al. 2003). The IBOT is a stair

climbing wheelchair, in which this very notion of one part of the chair leading and another one following in succession occurs. There are also existing wheelchairs which transform from seated to lying or standing apparatuses. Additionally, with seat tilting mechanisms and seat raising (elevator systems) mechanisms, there is some differentiation of parts so that the entire chair form is not only doing one motion. Rather, part of it is rising (seat) or tilting while the other maintains forward motion (wheels and chair base). Thus, some aspects of different parts of the device moving in different ways is occurring in wheelchairs, but not in significantly varied or intriguing ways. By considering some of the concepts within the Body area of the LMA framework, the assistive device design may be re-conceived as a body with differentiated mobile parts initiating new patterns of organizations to be explored. Further, how differentiated mobile parts might be organized and assembled in the future to support the user's complex movement could open new expressive possibilities in dance.

Summation and Further Thoughts

This chapter sought to bring more prominent attention to a socio-spatial, embodied movement perspective in the design of assistive technologies and to identify a specific need for attending to assistive device innovations in dance when acknowledging bodies of disability. I applied a dance-based lens to the assistive device design through utilizing key aspects of the Laban Movement Analysis framework. I self-reflectively evaluated the prototype chair design, while contrasting this with traditional wheelchair designs. Participant research responses helped to shape and inform the analysis. This

process of theorization presented the potential for a dance-based Embodied, Socio-Spatial Design (ESD) paradigm as a useful and novel way for re-imagining device design.

I hope that this discourse prompts further ideas for wheelchair design as an embodied, meaningful, formative element in the life of users and their friends/caregivers/partners. Perhaps the wheelchair's form can be a morphing form rather than a stilled/static/contained form. What other possibilities could be probed? It is up to those unique bodies who engage with and conceive of devices as dancers/performers, as caregivers, as therapists, as wheelchair users, as technologists, and as choreographers, to decode and re-code the possibilities, to invent new tactics, and to push into new places and spaces. These actions will continue to renew and challenge our lives as embodied, interdependent, and complex human beings.

CHAPTER VII

CONCLUSION

Brush Strokes

A poem of continuance…

In a space that stood still.
Silently gasping. Breathless.
A space that held time and marked relationships.
The brush that might have painted a different future.
That future. Remains.
Unknown, Unretrievable, and Unclaimable.
Yet, I have.
Known, Retrieved, Claimed.

Picking up the brush that my dad left for me to paint.
Filling in the white spaces of that room.
It wasn't the story my mom and I would have chosen, but it was the story that perhaps chose us. The story which unfolded.
And the story which I have painted across the pages of this dissertation.
The story that fueled the impetus of the writing.

A manifestation of experience. Linked lives.
Writing Time. Righting Time.

This dissertation evolved from a personal lived experience which brought the realities of disability to the fore. In tandem, my life in dance ignited a path forward to explore disability with a new lens, one emphasizing creative possibility. This creative mode of thinking evolved organically from the productive collision of dance with disability, and led me to re-imagine assistive device design. The research seeds for this dissertation trajectory were planted early in my life and began to take shape professionally in 2005, when I founded the Rolling Dance Chair Project, a project

exploring assistive technology design. I use this concluding chapter to highlight the main ideas and insights which surfaced throughout my research and to propose ideas for future research based upon the outcomes from this research experience. Further, I briefly summarize the innovative journey which led to the prototype chair development.

