



CREATING SPACE

The relationship between play
and furniture and how it supports
neurodivergent social development

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AUTHENTICITY STATEMENT

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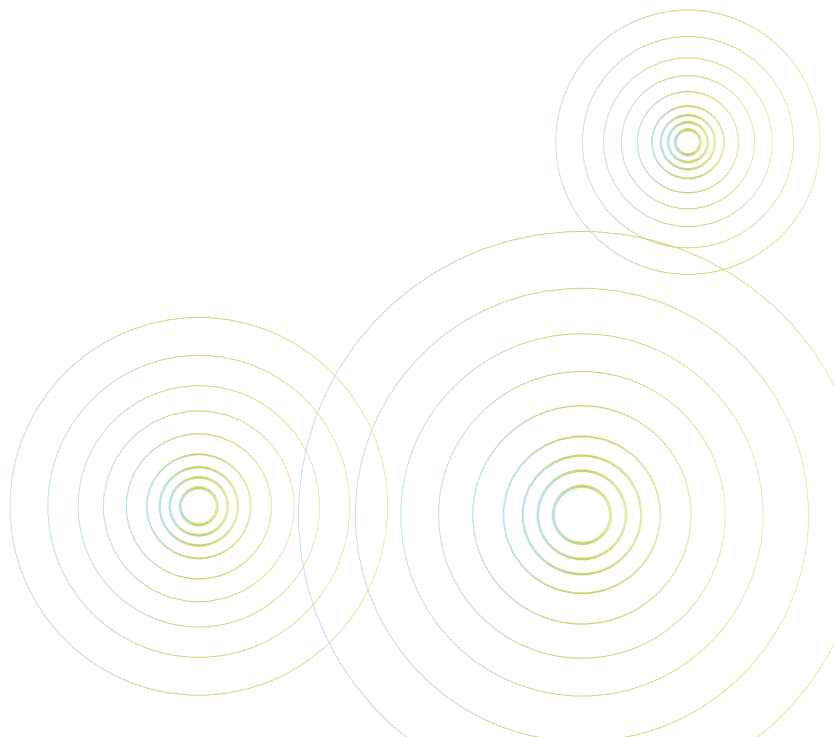
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EXECUTIVE SUMMARY

This report investigates the social development of neurodivergent children aged 3-6 and how play and furniture supports that development. Neurodivergence refers to neurological conditions such as ASD, ADHD, OCD, etc. These conditions will impact the individual's cognitive, emotional, social, and/or executive function.

The research executed in this report began with secondary research to gain a general understanding of the condition, followed by benchmarking to discern the current market and products available. Using qualitative research methods including surveys and interviews were then utilised to expand on this gathered knowledge and locate new concepts. Triangulation was used to connect and build concepts from the research, in turn identifying design implications for future products.

Definitions

Neurodivergent

An umbrella term for a range of mental conditions an individual may have such as ASD, ADHD, OCD, etc. Typically a spectrum that affects a person's social and/or cognitive abilities.

Neurotypical

An individual who does not have a neurological condition that impacts their life.

Neurodiverse

A group of individuals with a mixture of Neurodivergence and Neurotypical functionality.

Furniture

A product found in any built environment that is used for the purpose of comfort, storage, or completion of tasks i.e. a table and chair to eat a meal.

Proprioceptive

Stimulation found in comfort, weight, and touch.

Vestibular

Stimulation found in swinging, jumping, and movement.

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SECTION

INTRODUCTION

In Australia, it is estimated that 10-20% of the population is neurodivergent (ND)(Australian Disability Network, 2024). This is an umbrella term that includes conditions such as autism, ADHD, dyslexia, and more. Individuals living with these conditions are typically dependent on their parents (Cheatum, 2000) and government funding from programs such as the NDIS throughout their life. This financial support will average \$48.5k for 12 months depending on the individuals needs (Endeavor Foundation, 2023).

Neurodivergence is a spectrum where no two individuals will have the same strengths or experiences. However, common barriers for ND children include difficulties socialising, finding independence, executive functioning, and developmental and learning delays (Australian Disability Network, 2024). Despite stereotypes, ND individuals do not choose to “lack social motivation” (Baratchi et al, 2025), they desire social connectedness just as much as Neuro-typical (NT) individuals. Lack and limitations of these skills garnered this misconception, leading to peer rejection, loneliness, and eventually additional mental illnesses.

The purpose of this project is to study the importance of play and how it supports the child’s development, focusing on 3-6 years old as this is the age of transitioning from solitary forms of play to social. By understanding the child’s needs and experiences through background and primary research methods, the discrepancies will be unveiled, guiding a product that will either decrease or eliminate the social isolation ND individuals experience.

