Playing on the Spectrum:
Exploring How to Create Playgrounds More Accessible for Children with Autism Spectrum Disorder

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Abstract

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Playground design in the United States fails to address the needs of children with Autism Spectrum Disorder (ASD). As an exploratory study of the importance of play and the obstacles playground environments create for children with ASD and their families, this thesis examines two spheres of research and proposes considerations for improved playgrounds. The first sphere includes research into childhood development and education, looking into the available treatments and teaching strategies for children with ASD. The second focuses on the built environment, exploring the research into how architecture and landscape architecture address the design of spaces with the needs of the ASD community in mind.

Using the information gathered from this review of existing literature and resources, I created a checklist of considerations to evaluate two precedent sites on how well they meet the needs of the ASD community. This checklist highlights aspects of the park or playground design deficient or especially effective in terms of ASD accessibility. This checklist is envisioned to be an adaptable resource to those who are interested in determining how well a site provides for children and families impacted by ASD and provide guidance for future design choices.

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Thank you all!

Chapter 1: *Introduction*

A Father's Perspective

For young children, play is a vital and necessary part of their natural development. It is an innate urge to explore, interact, socialize, and create. Play provides a safe space through which children can challenge themselves and discover new things about who they are and the role they will play in the world. It allows a child to piece together the world around them in a way that is comfortable, engaging, and fun.

Play is something that everyone has experience with and, hopefully, it is something that we never forget how to do. We all have memories of playing as a child, our favorite places to hide, the games we would play with our neighbors or siblings, or the exciting and often dangerous stunts we would dare each other to attempt. These are important not just for the sense of nostalgia they provide later in life, but in how they shape the adults we become, the relationships we form, the way we see the world around us, and how we connect to the natural world. Play teaches us to work together, to communicate, to come to an agreement, and to accomplish goals as a group. The words we use, the way we talk, the non-verbal communication, and the unwritten social rules we adhere to are all practiced and understood through play (Burriss 2002).

As a father of three, seeing my children explore the world on their own, interact with others, and gain the confidence to make friends and overcome challenges is incredibly rewarding. This feeling is something that I took for granted, that I assumed other parents felt whenever they brought their children to the playground. I soon realized that our public spaces and playgrounds are not accessible for many children.

In 2017, I enrolled my four-year-old son in an inclusive preschool where at least half of the students had a disability. It was great to see him flourish at this school and become friends with children of all abilities without stigma or judgment. As I formed relationships with other parents and teachers, I realized that many of these families struggled to take their children into public spaces, especially playgrounds. For a variety of reasons, the parents felt their child was not safe in these spaces or that their

child was not able to enjoy playing with their peers because of the playground's design.

Many public places are designed in a way that is not appropriate for children. For example, restaurants or movie theaters create unique challenges for young children and their parents. Their behavior may be too disruptive, or they break too many of the unwritten social rules within that space. These limitations are understood by most parents who do not expect their toddlers to be able to sit through a movie quietly. Playgrounds, though, were designed and built for children to play. A child's inability to access a playground reflects on the design of the space rather than the user. These are spaces meant for children to play, to explore, and to socialize with other children. They should be safe, fun, and open to every child.

Many of the parents at my son's school who mentioned difficulty taking their child to a playground had children with autism. These were children who are active and capable of using the play equipment, of benefiting from the developmental stimulation these spaces would provide. I felt that there had to be something we, as landscape designers could do to open these playgrounds up to as many of these children as possible. If standards or guidelines could provide play spaces for those of all physical abilities, the same can be done for those with cognitive or sensory challenges such as autism.

Introduction

Playground design in the United States is failing to address the needs of children with Autism Spectrum Disorder (ASD). As an exploratory study of the importance of play and the obstacles playground environments create for children with ASD and their families, this thesis examines two spheres of research and proposes considerations for improved playground design. The first includes research into childhood development and education, looking into treatment and teaching strategies for children with ASD, and the second focuses on the built environment, exploring how architecture and landscape architecture address the design of spaces with the needs of the ASD community in mind. Using the insights gathered from this review of existing literature and resources, I will create a checklist of considerations to evaluate two precedent sites based on how well they meet the needs of the ASD community. This checklist highlights areas of the park or playground design in terms of ASD

accessibility. This checklist is to be a resource to those who are interested in determining how well a site provides for children and families impacted by ASD.

A solid understanding of the symptoms and challenges that face those with ASD is necessary when it comes to providing relevant changes to playground design. The physiological and behavioral challenges that come with this disorder can vary greatly between each person. Looking into the current research into the disorder, and the evidence-based therapies that are used, is an important first step in crafting design solutions to the obstacles this population faces when they visit a playground.

The goal of this research is to open up more opportunities for social and physical play for children with ASD. By using the techniques from education research to create familiar, safe, and inviting places for children with ASD, coupled with a design that provides emotional support, outdoor spaces can prevent challenging behaviors, which are the leading cause of why many parents avoid taking their child to the park. Once a place is inviting and accessible for children, the goal is to encourage a child to seek out play alongside their peers and, eventually, create a desirable play space. Parents will no longer need to push or coerce their children to engage with the playground. Looking at the different ideas about how the design of a space can be the catalyst for social, physical, and imaginative play will be invaluable in creating spaces that a child will want to return to again and again.

Considering contributions from existing literature in education, child development, architectural research, therapeutic garden design, and nature play, three assumptions can be made that serve as the foundation for this research. First, play is the most effective and powerful form of developmental learning in young children (UN Convention on the Rights of the Child 2002). Second, open-ended, nature-based play is more effective and should be encouraged (Wilson 2012). Finally, inclusive play (i.e., play that involves children who are typically developing playing alongside those who have disabilities) should be the goal of playground design that seeks to encourage social growth (Odom 1985).

Thinking of landscape architecture as a synthetic field that seeks to apply relevant theory and practice through design, it is vital to consider a variety of professional fields that can provide important insight into designing developmentally appropriate spaces. The primary focus of this landscape architecture thesis will be on how natural and constructed elements can be used to create spaces that

provide a child the ability to reach their developmental goals embedded in play (social, emotional, and physical) by ensuring these spaces are inviting, engaging, comfortable, stimulating, and safe for children with ASD.

This thesis begins by reviewing relevant literature to build a better understanding of the physical and behavioral symptoms that an ASD diagnosis means for a child and their family, looking first at how the common challenges and neurological differences that this disorder brings with it. Once I have laid the foundation on what ASD is, I move on to what forms of treatment are available, the types of evidence-based therapies that are available for families, and how they achieve their goals for the child. After understanding the clinical response to this disorder, I move onto why these children need to access a playground. Play, and the developmental benefits that it provides for all children, is vital to understanding why it is worth the time, energy, and money spent towards rethinking how communities build playgrounds. Next, I review relevant research in architectural, landscape design, and open-ended play theories. After gathering all these fields of study together, I will create a checklist of design considerations that I will use to critique two precedent sites. Taking what I have learned through research and precedent studies, this thesis will conclude with a simple, printable checklist that can be used by anyone hoping to learn how to make a playground more accessible for children with ASD as well as a call to expand this research even further.

Chapter 2: *Literature Review*

Overview of Autism Spectrum Disorder

To remove the barriers inherent in some playground design and provide children with ASD and their guardians incentive to integrate into the playground environment, it is essential to first look at the fields that relate to the disorder itself, the evidence-based treatments available, and what is effective at managing the most challenging behaviors common to this population. Next, there is the question of why play is so important in a child's development. Looking into the role that play serves in how a child grows, the classification of play types, and where outdoor play lies in regards to the other types, will build a strong argument for why it is important that all children have access to outdoor playgrounds. Finally, this project will look into the use of design, space, and landscape on those with ASD. Understanding how design choices can make a space more or less accessible, enjoyable, and therapeutic, will inform how playgrounds should be changed to better serve those with ASD.

Autism Spectrum Disorder (ASD), commonly called autism, is a relatively new disorder that has seemingly exploded in new cases over the last few decades. As research progresses, the scope and definition behind this disorder continue to evolve. The number of treatment options, both clinical, medical, and holistic, is also growing. For this review of the literature and research around autism, this thesis will focus on the current medical definition as well as evidence-based treatments that are commonly used in the United States.

ASD is not a single symptom, but rather a wide-ranging spectrum of symptoms. The official definition, according to the NIMH, is "a developmental disorder that affects communication and behavior...People with ASD have difficulty with social communication and interaction, restricted interests, and repetitive behaviors" (NIMH 2017). Another definition, from the advocacy group Autism Speaks, defines autism in a slightly different way. "Autism, or autism spectrum disorder, refers to a range of conditions characterized by challenges with social skills, repetitive behaviors, speech and nonverbal communication, as well as by unique strengths and differences" (Autism Speaks 2020).

These two definitions highlight one of the unique characteristics of this disorder; that some of

the symptoms can, at times, be strengths. One of the most enduring examples of this is in the film Rain Man, where Dustin Hoffman plays a character with ASD and is a savant in terms of numbers and memory. While savants such as this are extremely rare, it is important to remember that those who are diagnosed with ASD are not just people with disabilities and challenges. They also have unique strengths and talents that should be allowed to flourish. Choosing to view ASD as having both positive and negative symptoms can transform the conversation around treatment, therapy, and social perception.

Besides just looking at both the strengths and weaknesses of those with ASD, it is important to understand that the spectrum of autism is not just a linear gradient ranging from "very autistic" to "somewhat autistic" (See Figure 1, for example). The linear spectrum viewpoint tends to focus solely on the negative or challenging aspects of the disorder, as seen in the diagram below. This linear understanding places a person with ASD within the frame of how much help do they need, how easily they blend in with typically developing children and adults, and how challenging their behavior or impairments can be in relation to others.

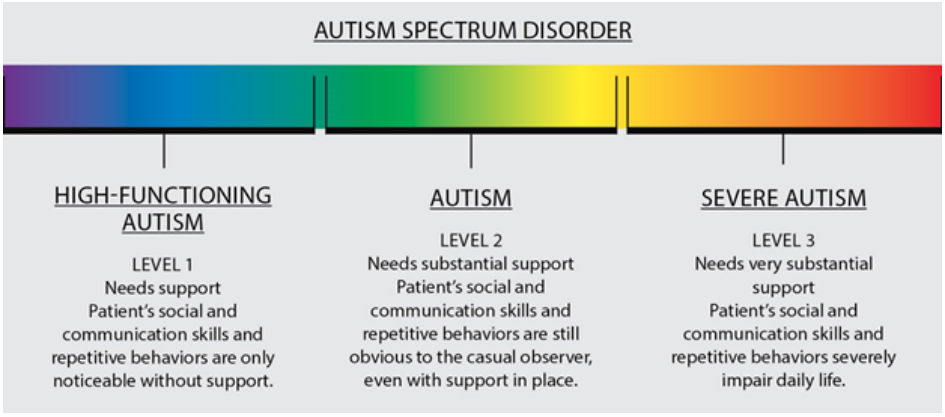

Figure 1: Linear Autism Spectrum Diagram from "Everything We Know About Autism Spectrum Disorder." Barna, Mark. Discover Magazine, 19 June 2017

Instead of viewing the spectrum in terms of severity of symptoms, it is much more accurate and inclusive to think of those with ASD as a collection of strengths and weaknesses. Therefore, ASD should be viewed as more of a circular color wheel where everyone has strengths and weaknesses in a variety of categories (See Figure 2). One person with ASD may be able to have conversations with their peers

and not be overwhelmed by sensory inputs while at school or at home, but when they are placed in a new situation, or forced out of their routine, they may become very uncomfortable and frustrated. At one point, they may land on the lighter end of a linear autism spectrum, but in another situation, they struggle and are labeled as "more autistic". This is clearly not the best way to judge a person with ASD and tends to highlight the worst about a person.

The image in Figure 2 was taken from Art of Autism, a blog written by a person with ASD, shows how the idea of a circular spectrum is better able to show the strengths and weaknesses of an individual. The author helps explain why a linear spectrum doesn't fit the whole person. By broadening the spectrum metaphor, it allows for a person to struggle in certain situations without being labeled as "strongly autistic". It also allows parents and those diagnosed with ASD to better understand the disorder and perceive more positive aspects without being labeled as a "high needs" individual.