The human body in motion and the expressive, meaningful possibilities this motion permits, provided the common point of intersection between the three domains of thought I explored in this dissertation: dance, disability, and design. When one juxtaposes the fields of dance, disability, and assistive technology design, unusual and dynamic relationships emerge catalyzing new modes of thought. I viewed these three areas broadly and simultaneously as lenses, frames, academic fields, areas of practice, and conceptual ideas. Perhaps, when thinking of the traditional Western conception of dance as a display of standardized notions of physical prowess, the most current disruptive coupling is dance with disability. The notion of a "disabled dancer" might sound like an oxymoron. Yet, in the act of bringing these two areas of discourse and practice in relationship, the birth of an entirely new way of conceiving dance, dancer, dance training, and disability is unveiled. This unveiling reveals the possibility of dance to create numerous and surprising movement expressions, expressions that foster new ways of seeing and feeling the world through each individual performer's unique abilities. Dance as movement expression then becomes a dynamic vehicle for channeling disability out of fixed perceptions and, thus, empowering and challenging the disabled dancer's and the viewing audience's imaginations of what might be possible. Therefore, the dynamic impetus of

these bodies of difference can radically change the face of dance performance and permanently alter the dance landscape (Albright 2010; Kuppers 2003).

The radical duet between dance and disability was explored in Chapter IV, Dance and Disability: The Reciprocal Push. The reciprocal push metaphorically refers to the ways in which disability pushes dance into new territories of practice and, similarly, the ways dance pushes disability into new spaces of experience and practice. Consequently, analyzing the nature of their duet required grappling with the points of tension in their bi-directional push. One such tension is the ability to celebrate the vulnerability of the body, a celebration often rejected in traditional Western concert dance contexts, in which the perfected and indestructible body is often the sought after ideal image performed on stage. In integrated or inclusive dance contexts, the vulnerable, contingent body is more embraced, expanding the creative palette and the notion of how dance can be a catalyst for change in contemporary society. Thus, where some traditional Western concert dance contexts resist the inclusion of disabled bodies, the integrated or inclusive dance context has made space for disabled bodies (although the spectrum of disabled bodies continues to remain limited). Thus, in the integrated dance venue, bold, new interactive bodily partnerships of both abled and disabled bodies moving in physically interdependent, mutually beneficial, and creatively synergistic ways counter misconstructions of the disabled body as incompetent, powerless, and segregated from abled-bodies.

However, a key point of emphasis is that this new construction of the disabled body requires intentional effort by choreographers and dance practitioners, as well as intentional effort to revise expectations of what dance should be from the viewing

audience. It is important, therefore, for dance practitioners to acknowledge the historically marginalized position disabled bodies have held (and continue to hold), through empowering and equalizing relationships amongst disabled and non-disabled dancers in training and performance venues. This effort additionally spurs the potential for exciting and innovative choreography and, hopefully, begins to re-educate the audience as to what else dance and the disabled body can be outside of traditional, assumed norms. To address how this radical duet of dance and disability might generate a re-evaluation of norms while prompting innovative choreography, I fleshed out in Chapter IV the ways in which Heidi Latsky's and Petra Kuppers's work reflect new ways for sensing dance as a place for empowering bodies of difference. Latsky's and Kuppers's strategic attention to space and novel movement approaches exemplified a means for re-defining both dance and the disabled body. Dance then becomes a space for destabilizing and disrupting norms. In this disruption, new ways of knowing and moving emerge.

In order to more fully explore the context for this new, disruptive dance space, I probed into the socio-political role of the disabled body in dance by examining the underlying paradigm of "saming." I illustrated how saming practices help to explain and illuminate the incisive, subversive effect the disabled body generates in normative performance realms (i.e., normative dance and sport competitions, etc.). In these normative performative realms (i.e., the Olympics) samed measures become idealized standards for all bodies. The disabled body brings this desire for extreme, acute measures and homogeneity to a halt, triggering one to re-evaluate assumptions of worth, value, and

measure. Thus, when marginalized bodies perform in dance, their histories and politics are also being performed, whether intended or not. Ultimately, a central point of emphasis revealed in this chapter is that the disabled body entering the spaces of dance is a socio-political act, negotiating and re-framing existing power relations and, therefore, signaling questions of human worth and measure on larger scale.