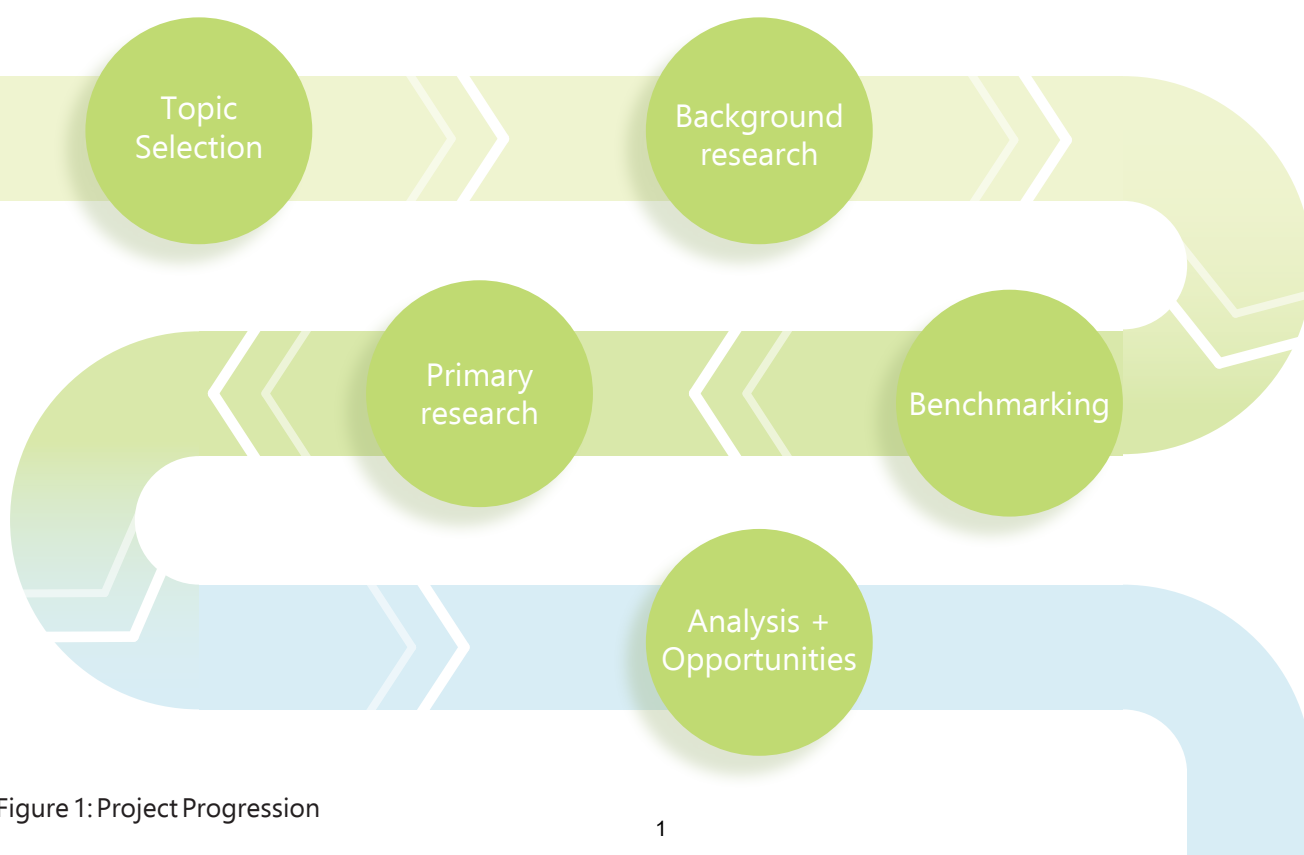


Figure 1: Project Progression

BACKGROUND

To better understand the topic and how to conduct primary research, secondary research was gathered. This included observation studies, psychology textbook chapters, and research articles.

It was discovered that there are connections between play, socialising, isolation and furniture when it comes to a neurodivergent vs neurotypical child's development. ND individuals play follows a similar path from infancy to toddler-hood, however compared to their NT peers, ND children generally begin to slow down at 3 years old, leading to gaps in social capabilities (Cheatum, 2000).

Development through Play

There are many types of play that reflect a child's development starting from infancy. This project focuses on those engaged with from ages 3-6 as this is a time of transition from solitary to social forms of play (Anderson-McNamee and Bailey, 2010).

This makes play an excellent indicator of a child's psychological and physical development as it suggests the growth of "perception, cognition, and emotion" (Adolph et al, 2015). Hence, this period could be the starting point where ND children diverge from the path of play supported development NT children follow.



Figure 2: Children playing (Kuzmina, n.d.)

The table below displays the different types of play and how they support development. Additionally, the figure indicates which forms of play ND and NT children engage in and which they struggle.

Types of Play and Engagement

Type of Play	Age	Definition	Development contributions	ND	NT
Solitary	3-18 months	Playing solitarily, exploring objects and their world, sensory absorption	Bodily control, memory		
Onlooker	1-3 years	Watching others play, usually older children.	Language, empathy, relate to others		
Parallel	1-3 years	Play alongside others, mirroring and/or mimicking	Understanding ownership		
Associative	3-4 years	Disorganised play, children become more interested in others rather than toys.	Socialising, introduction to sharing, problem solving, cooperation		
Social	3 years	Children practice sharing toys and playing games together.	Introduction to rules, socialising, expectations, sharing, values		
Physical/Motor	3-6 years+	Complicated movement, run, jump, climb and games such as hide and seek.	Muscle and strength development, acceptance of win or lose, taking turns		
Constructive	3-6 years+	Exploring objects by building. Typically with sand, blocks and patterns.	Manipulating objects, experimentation, problem solving, creativity		
Expressive	3-6 years+	Getting creative with paints, crayons and instruments. Sensory feedback.	Creativity, self-expression, identity		
Fantasy/Roleplay	3-6 years+	Using the imagination to play through scenarios based on what they know.	Imagination, language, co-operation, problem solve, decision making		
Co-operative	6 years+	Organised play, structured by a common goal.	Understanding of rules, expectations, socialising		

Figure 3: Types of play and engagement, based on the research presented by Anderson-McNamee and Bailey (2010), and Cheatum (2000)

Socialising

Social forms of play are difficult for ND children which is influenced by three factors: their struggle to self-regulate, difference in communication style, and their desire to play by their rules (Havlucu et al., 2024).

When overstimulated, ND children struggle to identify feelings, the cause and process them verbally, regularly leading to physical outbursts (figure 4). This corresponds with their communication style as they struggle to articulate their desire to play in a way that NT children understand (Bottema-Beutel et. al., 2012). Additionally, ND children regularly have their own rules and systems they follow in play that they expect other children to understand. However, this rarely happens as they do not make these known and become dysregulated when the rules are not adhered to (Havlucu et al., 2024).

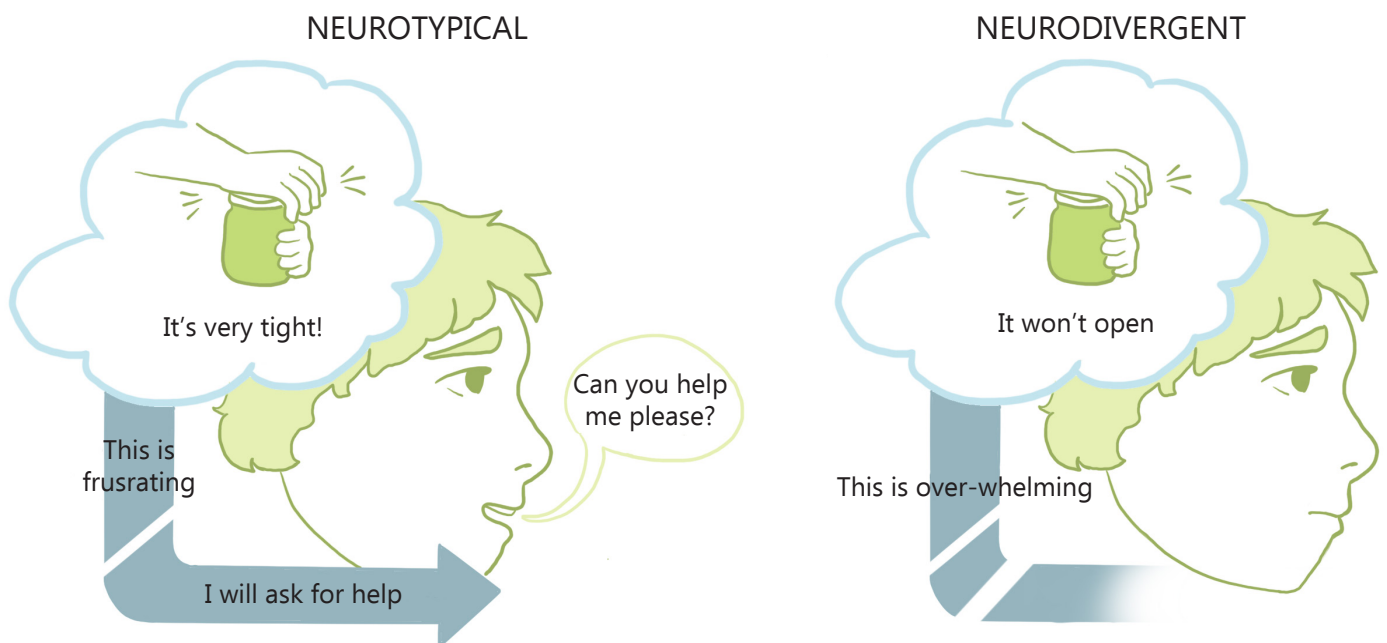


Figure 4: Differences in regulation between a NT and ND child

There have been successes in neurodiverse play for children. This has been reported to happen when the ND child can recognise they are being overstimulated, remove themselves from the play to self-regulate, then successfully re-engage in the social play (Havlucu et al., 2024). This is limited to play such as constructive as it supports both solitary and social play where the grey area between is associative play.