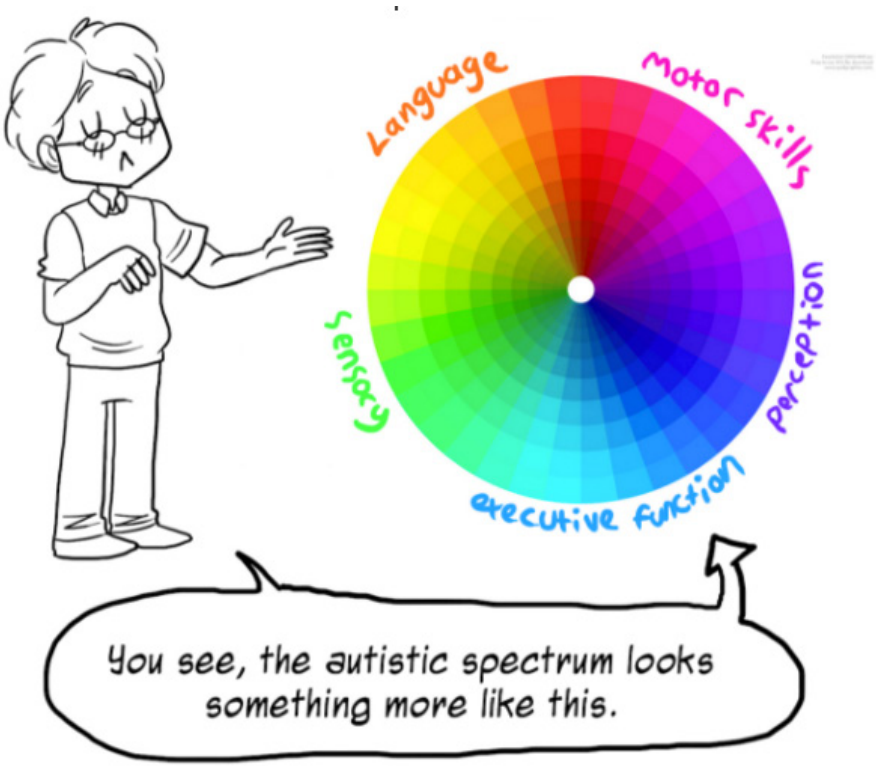

Figure 2: Image from "Understanding the Spectrum – a Comic Strip Explanation." Burgess, Rebecca. The Art of Autism, 5 Mar. 2019, https://the-art-of-autism.com/understanding-the-spectrum-a-comic-strip-explanation/.

Symptoms and Challenges

For those on the Autism spectrum, there are a wide variety of symptoms and challenges that they can exhibit. Below is a list of possible symptoms from the National Institute of Mental Health (NIMH) definition of autism (Autism Spectrum Disorder 2020):

"*Social Communication/ Interaction Behavior include:*

- *Making little or inconsistent eye contact*
- *Tending not to look at or listen to people*
- *Rarely sharing enjoyment of objects or activities by pointing or showing things to others*
- *Failing to, or being slow to, respond to someone calling their name or to other verbal attempts to gain attention*
- *Having difficulties with the back and forth of conversation*
- *Often talking at length about a favorite subject without noticing that others are not interested or without giving others a chance to respond*
- *Having facial expressions, movements, and gestures that do not match what is being said*
- *Having an unusual tone of voice that may sound sing-song or flat and robot-like*
- *Having trouble understanding another person's point of view or being unable to predict or understand other people's actions*

Restrictive and repetitive behaviors may include:

- *Repeating words or phrases, a behavior called echolalia*
- *Having a lasting intense interest in certain topics, such as numbers, details, or facts*
- *Having overly focused interests, such as with moving objects or parts of objects*
- *Getting upset by slight changes in a routine*

Sensory

- *Being more or less sensitive than other people to sensory input, such as light, noise, clothing, or temperature*
- *Processing sensory input in a different way than what is considered typical (such as seeing brighter colors more intensely, categorizing and remembering every object in the room instead of just the ones they interact with, or bring drawn to intense sensory experiences because they have dulled input)" (*Autism Spectrum Disorder 2020*)*

Each of these symptoms can be more or less severe, depending on the child. This variability in symptoms, as well as severity, is what creates such a vast difference among individuals with ASD. This variability also plays into the growing number of children diagnosed with ASD. As researchers continue to understand that different disorders, such as Asperger's Syndrome, are under the umbrella of ASD, the number of children receiving this diagnosis continues to grow. In the 1960s and 70s, the prevalence estimates were between 2 to 4 cases per 10,000 children. By 2002 the number had gone up to 6 to 7 cases per 1,000 children, a 30 fold increase (Boat 2015).

One of the defining breakthroughs in how the medical field, and society, came to better understand the challenges facing those with ASD is when advocates, such as Temple Grandin, explained how she perceives the world in a different way than someone without ASD. Grandin, who holds a doctorate in animal science, is a well-known and respected proponent for the humane treatment of livestock, and was one of the first adults to come forward and openly share that they are autistic. She provides a glimpse into how someone with autism sees the world with her book, *Seeing in Pictures*, which was published in 1995. Grandin was able to effectively describe the way her brain processes auditory, visual, olfactory, and her other physical senses. Grandin explained that at times she was overwhelmed by the multitude of inputs that she struggled to focus on, revealing how challenging it can be for people with sensory integration problems to focus on those around them, to communicate effectively, or even to experience the same things as others (Montgomery 2012).

Just like everything on the autism spectrum, not everyone is sensitive to sensory input. For many, they have the opposite problem, they do not receive enough sensory information and the world appears blurry, dim, or incomprehensible (Bogdashina 2016). The challenge is the same here, to provide for the individual's needs and bridge the connection between different people.

A better understanding of how those with ASD might perceive the world has allowed for new ways of thinking about how to effectively communicate with someone who might struggle to piece together the world around them. Figuring out how to calm the flow the information, or to provide them with a tool to convey the thoughts in their head in a way that others can understand, is something that has the potential to profoundly change their lives for the better (Bogdashina 2016).

Challenging Behaviors

The NIMH list of sensory, social, and behavioral symptoms, as seen in the previous section, vary significantly amongst individuals with ASD but are all linked to the main obstacle facing those with this disorder, challenging behaviors. How a child processes the world around them, where they focus their attention, or how they interact with their peers usually is not the real struggle for families and caregivers. The main obstacle preventing a child from accessing a playground is dangerous, stigmatizing, and problematic behaviors. Some common challenging behaviors include tantrums, property destruction, self-harm, aggression, running away, and screaming. Medical definitions for symptoms and ASD descriptions, such as the list from the National Institute of Mental Health, typically do not include challenging behaviors. This is noteworthy because nearly all of the recommended therapies focus primarily on replacing challenging behaviors with more socially appropriate forms of communication. Understanding that these challenging behaviors are extreme responses to outside stimuli will help build a better understanding of the problems inherent in playground design.

At the core of these behaviors is an attempt by the child to communicate with those around them. For many with ASD, they may not be able to communicate verbally, or they may struggle with the skills and vocabulary to ask for what they want. Instead, they have learned, for example, that throwing food off the table will result in them receiving a preferred food item. Another example would be when a child is told to transition from the play area to their desk. Instead of following directions, they respond by screaming and running out of the classroom. After returning they are then allowed to return to the preferred activity they were doing previously. Like any child, learning how to ask for what you want in a socially acceptable way is an essential part of growing up. For children with ASD, learning these social skills is incredibly difficult, and most parents are ill equipped to guide their child through this process (Buschbacher 2003).

It is these challenging behaviors, more than other symptoms or deficits, which cause many parents to avoid public places, such as playgrounds or parks. They fear for their child's safety, the safety of others, and the stigma that many place on a child who is behaving inappropriately in public. The embarrassment or shame that a parent feels when their child is acting inappropriately in a public space can be debilitating, causing many parents to avoid taking their child out in public. Understanding

the emotional challenge that parents face, the judgments, both spoken and unspoken, they receive from other parents, as well as seeing their child compared to typically developing peers, is difficult for them to handle. Preventing or replacing these behaviors is something beyond the scope of landscape architecture and playground design but strategies are discussed later in this chapter addressing how classrooms and garden spaces can be used to mitigate these issues as best as possible.

Sensory Perception Issues

Detailing the complex neurological process of perceiving outside stimuli, processing the information, and understanding what the sensations represent, is a fascinating subject but it is outside the scope of this thesis. To focus on the sensory perception challenges as they pertain to landscape design, I will be highlighting the two most common sensory processing symptoms that children with ASD have to overcome: hypersensitivity and hyposensitivity (Bogdashina 2016). There are other types of sensory processing disorders within the autism spectrum, and these should be pursued further as research builds on this topic, but for the sake of this thesis I am going to focus on the two which cover the widest swathe of the population and have opposite needs.

Hypersensitivity to outside stimuli is a common challenge with ASD. A child's senses either perceive things much more vividly or acutely than a typical child, or they are overwhelmed by the amount of sensory information that their body is gathering (Bogdashina 2016). This manifests in a child being easily distracted or frustrated by stimuli in their environment, often leading to outbursts in behavior.

In contrast, many children struggle with hyposensitivity, where their senses are dulled. The world around them doesn't provide adequate stimulation and this leads to them seeking out more intense sensations, often creating loud noises or physical sensations in order to resolve this lack of stimuli (Bogdashina 2016).

While these sensory processing symptoms are opposites, they both cause a child to become frustrated or overwhelmed with the world around them, leading to challenging behaviors such as tantrums, self-harm, or hand-flapping (Bogdashina 2016). It's important to understand the root cause of these behaviors so that design guidelines can be created that can effectively alleviate the frustrations of the child.

With this foundation of the symptoms and challenges of this disorder, it is important to look at how ASD has evolved over time. The next section will go into the history of ASD, how the spectrum has changed, and how there is still much more to learn about what ASD is.

History of Autism Spectrum Disorder

The relative explosion in autism diagnosis that has spread across the country in the last few decades makes it seem that this is a relatively new disorder, but it has its roots as far back as 1912. Eugen Bleuler, a Swiss psychiatrist, coined the term autism, which refers to the Greek term for self "autos" since he was referring to patients who had withdrawn within themselves (Holaday 2012). In 1943, Leo Kanner was one of the first to formally document a case of autism but believed that the disorder was caused by cold, unloving, "refrigerator mothers". This stigma surrounding the disorder lasted for decades, did a severe disservice to the parents of those with this disorder, and held back research into this disease for years to come (Holaday 2012).

It wasn't until the 1960s and 70s that the disorder was studied more closely, and the myth of the "refrigerator mother" started to lose its hold on society. With the introduction of the Education for the Handicapped Act in 1974, children with disabilities were now given a right to education alongside their peers for the first time (Holaday 2012).

In the 1980s and 90s, diagnosing autism became easier as researchers were able to better understand and define the disorder. The spectrum initially included autistic disorder, Rhett syndrome, childhood disintegrative disorder, Asperger's disorder, and pervasive developmental disorder-not otherwise specified (Holaday 2012). With the publication of the *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition* (DSM-5), in 2013, all of these have been folded into the spectrum of autism disorder, with the exception of Rhett Syndrome (which was found to have a genetic cause), and are no longer considered a separate diagnosis (NIMH). The fact that, within the last ten years, researchers are still making substantial changes and adjustments to the official definition of ASD shows that the field is has more to learn about the causes, symptoms, and characteristics of this disorder.

Treatment and Early Intervention

Diagnosing autism has changed dramatically over the last 20 years. Now a child with ASD can be diagnosed as early as 18 months. Although commonly diagnosed between 2 and 5 years of age, as that is when children start to show deficits alongside their typically developing peers, pediatricians have been making great strides in recognizing signs early (Yates 2013). Early screenings and diagnosis are important for securing services and treatment for a child. Not every child is the same, and, unfortunately, there is currently no cure for autism, but for some children, many of the symptoms can be treated or overcome successfully if therapy and treatment begin at a young age.

Behavioral Therapy

Applied Behavior Analysis (ABA) is one of the few evidence-based practices that has shown effectiveness when working with young children (Carr et al. 2002). The premise of ABA is that behavior serves one of four functions: social attention, tangibles or activities, escape, and sensory stimulation (Cosgrave 2020). This means that when a child engages in challenging behavior, such as screaming, kicking, biting, etc., they are using this to communicate that they want either: (1) attention from someone; (2) , a tangible such as a toy or game; (3) to get away from doing something; or (4) they enjoy the feeling they get when they engage in this behavior (Cosgrave 2020).

Early intervention is especially necessary and effective because it is a time when children explore and learn forms of communicating with others around them (Dunlap 1999). A typically developing child will throw tantrums when told they need to share a toy, but with guidance by an adult and social pressures from other children, they will learn to control this behavior and replace it with a more socially acceptable form of communication such as, “one more minute” or “no, thank you” (Cosgrave 2020). For children with autism, learning these communication skills is more complicated and requires extra effort and supports.

For some children with ASD, they are unable to use verbal communication and fall into the habit of using challenging behavior to get what they want. In these cases, therapists and schools need to teach the student different forms of communication such as visual aids, sign language, or prompting ahead of a demand to provide a different outlet for the child to communicate (Carr et al. 2002).

The goal of early intervention and ABA is to get ahead of what are perceived as socially unacceptable forms of communication and replace them with socially acceptable behaviors (Cosgrave, 2020). For children, removing these behaviors opens more opportunities to be with their peers and take part in activities in the classroom. For families, this can relieve an incredible amount of stress from their daily lives.

Play Therapy for Children with Autism

ASD inhibits the development of social skills. For young children, play is the most effective and enjoyable form of social learning. Unfortunately for children with ASD, the relationships that form through play, and the social skills needed to connect and have relationships with others, are difficult to teach. Autism and play research, Katherine Carrizales describes child-centered play therapy as "not only a relational intervention that is effective in addressing the needs of interconnectedness between child and therapist, it is also particularly strongest in the very areas where behavioral interventions might fall short: addressing the social needs of individuals" (Carrizales p.73).

Where behavioral therapy is successful at replacing challenging behaviors with more socially acceptable ones, play therapy strives to give children the confidence and problem-solving skills needed to succeed in social situations with other children. When successful, it teaches a child to enjoy playing with others and to seek out this behavior rather than needing direction from their therapist.