The need for this type of questioning becomes particularly relevant in the current United States political divide instigated by the 2016 election. The rhetoric of the new administration about returning to a normalized and past notion of what makes this country great immediately pushes aside all those who fall outside the borders of constructed notions of greatness; they are deemed as valueless and, at times, dangerous. By shunting aside all who do not conform to a specified standard, possibilities for change, for growth, and for new ways of thinking are thwarted. Therefore, by advocating for the value of disabled bodies, this dissertation research is timely and relevant in the current socio-political scene.

In order to ascertain and unpack the productive tensions between the dance and disability duet introduced in Chapter IV, to include the issues of saming, I first explored thematic constructions of the body in disability studies. This was the goal of Chapter III, Disability Studies: Revealing Bodies, Confronting Space, Claiming Power. Through a review of multiple literature sources and through analysis of disability activism protests, I asserted that the conceptualization of the body within disability studies over time may be understood as radically challenging the stability of the status quo. This new understanding of the body as challenging held ideas of normalcy was then posited as a

creative benefit for society as a whole. This creative benefit was seen as the basis for my argument in Chapter IV, in which the nature of the disabled body is portrayed as contingent, in flux, embodied, socio-spatial, capable/skilled, and vulnerable. Further, the disabled body, when intercepted with dance practice, offered a means for theorizing their intensely charged intersections. These charged intersections between dance and disability highlighted the many possible meanings which might be discovered through the movement of differently-abled bodies.

Further, this radical partnership between dance and disability, in its creative collusion/collision, stimulates and challenges the area of design and design thinking for assistive technology. Thus, in Chapter V, Dance and Disability Meet Assistive Technology, I examined the ways in which dance and disability ideas and practices interact with design-related thinking and practices. In order to explore this interaction, I surveyed design paradigms and assistive device conceptual models to identify thematic parallels or similarities with the dance context. A survey of assistive technology models indicated the ways contemporary researchers are attempting to address a more comprehensive view of the assistive device, responding to the problems evidenced by prior, less comprehensive approaches. The models elucidated the complexity of the person-device-environment relationship, detailing multiple environmental, personal, and psycho-social variables involved in the use of an assistive device. I then traced complementary linkages of the device in these models to the use of the device in dance practice by considering relevant synergies (i.e. the device as an embodiment of personal identity).

Additionally, design paradigms of note which seemed to resonate with the body-based focus emphasized in dance were: emotional design, human-centered design, and interaction design. These design paradigms attempt to recognize and address the unique needs of different human bodies moving through diverse environments. Rather than ascribe to a standardized design notion, which once again assumes uniform sameness of bodies, these design paradigms acknowledge a spectrum of difference and place the body in motion as a core consideration in their practices. Furthermore, emotional design foregrounds the feeling-based attachments humans have to their objects or devices. Therefore, it emphasizes the approach to design as a sensory and feeling-based experiential *relationship* between the individual and the object.

I next submitted that dance practice intersected with these paradigms due to its emphasis upon a sensing, feeling, interactive body in constant, responsive *relationship* to its spatial environment. Additionally, the disabled body in dance focuses attention on the unique attributes of diverse bodies, like the previously referenced design paradigms and conceptual models attempt to do. While my research illuminated intersecting and complementary points of resonance between dance and these paradigms, I continued investigating distinctions within the dance domain, which would make it relevant and radically generative to existing design paradigms. Responses from research participants and analysis of dance performance helped to shape this process of inquiry and led me to the main argument for Chapter V. Additionally, the history of assistive device technologies exposed the socio-political forces sculpting the device design, development, and distribution. Therefore, the device is positioned not as a neutral or passive mobility

aid; rather, it is portrayed as an active agent of socio-political change, influencing perceptions of disability.