Additionally, children will "stimm" to self regulation which will involve proprioceptive needs fulfilled by comfort and vestibular needs fulfilled by movement like handflapping, spinning etc. (Cushing, 2025).

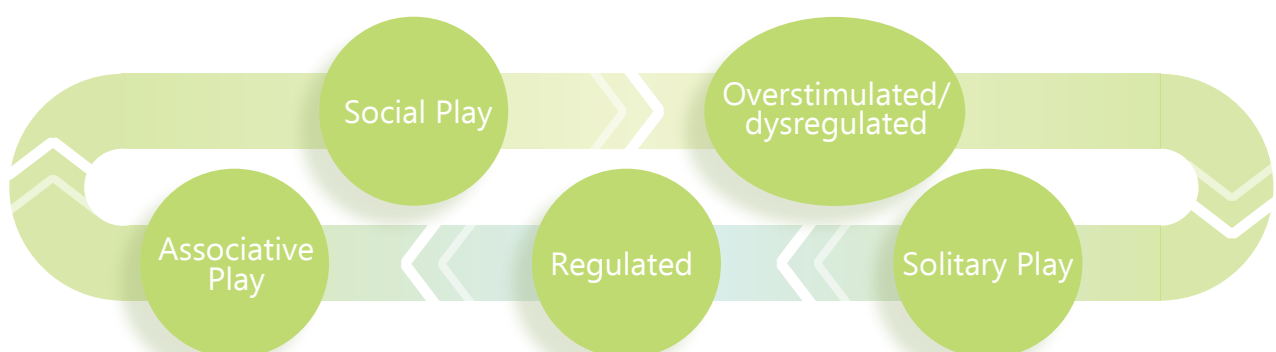


Figure 5: The process of self regulation in social play for ND children

Isolation

Despite traditional belief, ND children desire social interactions like any other human being (ChildNEXUS, 2024). Unfortunately they find themselves isolated more often than their NT peers due to their differences (Baratchi et al, 2025). This is caused by not only the socialising obstacles previously discussed but also the view of friendships and disability identity.

The disability identity is how one is perceived by themselves and others based on their neurodivergence. Often this prevents children from being seen as who they are, but more as their differences (Murugami, 2009). This can lead to isolation not just in childhood but also in adulthood as reported by Arnold et al. (2021).

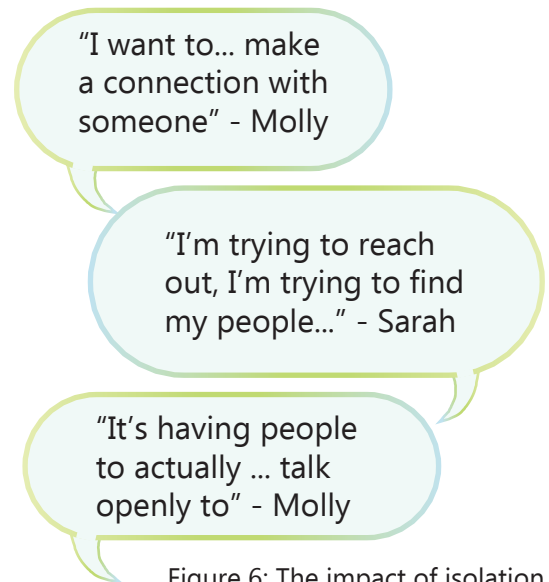


Figure 6: The impact of isolation (Arnold, 2021)

Hebron et al (2017) reports that ND children typically value "reciprocal help and support" in their friendships rather than the standard "intimacy and duration" (figure 7). This can lead to unreciprocated friendships or isolation as NT children will not hold or understand these views (Baratchi et al, 2025).