Speech Therapy

Often working closely with behavioral therapists, speech-language pathologists (SLPs) focus on developing language or other socially acceptable forms of communication (Autism Speaks 2020). Children with ASD often do not initiate conversations, use appropriate requests, or respond verbally to demands or desires. The goal of communication therapists is to provide a way for these children to connect and respond to others around them in a socially acceptable manner (Autism Speaks 2020).

Therapy can range from more complex social skills such as, teaching a child how to understand body language cues, to hold a conversation for extended periods, and to read facial expressions. For children who are non-verbal or who are not capable of using language, SLPs will teach alternative forms of communication, such as sign language, pictures, or speech devices (Autism Speaks 2020). By

providing an outlet for these children to communicate their needs and desires, it can reduce frustration for both the child and parent, decreasing the amount of challenging behaviors (Cosgrave, 2020).

Other Treatment Options

Depending on the individual's age and the severity of their symptoms, there are a wide variety of therapies and treatment options that have shown varying results (Masi et al. 2017). These include music therapy (VanFleet et al., 2010), diet and nutritional changes (NIMH 2020), pet therapy (VanFleet et al., 2010), and positive behavior support (NIMH 2020). As more research looks into the causes of ASD and the neurological differences of those with the disorder, more options for treatment become available.

Autism Spectrum Disorder is a complex challenge to overcome, but the end goals for each child are the same: to remove the harmful and disruptive behaviors, replace these behaviors with more socially acceptable responses, and empower the child to feel comfortable interacting with other people.

Autism treatment is still a relatively young field, and the review of treatments above is just a small portion of the most widely recognized and researched options. Understanding how teachers, parents, and therapists can overcome the challenges that ASD presents is vital to acknowledge the failures and successes of the built environment (Khare & Mullick 2009). Knowing the barriers that prevent children from accessing play spaces enables us to better accommodate the needs of this population as it pertains to accessible design. The goal of this thesis is to provide a broad foundation of research, design options, and successful interventions for designing ASD accessible spaces. I hope that as the field of clinical and medical treatments for ASD continues to progress, other fields, such as landscape architecture, will grow alongside it.

The next section focuses on the idea of play and what it means for a child's development. Understanding what play is, and the variations and progressive complexity of play is vital to designing spaces where a child can get the most out of their time.

The Importance of Play

This section examines the various aspects of play from its function in development, the types of play children engage in, and how the outdoors enables open-ended play that is especially important for childhood development.

Play as a Right

While it may seem inconceivable that a child would be denied the chance to play, it wasn't that long ago that children in the United States were forced to work in factories or farms from as young as four or five. In fact, until the Fair Labor Standards Act passed in 1938, the practice of employing children was common across the country (Child Labor in US History 2011). Obviously, this was a severe problem that took substantial progressive reforms to pass strict child labor laws. A lack of play, growing and developing alongside peers, or receiving an education has long-lasting effects on children as they mature into adults. For many, they never learn to create relationships with others and end up as insecure adults who suffer from depression. Physically, they often are stunted from the repetitive work they are forced to do day in and day out (International Labor Rights Forum 2011). The amount of physical, emotional, and social damage that is done to an adult who was not allowed to play as a child can be devastating and often irreversible. Suffice it to say that play is the most effective and powerful catalyst for childhood development and should be available for all children (Milteer 2007).

Play is something a child needs just as much as food, water, shelter, and love. Providing these for everyone, especially during the critical developmental period of early childhood, is something that a civilized and progressive society should strive to provide. Knowing that is the first step towards pushing for change. The next step is to investigate how play is so effective at providing developmental growth and what the different types of play are. This will help designers create spaces that can provide opportunities for play for children of any ability.

While it is important to gain a full understanding of play and human development, covering the entire body of research goes beyond the scope of this thesis. It is an incredibly deep field of study that goes beyond just human development, with scientists looking into the importance of play in animal development as well. I will examine the basic types of human play and what aspects of play are best

found within a playground environment. These are important for building a case for why a park or playground should be designed a specific way.

Types of Play

As discussed above, play is an exceptionally effective way for children to learn and develop. Since play is an intrinsically motivating activity (Huizinga 1955), it is easy for a child to be motivated to play. For young children, play is especially well suited for physical, social, and developmental learning. When play is separated by type, it can be easy to see how play is integral in the growth of a child. The list below is a good starting point into the significant play classifications:

- Locomotor play: any form of play that involves large motor functions such as running, climbing, or jumping. These are especially important for young children as they learn how to control their growing bodies. It gives them coordination and motor skills necessary for the rest of their lives.
- Social play: playful interactions between a child and other peers, a caregiver, or a parent. As children get older, the number involved in group play grows as well.
- Parallel play: for younger children it is common for them to play side by side without much interaction. For older children, this type of play can involve different aspects such as physical play, objects, or pretend play.
- Object play: playful use of objects which changes as a child gets older and more advanced. For babies, they use objects to feel and mouth. For older children, objects can be used for their designed purpose, such as jig-saw puzzles, or they can be used in imaginative ways. The more imaginative forms of object play have shown to provide slightly better benefits.
- Language play: for young children around 2 years of age, they talk to themselves and make noises for fun. As they get older, they use more complex language play that involves rhyming or tongue twisters. Some of these can be developed without other children but the most dramatic development is seen when children use language to play with other peers.
- Pretend play: when objects or actions are imagined to be something that they are not. For young children, this could be feeding a doll with a spoon or pretending a remote is a phone. As the child grows older, this pretend play becomes much more complex. Roles are assigned to characters and a story is shaped. Actions and intentions are assigned to others according to their story with the child scolding those who don't do it exactly as they have it planned (Pellegrini 2009)

These types of play are not siloed from one another; for example, social play can easily be mixed with pretend and language play. It is helpful to see these different categories of play, understand how

they build on one another, and how a child who is developmentally behind his peers in pretend play skills could quickly get frustrated.

Open-Ended Play

Since the scope of this thesis is outdoor play, I am choosing to highlight a specific theory because I believe that it is the most relevant in terms of outdoor play spaces. This is the idea of open-ended or child-driven play which is defined as play without rules or goals predefined by the designer (de Valk, Bekker, & Eggen 2013a). This type of play gives the control and the choice directly to the child. Play that has defined rules, such as games, or that is directed by an adult or another child, is something that could and should be explored more in future research.

In many schools, open-ended play is often scarce during a child's busy schedule. Allowing time where children can decide what they do and how they do it is exceptionally empowering for young children (Hughes 1999). Every child loves this freedom and looks forward to it. For children who have their days directed by adults, this is a special time where they can make their own choices and follow their interests. It is also proven to be very effective at developing independence and confidence in a child (Hughes 1999).

Outdoor Playgrounds

There are several reasons why it is essential to look into why outdoor spaces are exceptionally well suited for play. Often distinctions are made between natural and more constructed playscapes. Constructed playscapes are what typically comes to mind when we think of playgrounds – such as play fields, swing sets, and constructed climbing structures. Research conducted on which of these is more productive for child development shows there is value in both types of playscapes. Natural playscapes, much like the name implies, utilize natural elements such as plants, dirt, and water, to create areas of recreation. These "playscapes offer the most sensory stimulation and level of diversity when compared to most constructed and wild playscapes. These playscapes have diversity of sensory experience and physical structures which both challenge and engage childhood play" (Parsons et al. p.2). Indoor or constructed spaces are not able to provide play as stimulating and engaging as the outdoors. Richard Louv writes in *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* that "nature

inspires creativity in a child by demanding visualization and the full use of the senses" (Louv p.7).

Diversity in the outdoor and natural landscape is something that constructed and indoor spaces are unable to match (Louv 2005). It is the diversity and unplanned spaces of the outdoors that attract children. According to Fjortoft and Sageie, two researchers of physical education and outdoor studies, it is important to remember that "as adults, we perceive the landscape as forms, whereas children will interpret the landscape and terrain as functions" (Fjortoft and Sageie p. 85). When an adult designs a playground, it tends to have objects or structures that provide a singular benefit such as a slide, a swing, or spinning cubes for tic tac toe. Children quickly tire of these prescribed activities, and since play is inherently creative, they will look for other ways to play, often in ways that adults do not expect (Bartlett 1999).

Knowing that natural environment provides the highest source of engagement and play potential for all children, it adds weight to the push to "green" or mimic natural play within a constructed playground. Not all playgrounds can be nestled within a natural creek or small forest, but each can incorporate nature within the space as much as possible.

All children greatly benefit from time spent playing outdoors, in an unstructured environment, with the freedom to make their own play choices. Thus, it is so important to provide access to these play spaces within our communities, and truly be accessible to ALL children.

The push to create playgrounds accessible for children with physical disabilities has been very successful across the United States, e.g., the Americans with Disabilities Act (ADA) and the laws around accessibility. Ramps, supportive swings, and smooth surfaces are just a few of the ADA accommodations that allow children with physical disabilities to play alongside their peers. These changes are simple but powerful and can create opportunities for play that would not have been possible.

While physical disabilities can be accommodated with direct changes to the physical layout and design of the space, design solutions for children with emotional or cognitive disorders are most often not as simple. Wheelchair access is a standard that can be applied across the board as it applies to nearly everyone that relies on a wheelchair. For children with ASD, no two children are exactly alike. What one child may find overstimulating, another child would enjoy (Bogdashina 2016). Research

into autism accessibility is still relatively new, even more so for outdoor and play environments. Still, there are some critical techniques and designs that can encourage and comfort children with ASD (See especially the Autism ASPECTSS™ Design Index, the work from Christopher Beaver, and the classroom management strategies from Heflin and Alaimo).

The next sections build off this basic commitment to providing play spaces for children with ASD to explore how the built environment can be designed as more inviting, accessible, and therapeutic.

Architecture and Autism

Research into designing spaces for people on the spectrum began with indoor/educational spaces with the work of Richard & Nichol (1971) with their design of indoor playroom. Their two primary goals for their design were to reduce frustration and reduce flight behaviors, which is very similar to many of the research goals still going on today.

Over the following decades, more research has been focused on indoor spaces, specifically classrooms, hallways, building layouts, and interior design. Christopher Beaver is an architect who has been doing this work for years and has found success in rethinking how to build the basic elements and layouts of a building. This research focuses on the most common challenges, which are transitions and sensory changes, within and between rooms. His work highlights the importance of color, curves, acoustics, and the openness of spaces (Beaver 2011).

Over time, these ideas have been expanded upon by other architects, most notably by the architect Magda Mostafa, who created the Autism ASPECTSS™ Design Index, which is a set of evidence-based design guidelines focused on seven categories of a space and how to mitigate challenges for those with ASD. These seven categories are acoustics, spatial sequencing, escape space, compartmentalizing, transitions, sensory zoning, and safety.

Many of these aspects of interior and architectural design can be applied to outdoor spaces as well. Understanding what environmental triggers can cause behavioral challenges in a child with ASD is important to mitigating these through design practices. Whether a space is indoors or outdoors, both

deal with transitions, sensory changes, safety concerns, and reliance on familiarity and routine. Just as a teacher has a task of shepherding a group of children between classrooms, the playground, and the bathroom, so do parents when it comes to taking their child to the park. They move from the familiarity of the car to the open, often noisy, parking lot, which can be overwhelming for a child, especially if they are unfamiliar with where they are going. Then the child moves into a crowded, chaotic play area that often has no separation between spaces or areas of isolation or seclusion. If a child needs to use the bathroom, this can be another challenge for the parent when it is time to move from the fun, overwhelming area into a stark, enclosed space. Finally, taking a child out of the park is a transition that all children often struggle doing (Heflin & Alaimo 2007).

For all parents, teachers, or guardians, these challenges can be overwhelming at times. For parents of children on the spectrum, these spaces can create behavioral problems which can be too much for them, often resulting in them avoiding the playground altogether (Steingard et al. 1997). Looking at the success that architecture has had in designing buildings that provide relief of sensory challenges and provide options for heading off challenging behaviors before they become overwhelming is an obvious first step in understanding how to tackle the challenges of outdoor spaces.

Designing for Sensory Sensitivity

For researchers and designers looking to create spaces for those with ASD, the needs or symptoms of each child can be so different, often the opposite of one another, that it can be challenging to find common ground on which to begin forming solutions to fundamental problems. Looking at one of the most consistent issues that affect children with ASD, sensory sensitivity, helps narrow the scope of what landscape design can achieve in terms of providing inviting and safe spaces. The primary aspects under the control of the designer concerning the senses, are sight, sound, taste, touch, and smell. These are senses that need to be considered when choosing materials, plants, spacing, lighting, and other aspects of the space (Bogdashina 2016).

Beginning with sound, often spaces can be overwhelming for those with ASD when there are dozens of children running, yelling, stomping, or just moving through different areas. Besides the sounds of

activity in areas where this is expected, sound can also be overwhelming in areas where the hardscape echoes off nearby walls, traffic noises from a neighboring street, or squeaking of gates and doors. For those not sensitive to sounds such as these, it may go unnoticed how distracting and overwhelming these sounds can be when surrounded by them. For most, their brain can ignore unnecessary sensory information. This is not true for many children with sensory disorders. What is important is to be aware of the sounds that are created in each space and to provide refuge for those who prefer to not be surrounded by these noises (Richard & Nichol 1971).