In summary, there were three ideas illuminated through this dissertation inquiry process: (1) dance transforms the device from medical aid to creative partner; (2) dance emphasizes the role of the device *between* various bodies, the intercorporeal aspect; and, (3) dance dictates the need for the device to be spatially versatile and responsive to the body. This investigation led me to the premise of the assistive device as a creative, expressive agent enacting an embodied relationship between a moving body and its socio-spatial environment. Consequently, I then posited that dance and its intersection with bodies of disability notably alter four aspects of how the assistive device can be imagined in the future. These aspects include: what the device is designed to do as a moving partner with the user in relation to his or her environment; what the device is designed to mean when creating these relationships; what the body can do when working with the assistive device; and who the device is designed for, specifically moving beyond a singular body focus and embracing an intercorporeal focus. These four aspects revealed how dance can potentially chart new terrains for design due to the emphasis upon creativity, individual expression, intercorporeality, and sophisticated motion dynamics. These four aspects implicate the following questions:

- How does the assistive device (AD) design enable creative embodied expression rather than just “function”?
- How does the AD design attend to and support dynamic and intimate relationships with others?

- How may the AD design be transformed aesthetically and tactilely to better match identity, interests, and desires of users?
- How is the AD a responsive, relational entity, supporting the body in motion?

These questions were investigated throughout Chapter VI, the final data chapter, in which I described, analyzed, and posited future possibilities for the prototype chair design I have been working on with fellow collaborators since 2005.

In Chapter VI, A Prototype Intervention: Towards an Embodied Socio-Spatial Design Paradigm, I tasked myself with the investigation of a new design paradigm, using the prototype chair design as the point of focus for the discussion and analysis. I extended the embodiment and socio-spatial concepts generated throughout Chapters III-V as the premise from which to view the assistive device. These concepts revealed the meanings embedded in body-device-environment relationships, such as how agency, autonomy, access, self-hood, and relations of power are exposed through movement choices and spatial organization. Research in disability studies, design, disability geography, and sociology coupled with personal dance and disability experiences revealed that the device is a powerful mediator between individual bodies and their environments, both social and physical environments. As such, the device exerts an inhibitory and/or faciliatory effect in conditioning these social and physical relationships. The designer's responsibility, then, is to acknowledge the powerful role the device relationship has in promoting and/or restricting aspects of agency, autonomy, inclusion, access, and self-hood for the individual. The dance context exponentially heightens attention to the intimacy of this

embodied, socio-spatial relationship between body and device, making it a productive means of analyzing and envisioning design.

In order to perform a detailed analysis of the design of the prototype chair, I used a movement analysis framework which is prevalent in the dance domain. I found that by drawing upon a Laban Movement Analysis (LMA) framework to situate the chair's design and then further imagine its evolution, new ideas unfolded for the future of the chair's design. Thus, as a detailed method of inquiry, LMA became a useful methodology for analysis. Although, while conceiving the prototype chair I drew on the basic concepts within the LMA framework, to include the Efforts of Time, Space, and Weight and Flow, as well as the Space area at large, to conceptualize the chair's design, I had not done so in such a systematic, explicit manner as undertaken for this dissertation. Thus, this dissertation research provided the opportunity for more extensive theorization involving conceptual discovery and new possible design practices revealed through dance, disability, and assistive technology intersections.

The differing modes of analysis introduced in the dissertation also allowed differing ways for presenting and discussing participant feedback addressed in the final chapter (Chapter VI). In this chapter, I discuss being most struck by the ways participants interpreted freedom or agency differently. As designer, it was my intention to find ways to promote freedom of movement through the chair's design. It was also my intention to empower the wheelchair user and enhance the interactive capacities between user and her or his environment. The wireless, mobile mode of control used in the prototype chair was created to supply different possibilities for chair navigation without

impeding upper body expression: instead of engaging the arms to navigate the traditional wheel chair, the prototype chair allows the user to wear or hold a small, wireless device that activates motion through the movement of the user's body or through an outside user holding the mobile device and controlling the chair from a distance.