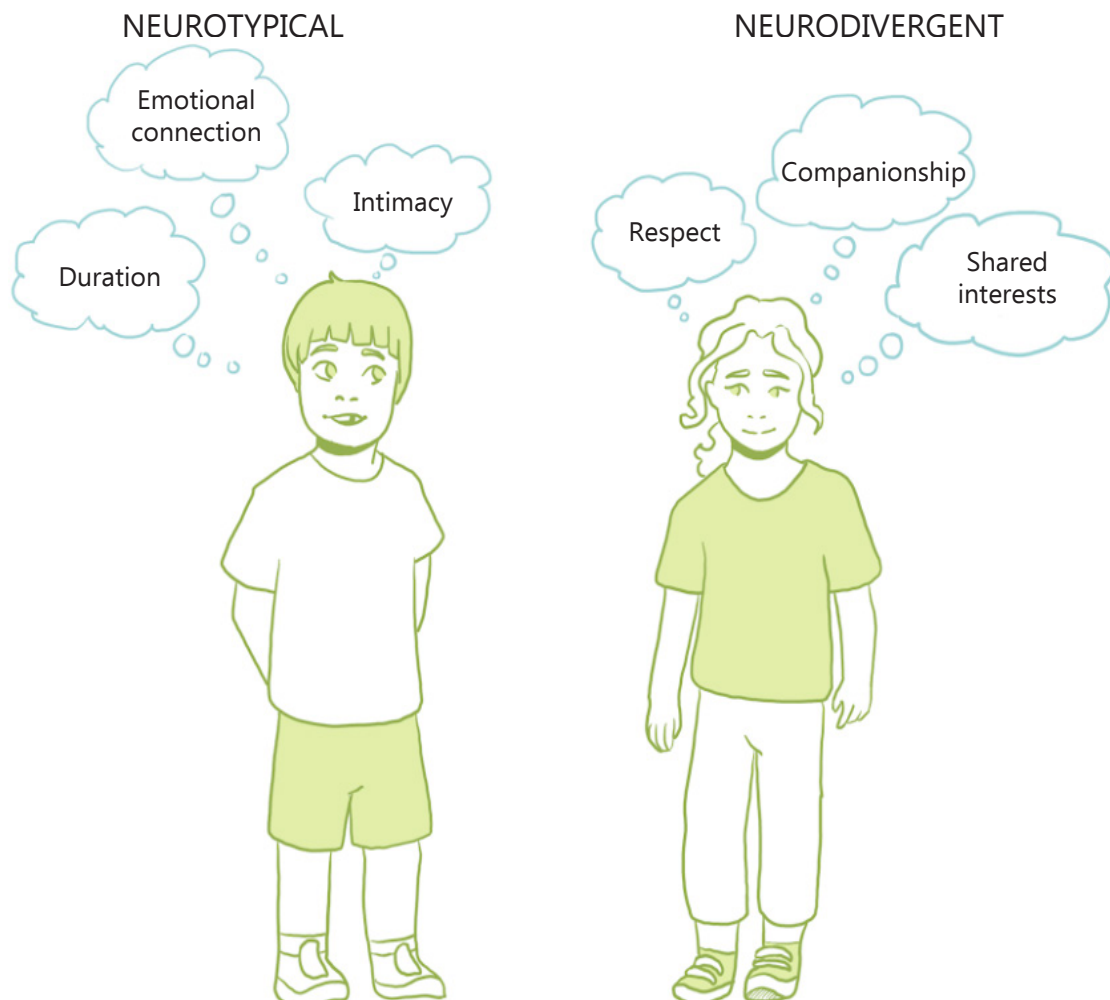


Figure 7: Views on friendship based on Hebron et al (2017)

Furniture

Kids furniture is a growing industry and it plays an important part in a child's development both physically and psychologically (Pashkevych et al, 2023).

Research indicates that playful furniture can be beneficial to a child's development and their relationships with others (Wu and Zhu, 2020). Thus, furniture that grows with the child, is multi-functional, and nurtures relationships is much needed in today's market as it is oversaturated by stagnant products.

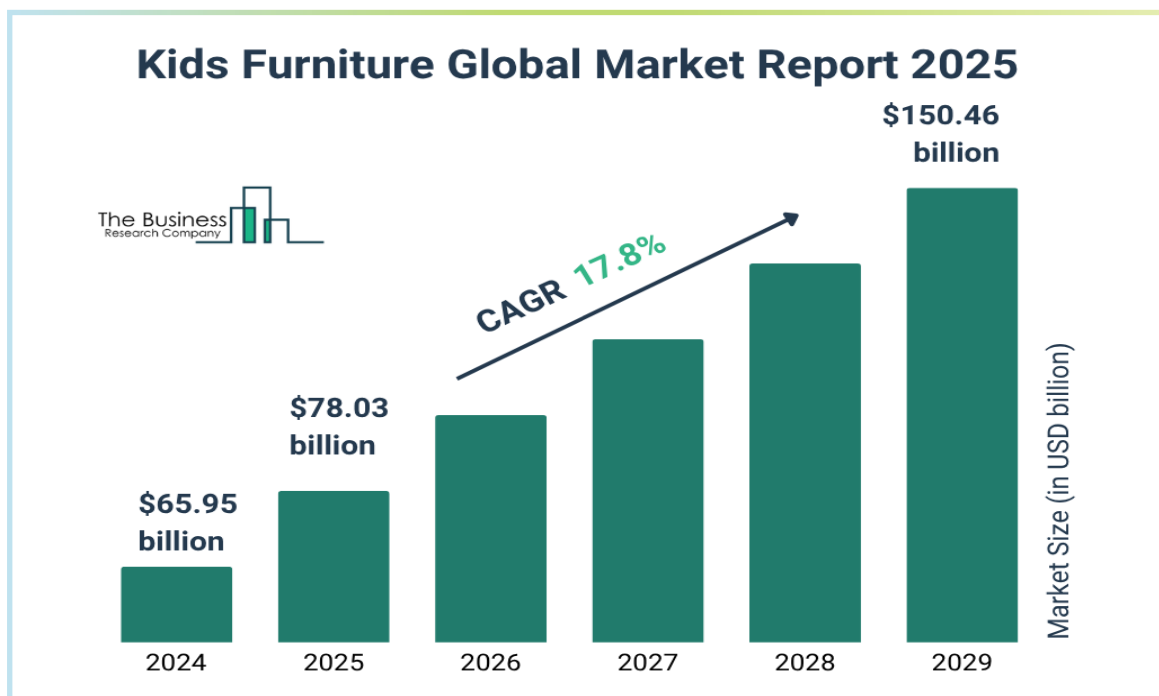


Figure 8: Kids Furniture Global Market Report (The Business Research Company, 2025)

BENCHMARKING

There are many products that support social play however they are limited when it comes to supporting neurodiverse play. Benchmarking was conducted to identify and rank existing organisations and products based on a criteria created from background research. This will give an indication of the company and product’s strengths and limitations. Understanding these shortfalls will better inform future design solutions through criteria and goals for companies to provide a more inclusive range.

Organisations range from broad providers such as Mattel, Lego, and Fisher-price to more specialised companies such as Rigamajig and MODU. These are ranked by their focus on supporting childrens development and product cost. Products are rated by the same criteria to narrow in on the difference.