Not all sound is bad, and many children love to make noise, even those with sensory disorders. The key with acoustics is to allow a child to control the environment. If a child wants to make noise, then design a space where sound can be a game. For another, sound can be too much, so they need an option to play in an area where noise is limited. It is important to be aware of the noises that are created in each space and to provide areas of refuge.

Many of the ideas on sound also apply to sight and the use of light and color. For example, it is important to be aware of how light can be overwhelming, providing areas of refuge, and allowing a user to control light as a form of play. Unlike interior spaces, where lighting can be controlled almost entirely by the designer, outdoor spaces are subject to the whims of the sun and the weather pattern of the moment. That does not mean that design implementations cannot provide some control over how a user experiences light in the space itself. Just like sound and acoustics, the designer needs to be aware of the light they are adding or blocking and the effects it has on the space itself (McAllister et. al. 2012).

Since many children with ASD suffer from sensitivity to light (Bogdashina 2016), the general objective, regarding lighting design, is to avoid creating extremes in both light and dark. By creating soft and diffuse lighting throughout the space, this allows for users not to be overstimulated. Just like with acoustics, light and shadow can be utilized to create spaces that provide different effects. Shadows and light can be creatively placed throughout the outdoor playground to highlight areas of activity or solitude (Richard & Nichol 1971). In some instances, users can have some control over how light and shadows play across the space, such as shadow puppets or turning on and off lights. By providing control over the sensory input, these elements that were once overwhelming can become a unique play aspect (Richard & Nichol 1971).

Besides the use of light and shadow, color is another element of sight that children with sensory sensitivity may see differently than a typical child. Using color in a space can provide many uses beyond just aesthetic purposes. Color choice can be used as a tool for navigation, indicate intended activity or emotional/sensory response, or offer options to play on flat surfaces.

Next on the list of senses is smell. This is especially important for outdoor environments since everything that is placed in the space adds a scent. Managing these smells is much more complicated than indoors, where air conditioning and deodorizers can be used to filter out unwanted odors. In outdoor environments, the scent of the space can change with the season, the weather, recent landscape maintenance, or even the placement of outdoor restrooms or trash bins. Being mindful of these changes within the space, just like the other senses, helps moderate any extremes that might overwhelm children.

Understanding the seasonal, thermal, and tactile changes that occur with plants and the earth around them will help designers choose their materials with the scent in mind. It can also help to amplify the odors of different species of flora. For some species, a single vine is enough to fill a yard with its scent. For others, one must be close enough to the flower to smell anything. Some might only give out scent when its leaves are crushed or if the sun is warm enough to heat the resin within. These are all tools the designer should use to think about how their space is perceived through smell.

The final sense, taste, is not going to be as necessary to consider when designing outdoor spaces unless the space intends to provide edible plants or gardens. It is essential to recognize that for many children with ASD, one of the common challenging behaviors is pica, or eating or mouthing things that are not meant to be eaten (Information from the National Autistic Society (NAS) on pica, 2020). So, thought should be taken to not design a space where poisonous or hazardous plants and materials are used in areas where children may attempt to eat them.

Spatial and Layout Needs for Children with ASD

Beyond the sensory challenges facing those with ASD, architectural researchers Rachna Khare and

Mullick Abir's research into creating educational spaces for those with ASD show the behavioral effects of understanding the needs of your target user. Some of their primary findings of spatial preferences yielded the following recommendations: provide visual organizational cues, allow for more personal space, provide withdrawal spaces, allow integration with their peers, and allow for a range of physical abilities to access equipment within the space. According to Beaver's (2011) research, children with ASD prefer curved lines over corners, often following these edges between different areas or rooms. In Mostafa's ASPECTSS guidelines, she dedicates an entire section to the sequencing of spaces and the need to have a logical flow from one space to another, preferably in a routine (Khare & Mullick 2009).

All of these architecture studies highlight many of the same topics. Below I have summarized many of the design goals seen across multiple studies:

- Provide a clear visual organization of equipment or rooms.
- Allow for a child to have personal space but still be near enough to others to participate as desired.
- Provide spaces of refuge when a child becomes overwhelmed.
- Make transitions logical, flowing from one to another. Transition spaces, such as hallways, should still be treated as rooms following these above guidelines.
- Apply the routine of the building into the sequence of spaces, minimizing unnecessary steps or transitions.

Architecture has done a fantastic job so far experimenting with how best to provide comfort, safety, and familiarity to the built environment. Many of these practices can be easily applied or transferred to the outdoors. Looking at how to make a child feel at ease in the space they are in is the first step in encouraging play.

To summarize the architectural and interior design research, children with ASD thrive on familiarity, routine, and choice. These are the foundations of what accessible architecture is expanding upon. Since the needs of each child can be so profoundly different, providing options or refuges from over-stimulation can give a child a choice to find where they are most comfortable. These are important design choices to be considered when creating an outdoor space that is accessible and inviting for children with ASD.

Outdoor Playground Design

Play has always been a vital part of childhood, but the idea of a specific space or equipment for children's recreation began with the industrialization and urbanization of society (Playgrounds in Parks 2010). As cities became more crowded, children were unable to access open space from their home. By the late 19th century, humanitarians saw the need to provide safe, public spaces for children to play. This was the beginning of playgrounds in the United States (Playgrounds in Parks 2010).

Initially, these "playgrounds" were nothing more than just an open patch of grass a sandbox. As the public realized the importance of providing these spaces for children, the playground became more complex, specialized, and formal in their design. Structures, swings, and other constructed tools for play were added to these open spaces to provide different movement and recreational opportunities.

To create a strong foundation that builds off the research covered in previous sections (open-ended play, mitigating challenging behaviors through design, and providing for the sensory needs of those with ASD), two types of playground philosophies will be explored in more detail. The first will be nature play, and the other will be adventure playgrounds. Both of these have characteristics that have been proven beneficial for the development of all children with ASD.

Nature Play

Understanding the role that nature plays in the wellbeing of a child is essential, especially within the field of landscape architecture. A discussion of nature and its effects on children must bring in the work of Robin Moore (2014). As a landscape designer and scholar with years of research into how the natural environment can significantly benefit both the physical and mental health of children, Moore has designed gardens to provide a place for children to interact and play with nature. According to Moore (1999), connections with nature are essential regarding play because "interactions with the physical environment are intimate and immediate. This makes garden settings especially satisfying because they are diverse, constantly changing, multi-sensory, and alive" (Barnes & Marcus p.323). Natural elements such as water, dirt, leaves, bugs, or rocks will not be the same the next time that a child visits the garden. Nature is inherently self-reflecting and allows children to explore not only the exterior world but also move away from the over-stimulation often found indoors. This is true for all children, not just

those with developmental or physical disabilities.

Defining nature play necessitates looking at the space, both from the use of materials and the type of play that occurs. According to Moore, nature play is defined as "a designated, managed location in an existing or modified outdoor environment where children of all ages and abilities play and learn by engaging with and manipulating diverse natural elements, materials, organisms, and habitats, through sensory, fine and gross motor experiences" (Moore, Cooper, & Frumkin p.21). This definition of nature play focuses on the natural elements within the space, whether they were there naturally or added through construction. For Moore, it is the direct interaction with nature that is so important for engaging children and creating a positive bond between child and nature. Incorporating nature into the play space is something that all outdoor parks or playgrounds should strive to do because it benefits everyone (Parsons 2011). Still, it also has been shown to have substantial sensorimotor, social, and physical benefits for children with ASD (Li et al. 2019).

Nature play, in the view of how children interact, also relates closely to the playground design philosophy of adventure playgrounds. When space is filled with natural elements, there will always be a sense of spontaneity, of discovery, that can fulfill the needs of children to explore and create (Parsons 2011). It is this openness to explore that can make a space more engaging and fulfilling for children, but it also opens the opportunity for accidents or dangerous activities. This is where the relationship to adventure playgrounds comes in and why this thesis chose to explore this play theory more closely in the following section.

Adventure Playgrounds

One of the most fascinating and debated topics in playground design is the notion of adventure playgrounds. The core idea of these types of play spaces is to provide "exploration, experimentation, and expansion" (Sutherland & Soames p. 12). Allowing children the freedom to create their own spaces, to play with danger, and to work together is something many parks do not embrace, especially now where safety concerns have removed much of these attempts at creation, leaving playgrounds as static structures over sand.

This type of playground started in Europe and came to the United States in the 1960s (Playgrounds

in Parks 2010). Before more stringent safety regulations came about in the 1970s, these playgrounds incorporated a lot of natural and loose materials to allow more creative freedom for children. One of the most engaging and developmentally essential aspects of adventure playgrounds is that often the loose materials found on site are used to construct new objects. For children, this freedom to build and create, coupled with the social requirements inherent in teamwork, provides important training in communication, social skills, and other group social dynamics (Parsons 2011). The idea of allowing children to build with real tools, to climb on unsecured planks they put together themselves, sounds like a lawsuit waiting to happen, but as anyone who looks into their fondest memories from childhood can attest, these moments of autonomy and creation that stand out the most. Children who can tackle these challenges and push their boundaries often gain self-esteem as well as real-life skills.

While dumping a pile of nails, wood, and hammers into a park is probably not going to work, the underlying concept of providing children the opportunity to create has been gaining popularity in recent years. Taking the ideas behind adventure play and placing them into safer, modern settings is starting to have more success. The organization Pop-up Adventure Play is bringing the benefits of this style of play and making it more accessible with training courses, guides on what scrap or loose parts to incorporate, and consultations on how to throw a pop-up adventure park in your neighborhood (Pop-Up Adventure Play 2020).

Looking at the core concepts behind natural play and adventure playgrounds, the two seem inherently intertwined. Children are drawn to the messiness and mystery within nature but they also want to make something out of the things they find, to work with others around them towards a common goal. The challenge is designing a space that encourages these aspects of play while also making it accessible for children with all abilities.

Having looked at how playgrounds can amplify the developmental benefits of play and through materials, landscape, and types of play, it is essential to also look into the emotional, sensory, and healing effects that outdoor spaces can have on an individual. The next section will look at how landscape, nature, and design can provide these benefits.

Therapeutic Gardens

Therapeutic garden design is a niche of landscape architecture that studies the healing effects of vegetation and the outdoors. Therapeutic designs can support activities that are both passive (e.g., sitting or walking), and active (e.g., gardening or playing in), depending on the intended use and effect of the space. When thinking about creating spaces for play alongside areas of solitude and isolation, therapeutic garden design has methods and techniques for using vegetation and outdoor space to provide relief and comfort. For those with ASD, these pockets of refuge are vital to the accessibility of these spaces.

Healing or therapeutic gardens have been around for centuries. "One of the first healing places for which we have evidence the Aesclipion at Epidaurus in ancient Greece – one of a network of healing places functioning from the fourth century BCE to the sixth century CE" (Marcus p. 6). As the field of medicine has progressed, the healing powers of the natural world has faded in and out of popularity. Discussions on the effects of fresh air, sunshine, and interactions with the natural environment have typically stayed in the background, along with drinking enough water and exercising regularly. Within the last thirty or forty years, more research on the side effects of a patient receiving consistent access to the outdoors has consistently shown that there are physical and mental health effects for those who are able to access these things (Marcus 2014).

These discoveries have propelled research into these fields alongside the growing consensus that caring for mental health is just as beneficial as focusing on our physical wellbeing. Many are looking at outdoor spaces to complement the health regimen for everything from post-surgery recovery to aiding the treatment of PTSD (Marcus 2014). Landscape architecture has stepped into this niche field and begun to experiment with therapeutic garden design.

Underpinning the field of therapeutic garden design is the belief that interaction with the natural environment is inherently beneficial for the wellbeing of people (Barnes 1999). Being in nature is something that humans evolved within, not apart from. This idea is expanded upon in E. O. Wilson's book, Biophilia, where he suggests that human life is innately connected to every part of our lives. Even

though our society is no longer predominately hunter and gatherers, spending a majority of our lives dependent on our natural surroundings, that evolutionary instinct is still very much a part of us as a species (Marcus 2014).

These ideas underpin the primary goal of a therapeutic garden, which is to provide a space where someone can interact directly with nature. These interactions can be as passive as an ADA accessible path through manicured gardens, or more active, such as garden beds requiring daily upkeep. There is a variety of programming options associated with therapeutic gardens, such as healing, rehabilitation, enabling, and restoration. According to the American Horticulture Therapy Association (AHTA), a therapeutic garden should provide the following elements:

- "*Scheduled and programmed activities: this could be anything from education programs or just a schedule of events for visitors.*
- *Features modified to improve accessibility: users should be able to take part in the activities or interactions with accommodations made to provide accessibility where able.*
- *Well defined parameters: Direct attention of visitors to the aspects of the garden meant to be highlighted.*
- *A profusion of plants and people/plant interactions: provide plant dominated spaces for all four seasons.*
- *Benign and supportive conditions: Avoid dangerous or hazardous chemicals or materials. Also provide shelter where necessary.*
- *Universal design: provide access and convenience for the most users possible in regard to age, language, and abilities.*
- *Recognizable place-making: simple, unified, and comprehensible spaces. Keep the focus on the plants.*" (American Horticulture Therapy Association 2020)

Therapeutic gardens utilize design and layout choices to highlight the connection between the user and nature. Simple layouts and paths, subtle navigation cues, and care to provide safe and nurturing spaces for people underpin the efforts made by therapeutic gardens. It is this effort to bring the natural world into a constructed space that has so much potential for providing behavioral and emotional support for children with ASD.