It was interesting to me that some participants found the most freedom when an outside user was directly controlling the chair. These participants enjoyed the element of surprise when interacting with their distanced partner. Other participants described finding freedom or agency in controlling the chair directly through the movement of their own bodies, while another participant described agency as being able to tell the chair operator where to move the chair. Another individual felt the most freedom when she did not know where the chair would move. She specifically asked me, as device controller, not to tell her where I was directing the chair. She seemed to enjoy the journey which unfolded when the chair simply moved her through space and she improvised her own movement with the chair's movement. Additionally, one participant placed a high priority on a sense of freedom as feeling safe; thus, for her agency seemed linked to the feeling of security. The sense of safety also generated differing perspectives from the research participants. For some, safety was described as less important, with freedom of movement and risk-taking of higher priority. These participants did not mind if safety or comfort was sacrificed for a higher intensity level of movement exploration.

Another insight I gleaned through the research suggested that the individual's choice of dance training might pre-dispose them to particular notions of freedom or agency, thus influencing how they experienced the chair's possibilities for movement.

For instance, those participants most versed in improvisational techniques and contact improvisation were inclined to explore differing aspects for controlling the chair and then discuss how they enjoyed these new evolving and varied experiences. They were more willing to immediately indulge in the unique movement qualities and features of the chair and yield control in order to explore. Further, several participants with improvisational skills also placed high priority on staying connected with a partner while moving through space, especially when unhindered by a controller which affixed their arms in space (i.e., wheels or joystick). These participants discussed both freedom and a sense of flow as taking place when they could maintain physical connections with a partner through full movement of the arms. They also described having more options for moving through space provided by the omnidirectionality of the prototype chair.

These observations point to the diverse ways individuals may perceive freedom and construct notions of agency. They also point to the different embodied meanings and possibilities assistive devices prompt for different users. Ultimately, these observations speak to the validity of inventing a diverse range of devices, customizable and versatile in control system and structure. In the future, I hope this research will help me refine the prototype device as a beneficial agent of socio-political change, thus broadening perceptions of disability, dance performance, and dance viewing. As can be seen, the need for innovation underlies all aspects of this dissertation research and presentation. Thus, in the next section I provide insight into the practical aspects of the design innovation process which undergirded and continues to undergird this research. I hope

that by sharing some of these experiences, others interested in pursuing similar design research projects will be assisted.

Design Innovation Process

Innovation is clearly abundant in the natural world; one need only look at the complexity, originality, and genius of the universe, to envision the human capacity for creative production. Our bodies in themselves are one such inspiring example of complex, innovative design. In fact, the human body's possibilities for motion served as the impetus in this dissertation for re-imagining assistive device design. The innovation process history which proceeded the development and realization of the current prototype dance chair was multilayered and complex. I will not provide an extensive history of every phase or aspect of the project; however, I will highlight major points and summarize the arc of the innovation process. I feel this discussion is important to include because, if I intend for this dissertation research to encourage interdisciplinary activity and research amongst artists, engineers, health professionals and others in the future, the reality of interdisciplinary challenges and opportunities should be acknowledged. From my past experiences developing the prototype chair, I now firmly believe that in order for useful innovation to occur in the arts or anywhere else, disciplines must come together, knowledge domains must be shared, and hierarchical divisions amongst disciplines must be deconstructed. I also believe that within educational systems, we must find better ways to "train" interdisciplinarity in order to support successful future collaborative initiatives. Additionally, infrastructure must exist to facilitate and sustain innovation pathways and interdisciplinary collaboration.

First, the innovation process for the development of the chair was not linear. It was circular and improvisational in nature, yet very directed in terms of goals and vision. To undertake this project, I initially pursued a collaborative grant in 2005 with the Department of Mechanical Engineering at the University of South Florida (USF). Concurrently, and as part of the grant proposal process, I began my own research by seeking out and exploring existing technologies, such as the Segway, omnidirectional wheel options, and wireless technologies, in order to determine if the prototype chair design concept could be achieved through an integration of these existing technologies. Collaborative discussions occurred with engineering colleagues to flesh out the main objectives for the project. Once the collaborative grant was awarded in 2006, the project began with several initial experiments happening simultaneously. These initial experiments were undertaken by four engineering undergraduate student groups under my leadership and that of an engineering colleague. One group attempted to address multiple design features of the chair concept, to include the wireless control, height adjustment, and seat rotation. The other three groups worked on the concept of body movement connectivity (leaning or shifting the body to direct the device). Two groups worked with Segway adaptations[63] to address the body movement control, while a third group worked on adapting an existing power chair to address the body movement control. The Segway adaptations were not successful, but still showed promise. The power chair adaptation, in which Hall effect sensors were affixed beneath the seat in order to enable movement to be directed through seat-tilting, was closest to embodying the body