Company and Product Scope

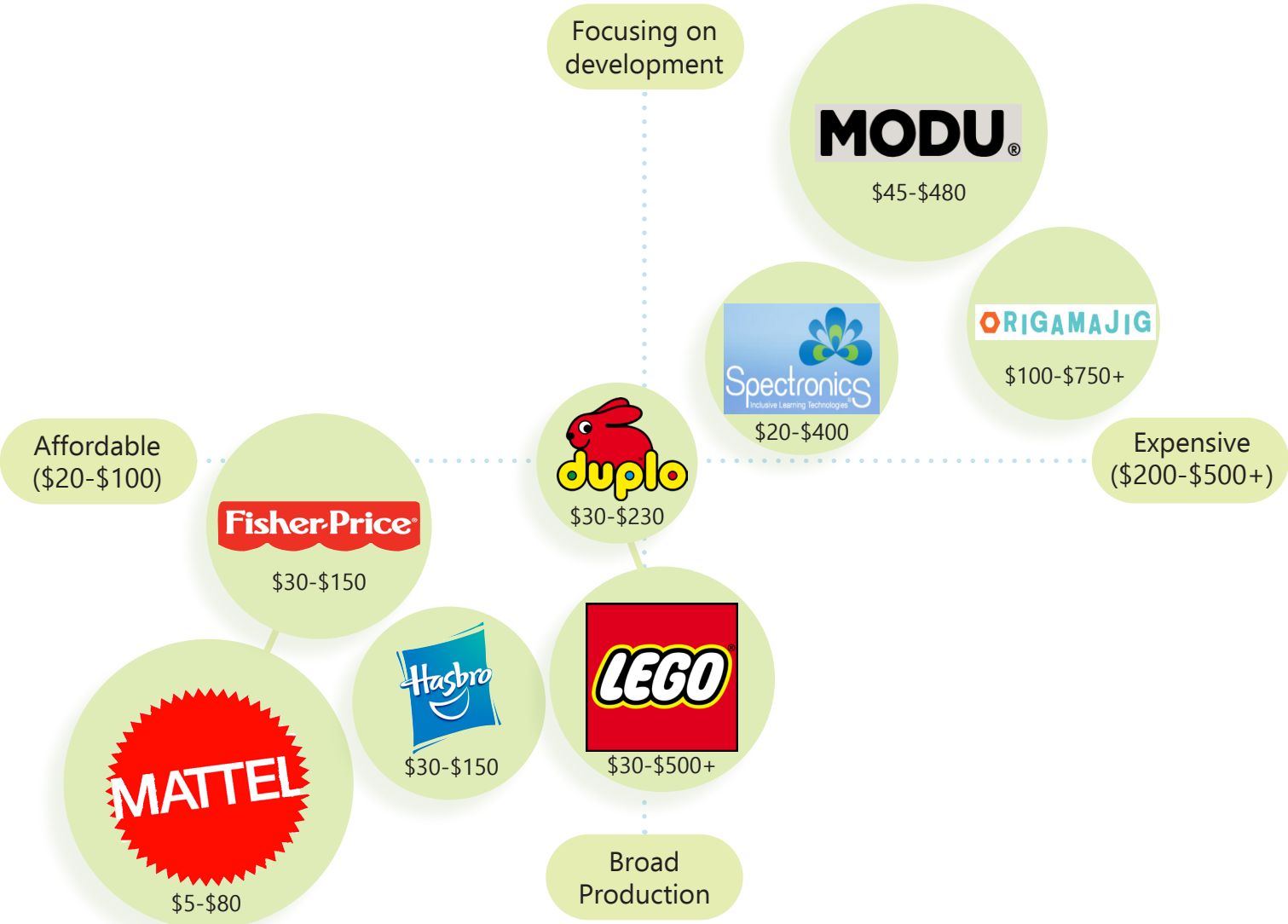


Figure 9: Company Benchmarking Matrix

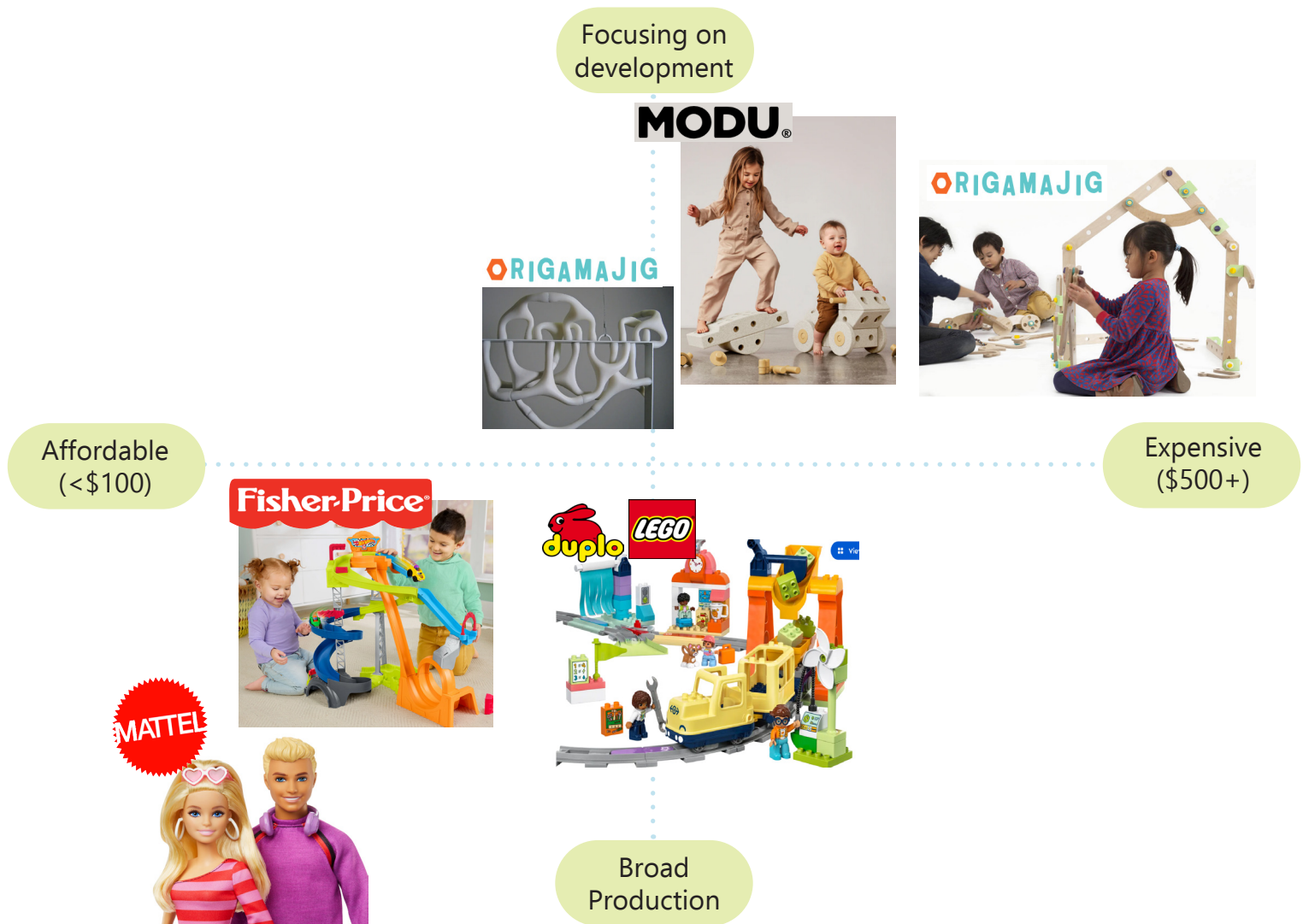


Figure 10: Product Benchmarking Matrix

Comparison

There are a few obvious trends to observe. Firstly, the broader companies are a lot more affordable than those specialising in developmental equipment. This could be because broader products can be mass-manufactured as opposed to the specialised play products that are more custom and multi-functional.

Additionally, the cost may be reflected in the material as the broader products are generally manufactured from plastic whereas the development-focused products are made from recycled/ recyclable materials and wood. These require more processing, adding to the final price-tag.

Finally, the broader products are roleplay and constructive play based and can be played socially or solitarily. However the development-focused products encourage constructive, physical/ motor, solitary, and expressive play. This diversity offers a range of experience through play, leaving room for the child's imagination within structure.

This price gap could make it difficult for low income families to afford toys that will aid their child's development beyond roleplay and constructive play. At home these are excellent for solitary play and the odd social play when a friend visits however for an ND child the alternative will be much more beneficial.