Designing for Children with ASD

For children with ASD, accessing play spaces requires more than just physical ability. Parents or guardians need to feel that their children will be safe enough to play in the space. This requires appropriate equipment and incentive to make the space inviting to the child. Both parents and children want to feel comfortable and supported in the play area. Amenities and design choices need to focus on mitigating challenging behaviors and providing for the safety and wellbeing of the child.

Looking at the different fields of research and projects that relate to designing and building accessible outdoor play spaces, there are a lot of applicable lessons and inspiration that apply to the design of outdoor play spaces for children on the spectrum. In the field of education and therapy, routines are embedded in the daily lives of children, both typical and atypical. Visual schedules are used at the start of any new day or activity. These are key to providing support for parents or guardians as they incorporate play into the daily or weekly routine of their child.

When thinking about the symptoms and challenges that prevent children from accessing play, challenging behavior is the top impediment for families. Over- or under-stimulation of the senses, inability to communicate needs or desires, fear of the unknown, or failure to play alongside their peers are all triggers for outbursts of embarrassing or dangerous behavior in children with ASD. Understanding the strategies that behavioral therapy uses to anticipate these outbursts and redirect or provide alternative forms of communication, are highly successful and integrating children into more social experiences. Ideas such as visual communication aids, modeling of proper equipment usage, and reward systems built into the park to encourage a child to do something outside of their comfort zone.

Architecture has done an incredible job of taking these abstract ideas and experimenting with how space can make a child feel, behave, or move through or within a confined space. Color, light, curved lines, open space, programmed spaces, and logical movement throughout a building or interior have dramatically helped children with ASD be more successful within their schools. These are essential concepts to bring into the outdoor design process, to understand how space makes a child feel, and how we can use these feelings to encourage and support play.

In terms of play itself and the role that nature plays in the development and growth of children, it is important to remember that often, playgrounds are just spaces where children create their own forms of amusement. Providing space for controlled chaos, enabling a sense of autonomy to create their own world, and allowing the freedom to explore the natural world around them can be the most engaging and fulfilling play a child may find.

So how do we create routine-based, logically laid out spaces that incorporate communication and behavioral strategies to limit challenging behavior, that is both stimulating to the senses without being overwhelming, that also incorporates plants and natural elements into a welcoming social environment that is accessible to children of all abilities? This is a lofty goal that, like every attempt to expand access to playgrounds, is not going to work for everyone. My goal is to provide an initial framework for those designing or advocating for inclusive spaces for those with ASD. I have taken the lessons learned through this literature review and distilled them into a checklist that can be used to gain a better understanding of how a site succeeds or fails to address the needs of those with ASD. Each site is going to have unique obstacles and advantages working for and against it. This checklist is designed to be a part of an overall site research tool set that can be used in conjunction with other disability and accessibility toolkits.

Chapter 3: *Checklist*

Description/Supporting Research

The first step towards designing more inclusive play spaces is to be aware of the wide range of accessibility needs that children require. Using the lessons and topics from the list above, I have created a checklist that can be used to evaluate a park or playground. This checklist is designed to be a jumping off point and not a final say on what is required in an ASD accessible play space. It is intended to be an initial framework addressing the most common obstacles to children with ASD accessing a playground while offering suggested approaches to alleviate these issues. The goal of this thesis is to develop and refine this checklist since there was little research available that directly related to this topic.

Since the application of this research into landscape architecture, play design, and other accessibility accommodations aimed at those with ASD is an emerging field, this checklist intends to highlight many of the major barriers and opportunities that the literature has shown to be true so far. The topics explored in the checklist are included in the following list:

Layout (Khare & Mullick 2009)

- Flow:
  - › Logical transitions
  - › Treat transition spaces as rooms with similar amenities
  - › Minimize unnecessary steps to move between spaces
- Purpose:
  - › Clear uses of space
  - › Organization should be clear
- Wayfinding
  - › Universal symbols
  - › Visual aids as necessary

Sensory Stimulation (Bogdashina 2016)

- Visual
  - › Colors choices for building materials and as play design
  - › Lights can be used for both safety and to engage with a child
  - › Shade from things such as overhead structures
  - › Movement from vegetation and other structures

- Auditory
  - › Sound from within and without the park
  - › Areas of refuge from sound
  - › Amenities that provide sound or music
- Tactile
  - › Choosing building materials to provide variety of textures
  - › Plants and vegetation intended to be touched
  - › Loose parts/Natural materials
- Olfactory
  - › Plants and vegetation that provide enticing smells
  - › Material choices, both natural and man-made, can carry strong odors
- Taste
  - › Plants and vegetation may be ingested, intentionally or not
  - › Preventing harmful items from being ingested

Safety (Buschbacher 2003)

- Containment: One of the most common challenging behaviors in children with ASD is elopement. Fencing, gates, and other measures need to be taken to prevent a child from leaving a space without guardian supervision
- Hazardous Materials
  - › Pica, or eating inedible objects, is another common behavior that children with ASD may have. The materials used on a site should be considered as a child may ingest something typically developing kids would not
- Line of Sight
  - › Guardians may need to keep a close eye on a child and hiding spaces or obstructed views can pose a safety challenge

Ability (Milteer 2007)

- Provide options for a variety of skills
- Do not separate by ability, allow them to play together
- Create escalating challenges so children do not get bored
- Open-ended play allows children to create their own challenges

Refuge (McAllister et. al, 2012).

- Spaces where a child could retreat from sensory or social stimulations
- Avoid overcrowding
- Transitional and other spaces should have options to avoid crowds
- Movement options to move around crowded spaces

Parental Support (Hume 2008)

- Symbols, colors, and other forms of visual aids to help a child communicate
- Routine building
- Icons or designations to spaces or activities
- Trails, numbers, letters, something to sequence
- Iconography: something unique to the space that the child can identify quickly
- Consider entering and exiting when designing the flow of the space

Incorporate Natural Elements (Moore, Cooper, & Frumkin 2014)

- Water, dirt, plants, rocks, and other tangible natural elements should be available within the site
- Where possible, use natural materials over man-made
- Provide open-ended play using natural elements
- Children thrive on challenge and independence, provide materials they can use to create something of their own

How to Use the Checklist:

The checklist has five columns which are described below.

- Topic: the category that the amenity fits into
- Amenity Description: the intent and short description of what is provided
- Provided (yes/no): is this in the play area or not
- Rating (-, ok, +):
  - (-) Denotes that this amenity is not provided at all or there is much room for improvement
  - (ok) Denotes an adequate amenity
  - (+) Denotes exemplary amenity
- Notes: Space for a description of what is there, how well it works, and other thoughts

The overall goal of this checklist is to change how a viewer perceives the play space and its effect on those in the ASD community. Understanding the viewpoint of those with ASD can help reshape the conversation about what is necessary in a park, especially at the early stages of park development.

Autism Spectrum Disorder Accessibility Checklist

Playground Name: ***Date of Visit:***

Each of the topics and amenity descriptions were chosen to increase awareness of the common challenges and needs of the autism community. When using this checklist, think about the strengths and weakness of the playground design in terms of accessibility for those on the autism spectrum.

Topic	Amenity Description	Provided in Space (y/n)	Rating (-, ok, +)	Notes
Layout	Flow: Is there a purpose or direction to how people move throughout the space?			
Layout	Wayfinding: When entering the park or playground, are there signs or guides to provide direction?			
Layout	Purpose: Are spaces delinieated from one another? If so, do they have a unique role in the park? Such as a play area, a refuge space, tables to eat, or bathroom areas?			
Layout	Movement: how do families move between 'zones' or spaces? Are the paths clearly defined and self explanatory? Are they accessible for people of all abilities?			
Layout	Variety of zones: Does the layout of zone types and the connecting paths allow for families to choose what area they want to be in? Are there different options for families?			
Layout	Extensions beyond park boudaries: Do the wayfinding extend beyond the boundaries of the park? Are those walking, driving, or taking public transit able to anticipate what is coming before entering the grounds?			
Layout	Map: is there a park map available on paper or on a sign within the park? Is this map able to be seen and used by adults and children?			
Layout	Univerisal symbols: Would someone who does not read be able to understand the map and the different purposes/zones within the park?			
Layout	Color and Shapes: Are these used to aid in movement, wayfinding, or labeling of spaces within the park?			
Sensory	Visual: How are colors used to engage or create fun/activity within the space?			
Sensory	Visual: Are there any objects, plants, or structures that use moving, spinning, or other motion to engage children?			
Sensory	Auditory: Is sound used within the park to engage children?			
Sensory	Auditory: Are there areas where sound is dampened to provide an area of respite? Is sound from outside the park mitigated in any way?			
Sensory	Visual: Are lights provided within the park in any way besides illuminating spaces? Are chidren able to play or engage with these lights?			
Sensory	Touch: Are any materials used to engage a child with different surfaces or malleable substances? Are paths, walls, or other surfaces purposely designed for touching?			
Sensory	Touch: Are plants, water, rocks, or other natural elements able to be touched and explored?			
Sensory	Smell: Are there any natural or man-made objects that provide engaging smells?			
Sensory	Taste: Is anything in the park edible?			

Topic	Amenity Description	Provided in Space (y/n)	Rating (-, ok, +)	Notes
Safety	Fencing/Enclosures: Is the park surrounding by walls or fencing? Is there anyway for a child to leave the park besides the entrance?			
Safety	Line of Sight: are there any places where a child could go that an adult would not be able to see them?			
Safety	Hazards: Are there any poisonous or hazardous materials that could hurt a child if ingested?			
Safety	Entrance/Exit: Are there door or gates on the entrances/exits? Is a child able to leave the space without the aid of an adult?			
Ability	Scaling challenges: Does the play equipment in the space provide activites for children with a variety of abilities? Such as a ramp for those in a wheelchair, smaller climbing walls, and even larger rock climbing walls?			
Ability	Separation by ability: Are children with varying degrees of physical ability able to play together in the same space?			
Refuge	Sensory Refuge: Is there a space or amenity within the park that allows a child to remove themselves from sensory stimuli? Such as a shaded alcove or an egg chair enclosed on 3 sides.			
Refuge	Social Refuge: Does the park provide spaces for a child to play by themselves? Are there solo activities that can be done without other children interupting?			
Refuge	Spacing: Do the paths or play areas allow a child to escape from overcrowding? Are there areas where bottlenecking occurs?			
Parental Support	Iconography: Is there a central figure or structure in the space that differentiates this playground/park? A rocket shaped structure in the center could make this the "Rocket Park" for instance?			
Parental Support	Routine building: Are there design elements such as letters, numbers, or shapes, that can be used to create a routine within the park? Would a parent be able to create a schedule using the elements in the park?			
Parental Support	Transition support: Does the design of the 'zones' and paths provide a way for a child to transition to a new space? This could include path designs using numbers, colors, or other visual aid.			
Parental Support	Bathroom: Is the bathroom clearly visible and easily accessible?			
Parental Support	Entering and leaving: Is there any visual aid or design to the park that would help a child move in and out of the space? Dinosaur footsteps from the parking lot to the playground, for example.			
Natural Elements	Plants: Are there plants or trees within the park?			
Natural Elements	Water/Earth: Is there water or dirt within the park? Are they accessible to children?			
Natural Elements	Little pieces: Are there small pieces of nature that a child can engage with? Falling leaves, sticks, rocks, etc.			
Natural Elements	Nature Trail: Are there paths or trails that create a sense of exploration using plants and other natural elements?			
Natural Elements	Nature as play: Is the natural landscape used to create a play space? Such as a large boulder to climb, a sloping hill to roll down, a tree to climb, etc.			

Chapter 4: *Precedent Studies*

Precedent Studies

In order to test and refine the checklist, I chose two sites in Seattle to visit. The goal of these visits was to observe children playing, look for the areas of importance highlighted in my literature review, and try my rating scale to take quick notes on what I observed. The visits took place in winter and early spring during open play times, and my children, aged 3 and 8, accompanied me on these visits.

The first site was Salmon Bay Elementary School, which I chose because it had recently been redesigned with ASD specifically in mind. This site was located within the grounds of an elementary school so my visit occurred on a weekend afternoon.

The second site, Seattle Children's Playgarden, was selected because of it's work towards an inclusive, nature-oriented space for children. I expected this site to be the best example of an accessible playground in the area.

After visiting these sites, taking photos, and using my checklist to rate the different attributes, I made a few organizational and rating scale changes to the checklist to make it more clear to the user. The site visit notes I took on these visits have been placed into the updated checklist format.

Salmon Bay Elementary School

Designed by: Johnson + Sutherland
Built in 2013
Visited in February, 2018

The PTA, Salmon Bay Elementary administration, and the City of Seattle, worked together to transform the playground of this school into one that was more inclusive to those with ASD. They hired the firm Johnson + Sutherland to redesign the playground with an emphasis on ASD accessibility.