[63] Two Segways with different capacities were ordered as part of the grant.

movement control I sought. This was successful in illustrating just one aspect of a much larger chair concept. By 2007, there was a rough draft prototype[1] designed to control motion through a bodily leaning action of tilting in the chair's seat; thus, hands-free movement for the chair user was established. At this point, it made the most sense to continue working on the power chair adaptation, improving the interface between user and seat sensors and adding the additional design aspects such as height change and omnidirectionality.

However, after 2007, the project moved slowly, there was a lack of financial resources and personnel to accomplish the design objectives. Regardless, I continued to have users test the existing rough draft prototype and I conducted pilot study research with physical therapy colleagues to test the chair's capabilities with differing users.[64] These research explorations clarified the potential value of the chair design's hands-free control aspect and also emphasized the need for a more stable seat interface design which users could control more easily.

In addition to funding challenges, intellectual property issues emerging early in the process created unforeseen challenges which slowed down my focus on building the chair prototype. Unfortunately, the intellectual property process was improperly initiated by one of the undergraduate student engineering groups causing unforeseen issues. It was important to educate myself on the nuances of intellectual property definitions and processes in order to move forward with the project. These are unfortunate, yet real

[64] See: Schrock 2008, Morris et al. 2011, and Mengelkoch, Highsmith, and Morris 2014 for research and information on a much earlier prototype development.

challenges in innovation when people and groups are working together. If projects have interdisciplinary aspects, it is important that communication amongst those involved is very clear, roles are delineated, credit is appropriately given, and respect is maintained. These experiences shaped and will continue to shape my on-going approach in collaborative engagements.

A fortunate and unexpected occurrence happened when I applied for and received the Thatcher Hoffman Smith Creativity in Motion award in 2010. Additionally, soon after, I received a USF Veterans Reintegration Grant which enabled me to contract with a company in California to build the full vision of the chair with all of the design specifications. After about a year and a half of work, the chair was completed and brought from California to Florida in November 2012. Patents were filed with USF to protect the intellectual property. I then worked with a company I had researched and found in Florida on continued refinement and programming of the chair.

Since that point, the USF Office of Patents and Licensing has worked to negotiate license agreements with companies who may be interested in producing the chair or using aspects of its design. Several companies have shown interest, and I worked to increase the visibility of the project through performance demonstrations, conference presentations, and guest speaking opportunities. Additionally, I continued to experiment with the current chair through movement exploration and on-going research with participants. A second prototype iteration which improves upon the current chair and draws from the participant research in this dissertation is in progress. I hope to have multiple prototype chairs built in order to transport them to different locations beyond

Florida. This dissemination process will provide me with more user feedback in order to continue developing the chair to its full capacity in the future.

I am glad to be at this point of progress; however, the project has not been without challenges, and those challenges have included financial barriers and interdisciplinary barriers. These are design innovation realities. However, there were faciliatory occurrences in the project as well. These included internal grant opportunities, external awards and grants, and support by higher administration personnel at the University who foresaw the project potential and helped to promote it. Additionally, developing a close working relationship with the Office of Patents and Licensing at USF has been a benefit to working through intellectual property issues. Further, local, regional, and national media attention and promotion in the project has been beneficial in promoting visibility and awareness. Additionally, at this point, I am fortunate to have found two primary sustaining engineering collaborators with which it is possible to make progress.