Detailed Benchmarking

An in-depth benchmarking of select products was conducted to understand their strengths and limitations according to a detailed criteria. The criteria are as follows:

CRITERIA
1. Does the product support social play?
2. Does the product support solitary play?
3. Does the product support solitary play in the background of social play (associative play)?
4. Does the product adapt to the child's physical growth?
5. Does the product adapt to the child's psychological growth?
6. Is the product made using sustainable materials?
7. Is the product suitable for home?
8. Is the product suitable for daycare?
9. Is the product suitable for 3-6 year old?
10. Does the product provide a range of sensory stimulation?
11. Does this product function as furniture?

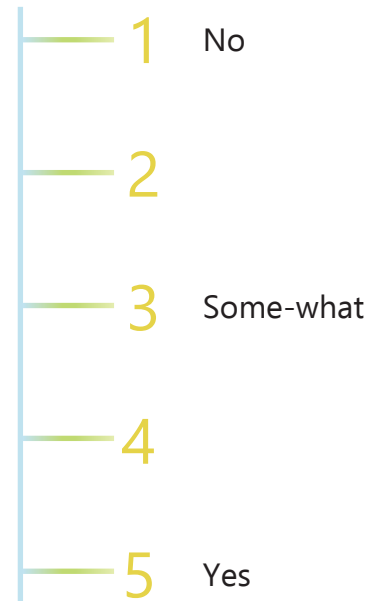


Figure 11: Criteria for Benchmarking

MODU

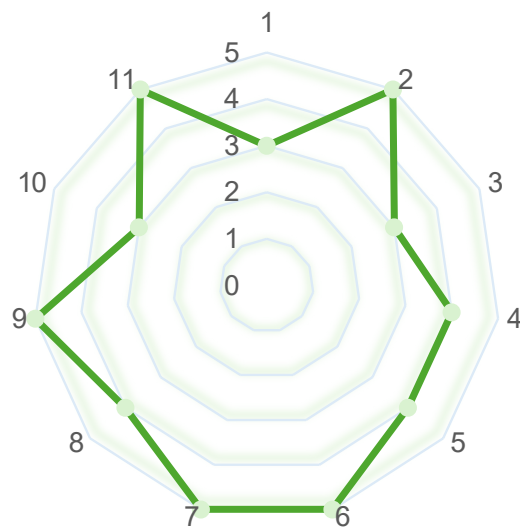


Figure 12: MODU Benchmarking

Tetris Sofa

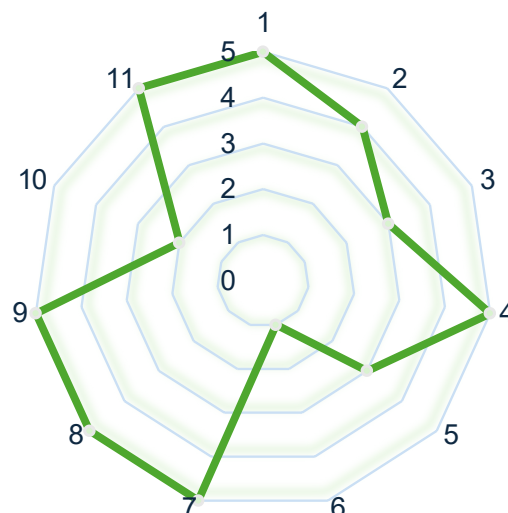


Figure 13: Tetris Sofa Benchmarking

Lego

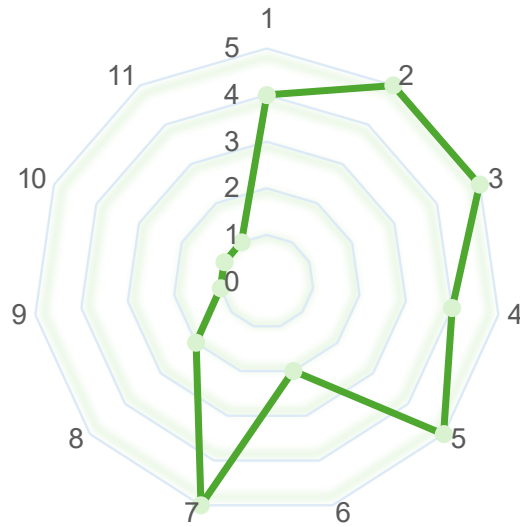


Figure 14: Lego Benchmarking

Rigamajig

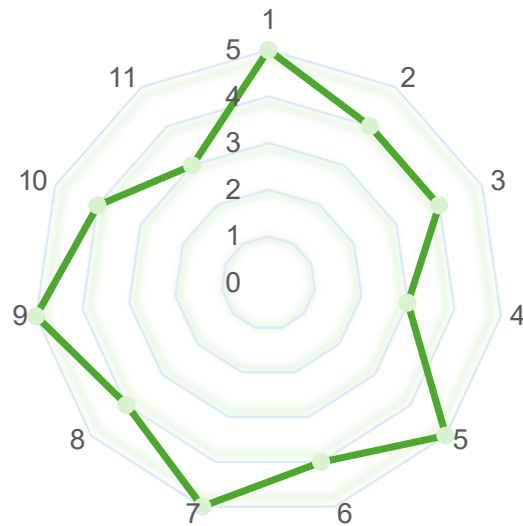


Figure 15: Rigamajig Benchmarking

Comparison

When it comes to meeting play criteria, Lego is most successful followed by Rigamajig. These have elements of constructive, expressive, physical/motor and sometimes role play. This is done through supporting creative avenues guided by set shapes and connections (constructive).

Additionally, this can be observed in the Tetris sofa and MODU however they are more successful in the furniture criteria as environmental objects rather than toys. Modular and adaptive to the child and their needs/play, these products only lack sensory stimulation opportunities.



02

SECTION

PRIMARY RESEARCH

With thorough secondary and benchmarking research complete, primary research was conducted to corroborate the initial findings and garner personal perspectives on the topic. The methods used were chosen based on the topic and what is appropriate for the nature of this study.

Methodology

For this context, qualitative research methods were used to understand the real experiences from the people neurodivergence impacts. Qualitative research relies on context and is reliable through verification (Gomez, 2025). Rather than sifting through numbers and statistics, a holistic approach into the complex world of neurodivergent development and play experiences was necessary to achieve an accurate understanding. Bias must be considered in this methodology as it is not fully supported by fact (National University, 2025).

Two sampling methods were used to collect data: semi-structured interviews and general surveying. Interviews were conducted to acquire a detailed view on the daily lives of ND children and their experiences in play and development whilst the survey gathered general insights from parents/caregivers of both ND and NT children. The results were analysed using data triangulation to compare and corroborate findings amongst themselves and secondary research. This “minimizes biases, reduces the likelihood of error, and strengthens the reliability” (Hassan, 2024). Limitations of triangulation include there being potential conflicts and time-consuming analysis, however by using coding and affinity diagrams to efficiently process results, this can be managed (Hassan, 2024).