Here is a description from the Johnson + Sutherland website, "The Salmon Bay School Playground is designed to be a high-quality experience for children with autism, as well as for all kids in the Salmon Bay K-8 community. We worked with experts and the community to develop design principles related to autism. The playground has been highly successful in creating an environment where kids with ASD feel comfortable, are engaged, and are gently stimulated to socialize. All kids benefit from the unique design, including ample transitional spaces created by a sculptural stone "tree root planter" and contact with natural materials. Play equipment that challenges strength, coordination and balance is organized in small pods. A "flow line" encodes number patterns that appeal to those ASD students who are gifted in math" (Salmon Bay ASD-Inclusive Playground 2020).

Overall Thoughts:

When I visited this site it was on a winter weekend in the mid-afternoon. Since this playground is located within an elementary school, it is not available to the public during the schooldays. My overall impression was that a lot of care was taken to provide an open, colorful, and well spaced play area. Layout choices provided clear uses of space, transitional paths within the playground, and universal wayfinding symbols.

In terms of sensory integration, the materials used in some of the hardscapes and walls provide interesting textures to explore. Soothing colors created a sense of space and provide paths to follow. These choices were great to see but many of the other senses were left out of the playground. The most noticeable was sound. The wide open space, as well as a lack of vegetation, meant that every sound was

amplified across the playground with no space for refuge.

The fenced in area and the open sight lines make for an incredibly safe and secure space for children. Gates are closed and difficult for a child to open on their own, which is a relief for many parents.

In terms of play, there was a wide variety of amenities and structures to allow children of a variety of abilities to engage with. Low sloping hills, variety of climbing heights, and the inclusion of a traditional playground next to the more ASD focused space allows choices for each child.

The aspect that was most lacking was natural elements. Almost all of the play area was hardscape or built structures. This led to a barren appearance, especially during the winter months when the few trees on site do not have any leaves. While many of these trees are still young, the effect is still that of a place apart from nature.

Figure 3: Image of Salmon Bay School and Playground taken from Google Maps https://goo.gl/maps/fHKshA2mMngJiu1j9

1. Traditional Playground
2. Accessible Playground
3. Street Entrance
4. School Entrance
5. Seating
6. Fencing

Autism Spectrum Disorder Accessibility Checklist

Playground Name: Salmon Bay Elementary | ***Date of Visit:***

Each of the topics and amenity descriptions were chosen to increase awareness of the common challenges and needs of the autism community. When using this checklist, think about the strengths and weakness of the playground design in terms of accessibility for those on the autism spectrum.

Topic	Amenity Description	Provided in Space (y/n)	Rating (-, ok, +)	Notes
Layout	Flow: Is there a purpose or direction to how people move throughout the space?	y	+	A colorful path weaves through the different spaces but doesn't prescribe a direction to follow or connect to the entrance and exits.
Layout	Wayfinding: When entering the park or playground, are there signs or guides to provide direction?	n	-	The park is a part of the elementary school, so there is probably a basic map of the school grounds but within the park itself there is no map for visitors to use.
Layout	Purpose: Are spaces delinieated from one another? If so, do they have a unique role in the park? Such as a play area, a refuge space, tables to eat, or bathroom areas?	y	ok	The overall park is split between an open field/court and a play area with typical play equipment and amenities. The "play area" has good separation between the larger play equipment, which is in a raised bed of wood chips, and the more ASD accessible section. In between is an space for sitting.
Layout	Movement: how do families move between 'zones' or spaces? Are the paths clearly defined and self explanatory? Are they accessible for people of all abilities?	y	+	The typical movement of the children and teachers during school would be to come up a small flight of stairs from the building and into the flat play area. There is a path that weaves throughout the space as well as openings for children and adults to traverse the different areas however they please. Outside of school hours, the gates on both sides of the park are where families can enter. This leaves them in the middle of the paved court area where they can move freely to where they want to settle down.
Layout	Variety of zones: Does the layout of zone types and the connecting paths allow for families to choose what area they want to be in? Are there different options for families?	n	ok	There is only one area for families to settle down, the tables in the playground area. The rest of the park is flat asphalt or play spaces with structures on them. With only one option, this does not provide an area for a child who might want to be away from crowds.
Layout	Extensions beyond park boundaries: Do the wayfinding extend beyond the boundaries of the park? Are those walking, driving, or taking public transit able to anticipate what is coming before entering the grounds?	n	-	Nothing from within the park reaches out beyond the fenced boundaries. Even within the school grounds, the painted path doesn't branch outside of the play space and towards the school building. This would be an easy addition to help lead children in and out of the school.
Layout	Map: is there a park map available on paper or on a sign within the park? Is this map able to be seen and used by adults and children?	n	-	There is no park map within the playground but there is most likely a school grounds map that would show the overall position of the park relative to the school and neighboring streets that families could find and print themselves.
Layout	Univerisal symbols: Would someone who does not read be able to understand the map and the different purposes/zones within the park?	n	-	There is no map and the spaces within the park do not use symbols or other iconography to differentate spaces.
Layout	Color and Shapes: Are these used to aid in movement, wayfinding, or labeling of spaces within the park?	y	ok	Color plays a strong part of the design of the this playground, especially the portion that has the most accomodations for children with ASD. A colorful path loops around the space, the different mounds and spaces use bright colors to separate themselves from one another, and different paths extend off the main loop creating optional paths to follow.
Sensory	Visual: How are colors used to engage or create fun/activity within the space?	y	ok	Color in the path is used to create 'stepping stones' to follow, color also creates boundaries around some of the climbable structures as well. Colors were chosen to be calming and peaceful. Lots of blues and greens are used throughout.
Sensory	Visual: Are there any objects, plants, or structures that use moving, spinning, or other motion to engage children?	y	ok	Some of the play equipment involves a child spinning an object or sitting and being spun around. Most other play equipment is the typical climbing and sliding options found in most parks.
Sensory	Auditory: Is sound used within the park to engage children?	n	-	There is nothing that creates sound within the park
Sensory	Auditory: Are there areas where sound is dampened to provide an area of respite? Is sound from outside the park mitigated in any way?	n	-	One of the most noticeable things about this park is the noise from within and outside of the space. With very little vegetation or walls to block sound, there is a lot of noise coming into the space. On top of that, the hard asphalt which makes up most of the hardscape amplifies the sound of children playing. There is nowhere within the park where a child could find a quiet place during a busy play time.
Sensory	Visual: Are lights provided within the park in any way besides illuminating spaces? Are chidren able to play or engage with these lights?	n	-	There are street lights but nothing within the park uses light to engage children.
Sensory	Touch: Are any materials used to engage a child with different surfaces or malleable substances? Are paths, walls, or other surfaces purposely designed for touching?	y	ok	This park uses a variety of hardscape textures to create engaging experiences for children. Colorful mosaic tiles, rough paving, stone tiles, soft padded ground, and some vegetation are all within reach of children.
Sensory	Touch: Are plants, water, rocks, or other natural elements able to be touched and explored?	y	-	To a small extent, trees are in the park and within grasp of children playing. Also, some dirt and woodchips are able to be explored. Overall the vegetation and natural elements do not seem to be a focus of the play space.
Sensory	Smell: Are there any natural or man-made objects that provide engaging smells?	n	-	Nothing that provides an olfactory experience.
Sensory	Taste: Is anything in the park edible?	n	-	Nothing edible.
Safety	Fencing/Enclosures: Is the park surrounding by walls or fencing? Is there anyway for a child to leave the park besides the entrance?	y	+	This is a very well contained park. Fencing covers the entire space and the entrances all have latches that can be closed.

Topic	Amenity Description	Provided in Space (y/n)	Rating (-, ok, +)	Notes
Safety	Line of Sight: are there any places where a child could go that an adult would not be able to see them?	n	+	Everything is within view of the park. There may be a few places that a child could hide behind, but it would not be difficult to find a child in this park.
Safety	Hazards: Are there any poisonous or hazardous materials that could hurt a child if ingested?	y	+	Even though the dumpster is located very close to the playground, this is the only thing that poses any concern to the children in this space. A simple fence around the dumpster could solve a lot of worry.
Safety	Entrance/Exit: Are there door or gates on the entrances/exits? Is a child able to leave the space without the aid of an adult?	y	+	Again, this is a well contained space. A child would have a hard time leaving without an adult noticing.
Ability	Scaling challenges: Does the play equipment in the space provide activites for children with a variety of abilities? Such as a ramp for those in a wheelchair, smaller climbing walls, and even larger rock climbing walls?	y	+	The play area is split between a typical playground equipment and area designed to engage children with ASD. The typical playground does not have a scaled set of activities for those with varying abilities. The other side, the one for ASD, does a good job of creating sloping hills, climbable walls, and other more difficult physical activities all within the same space as one another.
Ability	Separation by ability: Are children with varying degrees of physical ability able to play together in the same space?	y	ok	The park does a good job at this but more could be done to prevent a child from being left out, this is especially true of the typical playground equipment.
Refuge	Sensory Refuge: Is there a space or amenity within the park that allows a child to remove themselves from sensory stimuli? Such as a shaded alcove or an egg chair enclosed on 3 sides.	n	-	One of the biggest factors that this park is missing is an area of refuge. There are no spaces where a child could remove themselves from the activity and sensory stimulation. More could be done.
Refuge	Social Refuge: Does the park provide spaces for a child to play by themselves? Are there solo activities that can be done without other children interupting?	y	+	The use of texture, color, and spacing does create an interesting space for a child to explore and play without needing other children. It also allows for children to play side by side or to watch other children nearby.
Refuge	Spacing: Do the paths or play areas allow a child to escape from overcrowding? Are there areas where bottlenecking occurs?	y	+	The paths painted into the ground allow there to be a flow but when necessary a child could easily move throughout the space however they please. This prevents any overcrowing on the paths.
Parental Support	Iconography: Is there a central figure or structure in the space that differentiates this playground/park? A rocket shaped structure in the center could make this the "Rocket Park" for instance?	y	ok	The branching arms of the small slopes create a sort of amoeba look and is definitely a unique characteristic. I don't know if it's enough to give a name to the space, or to create a lasting impression on a child, but it's something special to the park.
Parental Support	Routine building: Are there design elements such as letters, numbers, or shapes, that can be used to create a routine within the park? Would a parent be able to create a schedule using the elements in the park?	y	+	The variety of spaces and the infinite looping path can be used to create routines and games for any child, both typical and atypical. More could be done to help with transitions into and out of the space, but it's a good start.
Parental Support	Transition support: Does the design of the 'zones' and paths provide a way for a child to transition to a new space? This could include path designs using numbers, colors, or other visual aid.	y	ok	There is some transitional support within the park itself, but these do not aid the parents in a way that could help them remove their child from the space, or to have them take a break. The paths don't connect to the seating areas but rather move past them, and more importantly, the paths do not lead in and out of the park itself, which can be the most troubling part of transitioning for many children with ASD.
Parental Support	Bathroom: Is the bathroom clearly visible and easily accessible?	n	-	There is no bathroom connected to this park. It is located within the school.
Parental Support	Entering and leaving: Is there any visual aid or design to the park that would help a child move in and out of the space? Dinosaur footsteps from the parking lot to the playground, for example.	n	-	Nothing that extends beyond the portion of the play area with the colorful path.
Natural Elements	Plants: Are there plants or trees within the park?	y	-	Trees are planted within large planters but they are still small. There is no other vegetation within the space. Overall this is a very stark and bare looking playground.
Natural Elements	Water/Earth: Is there water or dirt within the park? Are they accessible to children?	n	-	Just some woodchips and dirt around trees. Nothing meant for play or exploration.
Natural Elements	Little pieces: Are there small pieces of nature that a child can engage with? Falling leaves, sticks, rocks, etc.	y	-	Woodchips in the play space are the only real small piece that a child could engage with.
Natural Elements	Nature Trail: Are there paths or trails that create a sense of exploration using plants and other natural elements?	n	-	There is not much in terms of exploring nature within the park.
Natural Elements	Nature as play: Is the natural landscape used to create a play space? Such as a large boulder to climb, a sloping hill to roll down, a tree to climb, etc.	n	-	There is stone tile and a couple small trees but these do not have the natural feel of something to be played on.

Topic Areas:
Wayfinding
Flow
Routine Building
Visual Stimulation

Figure 4: Site Photograph, Colorful Path in Salmon Bay Elementary

The colorful paths that weave in and out of this playground are visually engaging. Not only do the colors draw the eye, the paths instill a sense of flow throughout the space. Children innately know to follow the path and do it willingly. This is a great example of providing an amenity that parents or teachers could use to encourage a child to move within the space. The only problem with this path was that it did not go beyond the play area. If this had been extended to the school entrances, this could have served as a guide for children with ASD to transition between recess and class time.

Topic Areas:
Tactile
Natural Elements

Figure 5: Site Photograph, Dry Creek Bed in Salmon Bay Elementary

Textures and natural elements are used throughout the playground providing both sensory engagement as well as connection to nature. My children, whom I brought with me on this trip, enjoyed climbing over the rocks and feeling the mosaic tiles on the paths. These trees are still young and it was winter so their presence within the space was not apparent. Hopefully in a few years these trees will be able to provide more shade and loose items, such as leaves and twigs, to play with.