In a presentation I gave at the Smithsonian Institution, I was asked if it was possible to “teach” innovation. To some extent, yes, people can certainly be exposed to processes in which their creativity is stimulated and they learn to see a bit differently and from differing perspectives, thus engaging their imaginations. Further, strategic observation and movement exploration exercises are beneficial for probing and cultivating creativity. But, innovation also requires more than creativity, at least in my experience. It requires persistence, patience, continual renewed curiosity/motivation, a problem-solving mind, and a desire to bridge connections and push beyond existing boundaries by challenging existing dominant structures or processes. These qualities can

be encouraged and fostered in individuals, but they also require the individual's desire to take action and continue that action even when the challenges seem insurmountable. Reflecting upon this innovation history offers insight into what the future implications for the research might be in order to continue refining the device design. I address these ideas in the next section.

Future Implications of the Research

In terms of future research, it would be useful to broaden the size and scope of the study. This may include working with a larger number of participants over a longer period of time, and looking more closely at the impact of dance training type upon the embodiment of assistive devices. Additionally, it would be helpful to glean the perspective of dancers who engage with the chair user in multiple ways. In this dissertation research, I focused upon feedback from the participants with disabilities who explored the prototype chair. Incorporating the responses of other participants who interact with the chair user would potentially broaden the perspective of what is important in device design as an interactive, intercorporeal device.

Working with participants for a longer period of time could help assess the long-term impacts of exploring movement possibilities in the prototype chair. This type of larger, long-range study would help determine the scope of training time needed for moderate proficiency and also reveal any challenges of longer term use. Broadening the scope would then help me further understand how best to target the evolving prototype chair to a specific group of dancers with shared movement interests. This specificity would allow me to better determine who the research participants should be in the future

and the types of research and interview questions I need to develop to better address their unique needs.

Broadening the scope of the study in different ways could also lead to improved funding options and buy-in from potential supporters. For instance, I am also interested in exploring further quantitative research studies relating to the prototype chair design. To this point, minimal quantitative data has been collected on the chair, most occurring through collaboration with physical therapy colleagues. In addition to continuing to examine metabolic or core muscle engagement, I would like to delve into the potential balance or proprioception effects of using the chair. I am interested in looking at potential rehabilitative and conditioning effects, in and outside of dance. Thus, I plan to seek out future collaborative opportunities with health professionals, adding other interdisciplinary perspectives to the chair's application.

Additionally, in order to support the opportunity for future research, I will look towards building key partnerships in the dance and disability community, partnerships which are mutually beneficial and potentially possess shared resource infrastructure. Mobilizing and sharing the research with different communities (art, health, design, and business communities) is potentially the most important means of supporting the research evolution.

Beyond continuing the design development of this chair, I plan to continue to invest in the innovative design of integrated and inclusive dance curriculum, seeking best practices for further education in this area. I have already begun this effort through documenting and presenting my teaching in multiple venues and reaching out to others in

the field who practice this work. I have been involved in collaborative webinars focused on inclusive teaching practices and I have initiated multiple types of teaching and choreographic exchanges to create supportive alliances nationally and internationally with others in the field. The integrated/inclusive dance field, although small, has a growing number of practitioners recognizing that we must build better networks and alliances to sustain an impact in the arts and society at large.

In closing, my hope is that this dissertation research has set the foundation for how I will face the challenges and opportunities emerging from my future research plans. I look forward to seeing and being a part of the continued landscape of design innovation in the 21st century. Further, I hope that for disability, dance, and society at large, keen creativity and collaborative exchange remains a driving force for humanity's progress and preservation. To end, I return to the poem I presented at the beginning of this conclusion. This dissertation becomes,

> A manifestation of experience. Linked lives.
> Writing Time. Righting Time.

To the reader, I offer the metaphorical paint brush. Your turn.