Interviews

In-person, semi-structured interview participants included two parents of neurodivergent children (separate children) and a child therapist whilst digital form interviews were distributed to an occupational therapist, after school support worker, and ADHD coach. Participants were gathered through personal ties and recruitment through social media. Questions were tailored to the subject and their role with the neurodivergent child/children with room to diverge and elaborate on topics when sitting the interview. This would provide a wide range of perspectives from those with familial ties to the child compared to those with a clinical approach. By gathering a range of perspectives, the issue of bias has been addressed (George, 2023).

Surveys

The general survey was distributed to parents through daycare centres, a Linked In post, personal contacts and social media. Comprising of 30 questions in the form of likert scales, multiple choice, and short paragraph answers, this survey allowed parents to reflect on their child’s development and how play has impacted its course anonymously (McCombes, 2025). Open to both ND and NT parents, this survey was created to acquire insights on the shared experiences of these two types of children as well as how they play and interact with furniture.

Interview Participants



Amelia

Mother of 2 ND children (11 and 13) both ASD, younger sensory sensitive.



Michelle

Mother of 1 ND child (13) ASD, OCD, and demand avoidance and one NT child (17).



Ruby

Occupational therapist for ND children, assess their needs



April

ASC Support worker, works with a range of ND children, the interview focused on a non-verbal client.



Pearl

Child therapist for both ND and NT children, emotional and psychological support.



Jason

Coach mainly for children with ADHD. Encouraging independence.

Figure 16: Interview Participants

Write interview and survey questions

Conduct interviews

Distribute survey

Gather results

Analyse

Figure 17: Research Design

FINDINGS AND ANALYSIS

The aim of these interviews and surveys is to build on what was discovered in the secondary research phase by providing new insights. Key insights to look for were coping strategies, personal experiences in social play, and triggers for over-stimulation. This would give an indication of what obstacles ND children face personally, how it impacts them, and how they may overcome them. These results could be adapted into a product to better guide them through these situations.

To analyse these findings, a mixture of inductive and deductive code was created (figure 18). This thematic code was applied to the interviews and surveys, each formatted into a table to organise key concepts, words, and quotes.

By corroborating and comparing insights, a greater understanding of how neurodivergence impacts children's development and play can be achieved.

Category	Code	Sub-code
Play	Conventional	Solitary
		Onlooker
		Parallel
		Associative
		Social
		Physical/motor
		Constructive
		Expressive
		Fantasy/roleplay
		Co-operative
	Unconventional	Distractions
		Guided
ND and NT together	Common Ground	
Emotion	Positive	Safe
		Content/happy
		Relaxed
	Negative	Loneliness
		Anxiety
		Overwhelmed
		Fear (rejection)
Regulation	Regulated	Self-regulation
		Co-regulation
		Strategies
	Dysregulation	Triggers
Stimulation	Overstimulated	Signs
		Triggers
	Tools	Products (physical)
		Strategies (mental)
Condition	Neurodivergence	Type
		Daily-life impacts
		Impacts on play
Furniture	Conventional	Usage/interaction
		Product
	Unconventional	Usage
		Product
Reflection		

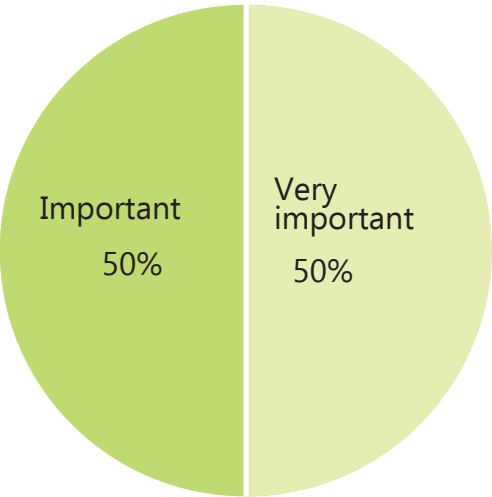
Figure 18: Coding

Results | Survey

In the two weeks this survey was available, eight carers responded. Out of these eight responders, two were a parent of a ND child, four were a parent or sibling of NT children and the remaining two were unsure of their child’s neurological state.

The low ND care-giver participation rate could be explained by two factors. The first being that there is a lower percentage of ND individuals than there are NT (Australian Disability Network, 2024). Additionally this is a personal and confrontational topic to discuss with a stranger so it is understandable that carers of ND individuals are not as forthcoming. Despite this, the survey results were insightful and one parent offered to complete further questionnaires which was capitalised on.

Is play important in a child’s development?



Participant’s child’s gender



Neurodivergent, neurotypical or unsure

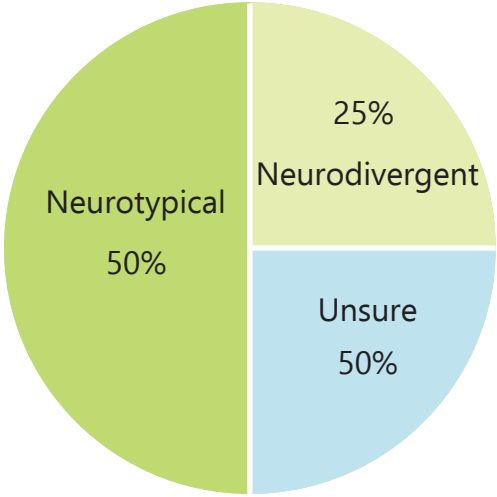


Figure 19: Parent opinion - Is play important in a child’s development?