Topic Areas:
Refuge
Natural Elements
Auditory

Figure 6: Site Photograph, Seating Area in Salmon Bay Elementary

There are a few tables situated between the two play zones within the playground as well as a few benches scattered around the edge. This provided some options for families who might need a place to find a refuge from the chaos of the playground. While these spaces are provided, there are definitely not many places to avoid the noise and movement of the other children. With so little vegetation and so much hardscape, sound travels easily across the entire space. For any child with a sensitivity to sound, this park may be too much for them during the busiest times of day, especially during a school recess when so many children would be present at once.

Topic Areas:
Ability
Safety
Visual

Figure 7: Site Photograph, Accessible Play Area in Salmon Bay Elementary

With sloping inclines onto a rubber flooring, this side of the playground is clearly designed for accessibility. It also mixes climbing equipment with less challenging activities, which is great for encouraging play between children with different physical abilities. Rocks on the side can be climbed relatively easily, there are some low hanging bars and steps, as well as higher bars for a tougher challenge, providing a good mix for children. Also, this space has clear line of site, which prevents a child from hiding.

Topic Areas:
Purpose
Ability
Options

Figure 8: Site Photograph, Traditional Playground in Salmon Bay Elementary

On the other side of the playground is the more traditional play equipment over wood chips. This area is clearly defined and includes more common amenities such as slides, climbing walls, towers, and monkey bars. While this followed the more traditional layout, it used equipment pieces that encouraged more creative playing besides just climbing and sliding. While this may not be appropriate for all children, it provides more options for children to play.

Topic Areas:
Safety
Layout
Olfactory

Figure 9: Site Photograph, Dumpster Location in Salmon Bay Elementary

One of the main criticisms of this playground was that the dumpsters were positioned so close to the path and play area. The smell, chance of children coming into contact with hazard materials, and place for children to hide, are all problems that could arise. This is easily fixed by the removal of these dumpsters to somewhere else and does not reflect on the design of the playground but rather is a good example of something that a designer may not intend to happen.

Topic Areas:
Containment
Line of Site

Figure 10: Site Photograph, Street Entrance in Salmon Bay Elementary

The entire play area is enclosed by these fences and gates. This can be such a relief for a family who have a child prone to elopement. For many playgrounds, fences are non existent, which can be very troubling when situated next to a busy street. While this space is large, there is no easy way for a child to leave without the assistance of an adult.

Seattle Children's Playgarden

Initial Design: Winterbottom Design Inc.
Initial Completion Date: 2010
Other Designers Include: Wendy Welch, Jeff Babienko, Elizabeth Bullard, Gay Naganuma Burton, Robin Warmby Laskowski, Jennifer Carlson, and Eli Sitchin
Founded in 2002, first design completed in 2010, with revisions over the years.
Visited in March, 2018

What was once a neglected park has become one of the most interesting and exciting playgrounds in the country. Blending nature, play, and accessibility for all children, the Playgarden excels at creating an engaging, nature oriented space .

A short history of the park can be found on the organization's website. "The Seattle Children's PlayGarden was founded by Elizabeth Bullard in 2002, in recognition of the right for all children to play outdoors. All park features and amenities are designed to be handicap accessible and eco-friendly through a collaborative design effort between medical professionals, community leaders and design specialists. The design of the PlayGarden enables children, age 4-18, to participate in and pursue a diverse array of passive and active recreational interests from basketball to gardening. The on-site facilities provide space and programming for therapeutic conditioning for children with disabilities while also hosting a full complement of after school and summer camps for children of all abilities. One component of the curriculum for these programs is to utilize the vegetables from the on-site potager (kitchen garden) to teach children about the relationship between growing and preparing the food they eat" ("Seattle Children's PlayGarden" 2019)

Overall Thoughts:

Seattle Children's PlayGarden is an incredible park and play ground. I visited this space during open play hours with my children. There is a lot that I can say about where this park succeeds in providing an engaging, safe, and natural setting for children of all abilities but I believe that the most important aspect of this park is the choices that it provides. Classic playground equipment, custom amenities, and equipment for those with varying degrees of mobility, edible gardens, trails through trees and shrubs,

and natural elements such as water, mud, rocks, and plants.

The layout of the park is centered around the central hub of buildings and large play mound. Around this space there are winding trails, play areas, garden beds, and other amenities that all can be traced back to the central space. These trails and paths are not clearly marked, for the most part, but they do always wind up back where they started. This can be a little disorienting if a child or parent is looking for something particular, but it also lends itself well to the sense of adventure and exploration that these paths provide.

In terms of sensory stimulation, at the central play mound there are sounds machines, water textures, spinning and twirling objects, and other play choices that would be very engaging for a child who is interested in sensory stimulation. In the surrounding play spaces, there are refuge spaces where a child could remove themselves from the chaotic and noisy central play spaces,

When it comes to accessible and nature-oriented play spaces, this is one of the leading designs in the country. It continually is updating and advancing its goal of providing open-ended play for children of all abilities.

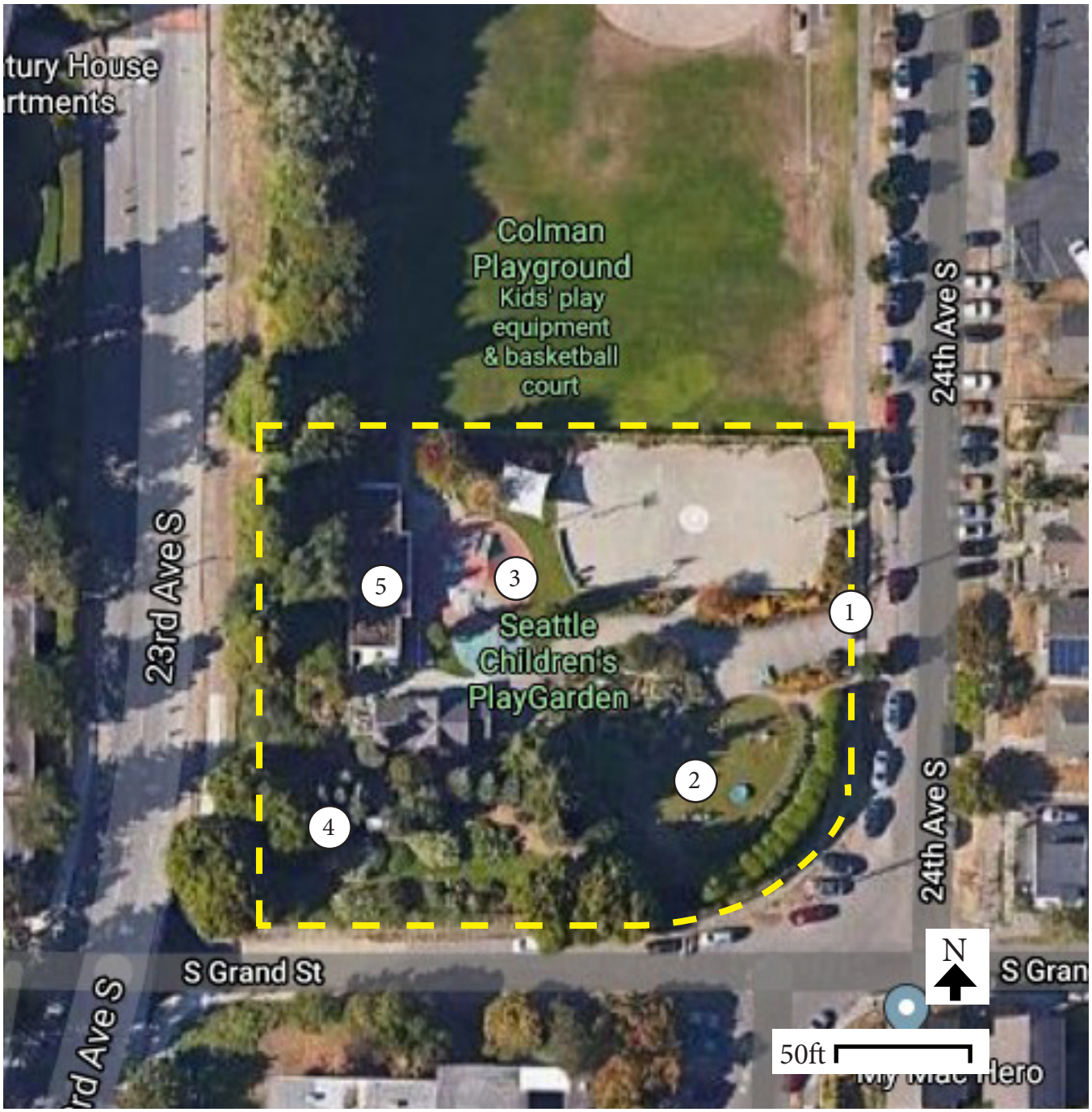

Figure 11: Image of Seattle Children's Playgarden taken from Google Maps https://goo.gl/maps/g3dew4dmqR1bSYnt5

1. Entrance
2. Traditional Playground
3. Central Play Area
4. Wooded area
5. Main Buildings
6. Fencing

Autism Spectrum Disorder Accessibility Checklist

Playground Name: Seattle Children's Playgarden

Each of the topics and amenity descriptions were chosen to increase awareness of the common challenges and needs of the autism community. When using this checklist, think about the strengths and weakness of the playground design in terms of accessibility for those on the autism spectrum.

Topic	Amenity Description	Provided in Space (y/n)	Rating (-, ok, +)	Notes
Layout	Flow: Is there a purpose or direction to how people move throughout the space?	y	+	With many branching paths and unique spaces within the park, there is no prescribed direction to follow but there is a central hub which provides a place to return to when finished exploring.
Layout	Wayfinding: When entering the park or playground, are there signs or guides to provide direction?	y	ok	There is a handmade chalkboard sign at the entrance providing some direction but for the most part, there are not very many guides to help direct someone until they reach the central hub of the park where the main buildings are.
Layout	Purpose: Are spaces delineated from one another? If so, do they have a unique role in the park? Such as a play area, a refuge space, tables to eat, or bathroom areas?	y	+	Seattle Children's Play Garden shines in this respect. There are multiple unique spaces with their own feel, design, and purpose. Some are clearly defined while others are more exploratory and wild. Connecting all of these are paths which can take a child around the whole space.
Layout	Movement: how do families move between 'zones' or spaces? Are the paths clearly defined and self explanatory? Are they accessible for people of all abilities?	y	+	Many of these paths are ADA compliant and the central space provides many accomodations for those with varying abilities. Movement between these spaces typically uses paths of different materials but there are many trails that extend beyond the central area that may be too steep or rough for those in a wheelchair. Overall it is a good mix of options for children of all abilities.
Layout	Variety of zones: Does the layout of zone types and the connecting paths allow for families to choose what area they want to be in? Are there different options for families?	y	+	Again, the variety of spaces allows a family or child to choose where they are comfortable. There are tables and buildings or there are fields and benches. A family could also walk down a path and stop somewhere outside of view.
Layout	Extensions beyond park boudaries: Do the wayfinding extend beyond the boundaries of the park? Are those walking, driving, or taking public transit able to anticipate what is coming before entering the grounds?	n	-	Entering the park requires walking or driving past the entrance sign and climbing a hill where they can view parts of the space beyond a fence. This provides some anticipation or preparation for a child but there is nothing about the design of the entrance that would provide wayfinding amenities to families.
Layout	Map: is there a park map available on paper or on a sign within the park? Is this map able to be seen and used by adults and children?	n	-	On the website and in the park there is no map of the different paths, buildings, or spaces. For many kids this could be a great tool to preprare to visit.
Layout	Univerisal symbols: Would someone who does not read be able to understand the map and the different purposes/zones within the park?	n	-	While the purpose and uses of each space does not require a symbol to differentiate, there is very little use of symbols within the park for guidance or direction. More could be useful but not necessary.
Layout	Color and Shapes: Are these used to aid in movement, wayfinding, or labeling of spaces within the park?	y	ok	Color is prevalent in the park and the design of each node or space within the park is clear to see. Colorful hardscapes, structures, and plants all help differentiate spaces.
Sensory	Visual: How are colors used to engage or create fun/activity within the space?	y	ok	Color in the paths and on the central mound could be used to engage a child but this doesn't seem to be the primary purpose. More could be done with color to create activities but there is more than enough for a child to engage with
Sensory	Visual: Are there any objects, plants, or structures that use moving, spinning, or other motion to engage children?	y	+	The central mound of the play garden is home to most of the specialized amenities designed to engage with children of all abilities and development. One of the structures here uses moving and spinning pieces of equipment to create an engaging activity for children.
Sensory	Auditory: Is sound used within the park to engage children?	y	+	Near the central hub there is a piece of equipment that allows a child to create musical sounds.
Sensory	Auditory: Are there areas where sound is dampened to provide an area of respite? Is sound from outside the park mitigated in any way?	y	+	Since the park is located on top of a small hill and is surrounded by trees and vegetation, the sound from beyond the park is mitigated for the most part. While within the park itself, there are a lot of trees and vegetation that create pockets of solitude and respite from noise. A child could easily move into one of these areas to escape the noise of the busier parts of the park,
Sensory	Visual: Are lights provided within the park in any way besides illuminating spaces? Are chidren able to play or engage with these lights?	n	-	Lights are one of the few things that are not a part of the park's amenities. There is light for safety, but nothing no noticeable design choices use light to engage a child.
Sensory	Touch: Are any materials used to engage a child with different surfaces or malleable substances? Are paths, walls, or other surfaces purposely designed for touching?	y	+	This park does an excellent job of providing a wide variety of tactile experiences for children. From the water and mud, to smooth concrete and gravel, to shrubs and grass. There are a lot of options to engage a child who enjoys exploring with touch.
Sensory	Touch: Are plants, water, rocks, or other natural elements able to be touched and explored?	y	+	Again, this is something that this park excels at. The amount of natural elements that are readily available for a child is astounding. From the man made water fall at the central mound to the dirt and leaf filled paths that lead deep into the woody hillside, these all provide a great way for a child to engage with nature.
Sensory	Smell: Are there any natural or man-made objects that provide engaging smells?	y	+	Nothing man-made but there are a lot of plants that create a variety of smells throughout the year.
Sensory	Taste: Is anything in the park edible?	y	+	There are edible gardens located in this park as well.
Safety	Fencing/Enclosures: Is the park surrounding by walls or fencing? Is there anyway for a child to leave the park besides the entrance?	y	+	The entire park is enclosed with a fence. It is not easy for a child to wander beyond the park boundaries.