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APPENDIX A

IRB Approval Letter

Institutional Review Board
Office of Research and Sponsored Programs
P.O. Box 425619, Denton, TX 76204-5619
940-898-3378
email: IRB@twu.edu
http://www.twu.edu/irb.html

DATE: May 1, 2015

TO: Ms. Merry Lynn Morris
Dance

FROM: Institutional Review Board - Denton

Re: Approval for Innovative Mobility: Prototype Chair Analysis (Protocol #: 18151)

The above referenced study has been reviewed and approved by the Denton Institutional Review Board (IRB) on 4/29/2015 using an expedited review procedure. This approval is valid for one year and expires on 4/28/2016. The IRB will send an email notification 45 days prior to the expiration date with instructions to extend or close the study. It is your responsibility to request an extension for the study if it is not yet complete, to close the protocol file when the study is complete, and to make certain that the study is not conducted beyond the expiration date.

If applicable, agency approval letters must be submitted to the IRB upon receipt prior to any data collection at that agency. A copy of the approved consent form with the IRB approval stamp is enclosed. Please use the consent form with the most recent approval date stamp when obtaining consent from your participants. A copy of the signed consent forms must be submitted with the request to close the study file at the completion of the study.

Any modifications to this study must be submitted for review to the IRB using the Modification Request Form. Additionally, the IRB must be notified immediately of any adverse events or unanticipated problems. All forms are located on the IRB website. If you have any questions, please contact the TWU IRB.

cc. Dr. Mary Williford-Shade, Dance
Dr. Linda Caldwell, Dance
Graduate School

APPENDIX B

Research Questionnaire

Participant Questionnaire

IRB # 106418
Innovative Mobility: Prototype Chair Analysis and Recommendations for Future Modifications.

Participant information:

Name:	_____
Wheelchair user:	____yes ___no
If yes, type of wheelchair:	____manual ____powered
Type of disability	_____
Dancer	____yes ___no
Years Dancing	_____
Type of dance	_____
Training or performance group/company	_____

1. Please describe how you experience your relationship with your mobility device. Has this experience changed over time? Has dance influenced this experience? If so, in what ways?

2. Please comment on how you conceive of disability, what does it mean, to you?

3. Do you feel like your current device imposes limits on your movement choices? If yes, how and in what contexts? Please describe as completely as possible.

4. Please describe your experience in the prototype chair as completely as possible, including any feelings/sensations which arose.

5. Please comment on this chair's applicability level for you. Would you be likely to utilize this chair and, if so, in what capacity (i.e. dance? life?).

6. Can you think of something that you could do in this chair that you could not do with your current device?

7. What are the most significant differences, if any, about this chair compared to others you have used?

8. Please rank (1, 2, 3, 4 or 5) the following design elements in order of importance/benefit for you. Multiple items may be ranked as high priority, low priority, etc.

1 = highest priority, 2 = high priority, 3 = low priority, 4 = lowest priority, 5 = not important at all

___Seat Rotation independent of base

___Height Change

___Mobile phone control system

___Footholds for other dancers to step on and off

___Small base

___Removable/changeable seating

___Omni-directional movement (forward, backward, side, diagonal, and turning)

___Lighting effects

___Chair aesthetics

___Stop buttons

___Variable speed

___Stability of the base

___Overall comfortability

9. Are there other design elements you would like the chair to possess? If so, please describe.

10. Please describe any recommended improvements to the current design or design features.

11. Did you find the mobile phone control:

Hand-held

Not difficult at all Moderately Difficult Very difficult

Worn on body

Not difficult at all Moderately Difficult Very difficult

12. Did you have a preferred use or placement of the mobile phone control?
If so, please list (i.e. hand, torso, head, other person).

13. Please rank order (1, 2, or 3) the following uses of the mobile phone control in terms of your preference **(1-most desirable method of control to 3-least desirable method of control):**

___Holding with hand

___Wearing on body

___Other person/dancer wearing or using the control

14. Please describe any other feelings/sensations and/or thoughts related to your experience in the prototype chair.