Topic	Amenity Description	Provided in Space (y/n)	Rating (-, ok, +)	Notes
Safety	Line of Sight: are there any places where a child could go that an adult would not be able to see them?	y	-	If a chid needs to be under constant supervision, then this would be a difficult park for them to be in. With so many paths and hidden spaces it would be easy for a child to be beyond the view of an adult.
Safety	Hazards: Are there any poisonous or hazardous materials that could hurt a child if ingested?	y	ok	While having so many natural and tangible elements within the park, there is a lot that could make a child sick if ingested. This would be something that a parent or guardian would have to be aware of.
Safety	Entrance/Exit: Are there door or gates on the entrances/exits? Is a child able to leave the space without the aid of an adult?	y	+	The entrance/exits are gates that can be closed and secured. It is not easy for a child to leave on their own.
Ability	Scaling challenges: Does the play equipment in the space provide activites for children with a variety of abilities? Such as a ramp for those in a wheelchair, smaller climbing walls, and even larger rock climbing walls?	y	+	With so many of the activities exploration focused rather than on physical challenges, there is a lot that a child could do alongside others with different abilities. The central mound itself can be climbed by children with all different abilites. There is also plenty of ramps and activities that cater to a child in a wheelchair.
Ability	Separation by ability: Are children with varying degrees of physical ability able to play together in the same space?	y	+	There are a few places where amenities are provided that do not allow children of different abilities to play alongside one another, but enough has been done in the main play areas that this does not feel like a problem.
Refuge	Sensory Refuge: Is there a space or amenity within the park that allows a child to remove themselves from sensory stimuli? Such as a shaded alcove or an egg chair enclosed on 3 sides.	y	+	There are many winding paths and hidden spaces where a child could go to escape some of the sensory challenges they may face. These are not perfect for everyone, if a hcild struggles with sensory overstimulation this may be a challenge.
Refuge	Social Refuge: Does the park provide spaces for a child to play by themselves? Are there solo activities that can be done without other children interupting?	y	+	Again, there are many places for a child to play, with or without others. If a child needs to step away then they will be able to do so easily.
Refuge	Spacing: Do the paths or play areas allow a child to escape from overcrowding? Are there areas where bottlenecking occurs?	y	+	There are many paths and the chance of bottlenecking or overcrowding can be avoided. That being said it was clear during my tour that there are places that are very popular, the mud pit for one, that there is little that can be done to avoid children crowding there.
Parental Support	Iconography: Is there a central figure or structure in the space that differentiates this playground/park? A rocket shaped structure in the center could make this the "Rocket Park" for instance?	y	+	The central mound is the iconic shape of the park. Many children refer to it as the volcano and in effect, call the park, Volcano park. This differentiates it from other spaces.
Parental Support	Routine building: Are there design elements such as letters, numbers, or shapes, that can be used to create a routine within the park? Would a parent be able to create a schedule using the elements in the park?	y	ok	There is a lot that could be used to build a routine or schedule but the lack of symbols within the space could make this difficult. A map or signpost could do a lot to help a child move through each space.
Parental Support	Transition support: Does the design of the 'zones' and paths provide a way for a child to transition to a new space? This could include path designs using numbers, colors, or other visual aid.	n	-	There is a lot of choice here for a child but for those that do not have the drive to go play unless provided with a system or routine it could be difficult to create that in this park.
Parental Support	Bathroom: Is the bathroom clearly visible and easily accessible?	y	+	Near the central mound where the main buildings are located is the best place to put this. Easy to find and to return to when needed.
Parental Support	Entering and leaving: Is there any visual aid or design to the park that would help a child move in and out of the space? Dinosaur footsteps from the parking lot to the playground, for example.	n	-	More could be done in terms of transitions and routines, especially when transitioning in and out of the park itself.
Natural Elements	Plants: Are there plants or trees within the park?	y	+	This is one of the parks greatest strengths. Vegetation is incorporated into nearly all of the play spaces and some are completely natural spaces.
Natural Elements	Water/Earth: Is there water or dirt within the park? Are they accessible to children?	y	+	Water, dirt, mud, plants, and gardens are all here in great amounts. It's a celebration of nature and it allows children to enjoy and explore it.
Natural Elements	Little pieces: Are there small pieces of nature that a child can engage with? Falling leaves, sticks, rocks, etc.	y	+	There is the natural pieces from trees or bushes as well as water and rocks. It's as close to nature as one can get.
Natural Elements	Nature Trail: are there paths or trails that create a sense of exploration using plants and other natural elements?	y	+	There is an incredible amount of this in the park.
Natural Elements	Nature as play: Is the natural landscape used to create a play space? Such as a large boulder to climb, a sloping hill to roll down, a tree to climb, etc.	y	+	This is a place that would create childhood memories of wild spaces and overcoming natural challenges. Hills, trees, dirt, rocks, are all within reach as well as the sense of getting lost in nature.

Figure 12: Site Photograph, Central Play Mound in Seattle Children's Playgarden

Topic Areas:
Ability
Iconography
Textural
Natural Elements
Wayfinding

Part of the initial redesign, and the most iconic spot within the garden, the large mound in front of the main buildings is a wonderful example of accessible play. The low incline allows children to either climb or crawl, wheelchairs can roll up to the water feature, and everything is within reach of a child no matter what their physical abilities. It also incorporates water in a really fun way. My children really enjoyed exploring this unique feature.

Talking to other parents, the mound was something that their children always remembered. One mother, who had a son with ASD, told me that they referred to this park as volcano park, in reference to the mound. Her child was not very verbal but he was still able to tell her that he wanted to go to the volcano park. This is a great example of creating iconography within a space.

Topic Areas:
Natural Elements
Refuge
Flow

Figure 13: Site Photograph, Path Around Traditional Playground in Seattle Children's Playgarden

One of the design choices that is very effective is the creation of paths that wander throughout the playground. This path is found between the main playground and a wall of hedges. It serves no purpose other to be a somewhat hidden trail for children to explore. As a child, the hedges and the trees that surround both sides of the path feel enormous. It provides a sense of being within nature even though they are still within sight of anyone standing in the playground.

This path is it's own refuge area. Children can leave the main playground and feel like they are somewhere outside the busy or noisy areas. It also provides an alternate route between spaces, which can allow a child to avoid overcrowded areas.

Topic Areas:
Natural Elements
Ability
Tactile

Figure 14: Site Photograph, Mud Kitchen in Seattle Children's Playgarden

By far the most popular and busy attraction within the playground was the makeshift mud kitchen. This space was a muddy puddle with a pretend kitchen, pots and pans, and access to running water. Children would act like they were baking, packing the mud and putting it in the oven. My own children were amazed that they could get wet and dirty and even have control over the hose.

This is a great example of open-ended and nature play combined. Children are able to use their imagination to play however they want while interacting with nature in a direct way. It also is something that a child of any ability can take part in.

Topic Areas:
Natural Elements
Sensory
Refuge

Figure 15: Site Photograph, Nature Trails in Seattle Children's Playgarden

Off the main playground, there are a few dirt paths that lead down into the trees. These paths are small and clearly designed for children. My son was especially excited to walk down this path and discover where it went. Allowing my son to explore on his own, even though he ran back after a few minutes, provided a memorable outdoor experience for him.

This space is also downhill and surrounded by vegetation. The noises from the busier parts of the park were muffled, creating a quiet escape from the activity.

This connection to nature while within a safe space is something that is rare to find, especially within an urban environment. For children who may not have many opportunities to experience the feeling of exploring nature, this playground provides something special.

Figure 16: Site Photograph, Wooden Deck in Seattle Children's Playgarden

Topic Areas:
Ability
Iconography

Tucked down the hill from the main play area is a wooden deck that resembles a ship. This is a simple and fun space for children to use their imagination but doesn't provide much else in terms of open play. While I liked this area, my children got bored easily. I think since this area felt so prescribed in what it was supposed to be and also removed from the loose pieces of nature, it didn't have enough to keep my children engaged.

While it may not have much in engagement, it did provide a space where children of all abilities could play together. The space provides a great area for open-play.

Topic Areas:
Natural Elements
Refuge
Sensory

Figure 17: Site Photograph, Split Path in Seattle Children's Playgarden

Further down the path, beyond the ship deck area, there are a series of paths that meander in and out of each other. There are many forks here where children have to make a decision on where to go. This provides another sense of exploration for a child as well as the freedom to make decisions. Forks in a road give the child some sense of self reliance, as if they are in charge of where they go and not the path itself. My kids loved getting lost back here and finding hidden rope swings or chairs tucked into the hillside.

The wild and natural feel of the space is unique and exciting. Nature stimulates the senses in ways that the constructed spaces can't quite match.

Topic Areas:
Ability
Iconography
Natural Elements

Figure 18: Site Photograph, Truck Planter in Seattle Children's Playgarden

My son's favorite part of the playground was the old truck with a planting bed in the back. He loved climbing around the driver's seat and wondering what was going to grow out of the dirt. While this is a simple thing to add to a park, it really helps blend the natural world into the playground itself.

Chapter 5: *Conclusion*

Final Thoughts

One of the primary goals I set for this thesis was to create a foundation of research that pertains to providing therapeutic and developmentally appropriate play for a child with ASD. Looking into the symptoms and challenges of those with this condition and understanding how factors in the environment can exacerbate or alleviate some of these challenges is an essential first step towards designing spaces that can provide appropriate accommodations in outdoor play spaces. The research into symptoms and behaviors covered in this thesis is a basic overview. As more is understood about the lives of those who are severely impacted by this condition, hopefully, landscape designers can do more to provide accommodations for them as well.

Comparing the strategies used by therapists and educators in classroom or clinical settings is helpful in finding inspiration for the built environment. Thinking about school routines, visual communication strategies, and other techniques used to prevent challenging behaviors can often inspire creative solutions to antecedent triggers found in outdoor spaces. Studying the progress made in the field of architecture, it is clear how impactful simple adjustments to the layout, transitions, and spacing within and between rooms has been for children. There is also much more to be researched in the field of therapeutic garden design as it pertains to those with ASD or sensory challenges. This field is still forming and hopefully much more work can be done to expand on what is most affective and engaging for children with ASD. Knowing how much more there is to learn and provide, the checklist I have come up with still has a lot more to expand.

After using the checklist on two sites, it is clear to me that this is just a starting point for future input. Since this thesis focused so heavily on open-ended play, nature play, and preventing challenging behaviors, it feels that most of the push behind the list is to point out places that cause problems rather than create opportunities for fun and engagement. I hope to see more done on building more enjoyment and social play within a space. So often designs are hampered by the need to avoid all mistakes or challenges, with the end result suffering for this. If I were to continue with this project, I would look deeper into what amenities or design choices bring more joy for the users.

The biggest takeaway that I found writing this thesis is that since autism is on such a wide spectrum, it can be daunting to try and design something that can fit the needs of everyone. It became clear to me that there is not a single solution to the challenges that this population faces. Our designs need to be flexible and provide options for the user even if some of these accommodations seem at odds with one another, such as providing visual stimulation as well as refuges from the same stimulation. The field of designing for autism is still an emerging niche, especially for outdoor spaces. More research and experimentation should be done on what is effective at mitigating challenging behaviors.

The final takeaway that I, and I hope the readers of this thesis, leave with is that ASD should be considered when designing outdoor play spaces. Just as the Americans with Disabilities Act (ADA) put in place design changes for accessibility, design considerations should be given to the diverse needs of a child with ASD. For most parks or playgrounds, the resulting design changes do not need to be excessive. Often something as simple as a fence is all that is keeping a child from enjoying the playground alongside their peers. Such minor changes can have a dramatic effect on the accessibility of a space, and often these are overlooked when the needs of the ASD population are not considered.

I hope the field of landscape architecture will work with other experts to create spaces that can accommodate the needs of everyone. Being outside, exploring the world, and gaining an affinity with nature is something I believe is vital for a child's development as well as the health of our society in the future. As a father, I hope to see every child have the opportunity to play and socialize with their peers, to gain self confidence through overcoming challenges, and to find joy in the outdoors. I hope this thesis adds to the research into ASD accessibility and inspires others to learn more about designing spaces for those on the spectrum.

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