Figure 20: Participant’s child’s gender

Figure 21: Neurodivergent, neurotypical or unsure

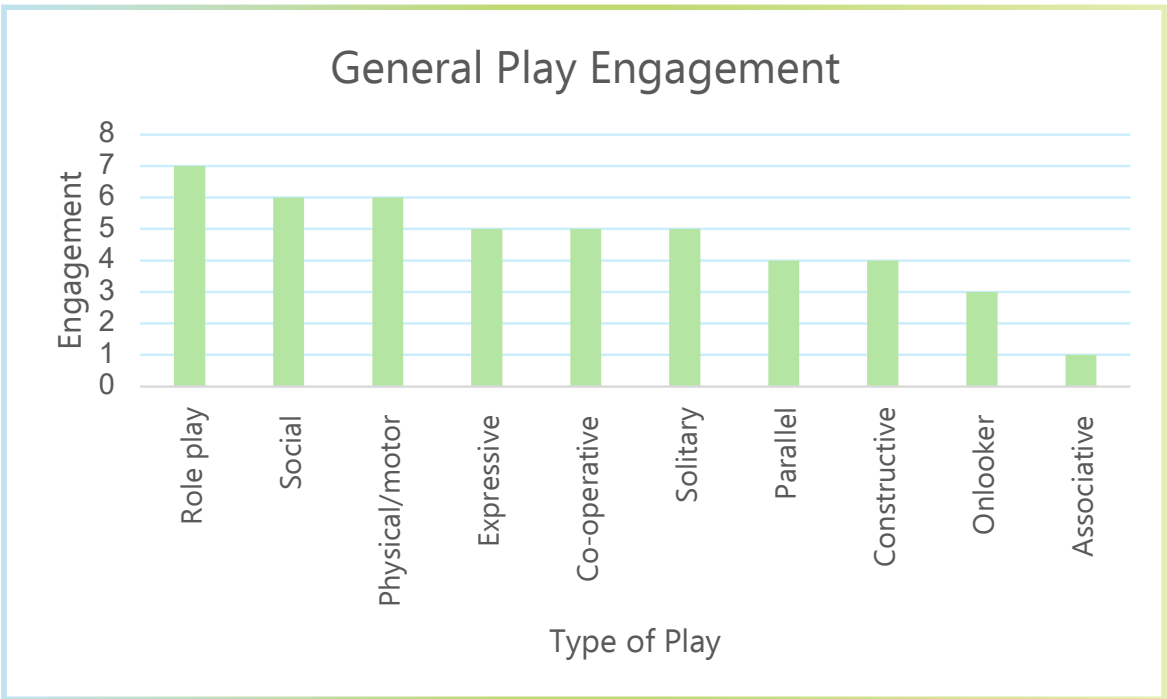


Figure 22: General play engagement



Figure 23: Play equipment

From the survey responses it must be noted that a majority of parents had a son, meaning that the type of play and products they engage in will be slightly different from daughters due to societal norms and interests. This can be seen in the raw data as all the boys were interested in cars and sports which can skew the data. Despite this there is a decent range of play that these children engage in.

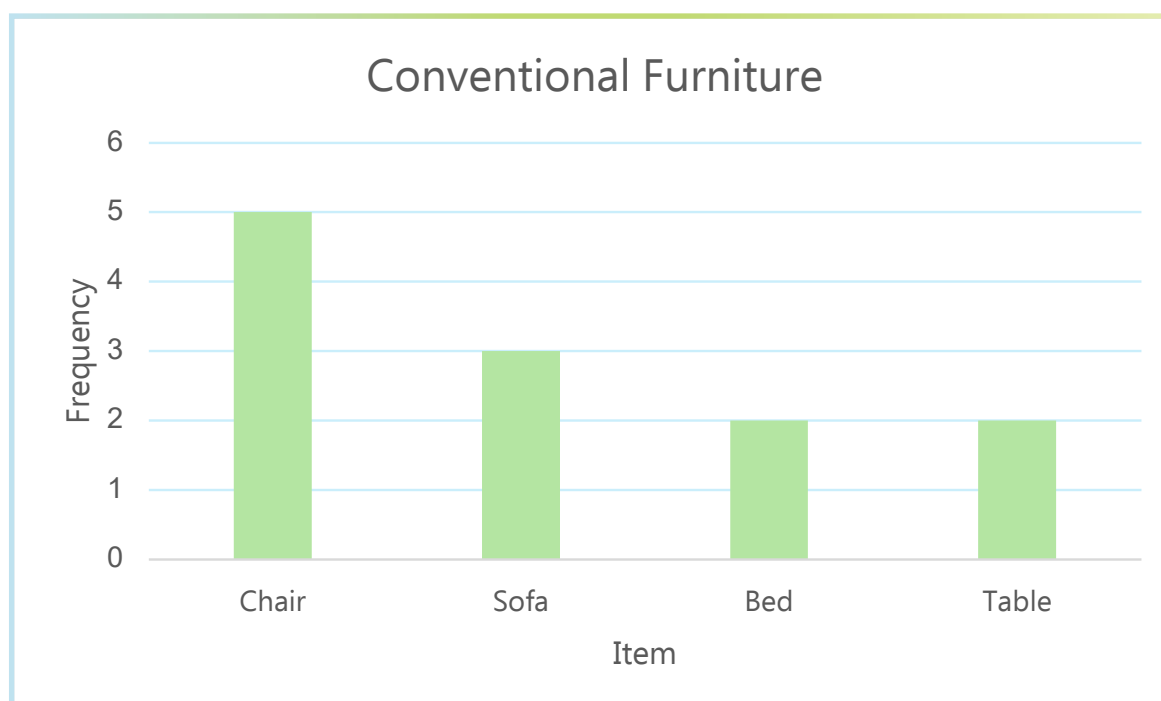
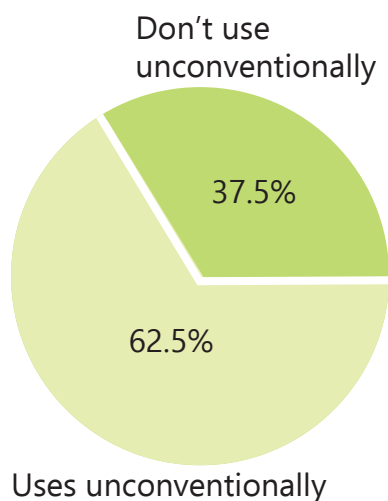


Figure 24: Conventional furniture

Carers reported that these four (figure 24) furniture items are the most common pieces their children engage with. Interestingly a ND parent stated their child "likes to push chairs" as a part of their proprioceptive needs as a form of "physical feedback" (participant 7). Further adding that the child's "low muscle tone and poor fine and gross motor skill" means they "tends to just "push" things" as a form of play.



Unconventional Use	Type of Play (code)
Fort/cubby Frequency: 3	Constructive, solitary, social, associative, expressive
Comfort Frequency: 2	Constructive, solitary, social, associative, parallel, expressive
Game Frequency: 1	Physical/motor onstructive, solitary, social, associative, parallel, expressive

Figure 25: Unconventional use of furniture

NT parents reported their children naturally used furniture and objects in unconventional ways to play whereas parents of ND children suggested their child didn't express the same interests. Most children that did engage used constructive play to create comfortable or enclosed environments.

Additionally, a sibling to a NT child reported she, "stacked pillows and put a washing basket ontop and then gave us (family members) hats to throw into the basket and there were 'levels' each time we got the hat in she made it more difficult to get the hats in" (participant 1).

Participant 7	
Key Quotes	Code/Analysis
"Will stay on the fringe of the playing group and 'mimic' what they do without fully engaging"	Solitary and parallel play The child's ND condition makes it difficult to engage in social play and this is their attempt
"Meltdown due to sadness over exclusion "	Emotion, sadness, isolation, regulation These are big feelings of rejection and a lack of understanding why they cannot engage. This will be overwhelming and difficult to process, thus dysregulation will occur leading to "meltdowns"
"Very high proprioceptive needs. Needs a lot of physical feedback... to feel safe "	Stimulation, regulation, emotion, safe The child requires a lot of physical comfort and support to feel safe, thus regulated.

Figure 26: Key quotes and analysis from survey participant 7

Participant 8 (ND Parent 2)	
Key Quotes	Code/Analysis
"Finds it hard when it comes to others social cues and doesn't understand what their expectations are"	Condition, social play, communication This is part of the condition.
"Try to get as close as they are comfortable with being and parallel play and wait to see if they (other children) move their game to their safe area "	Emotion, safe, parallel play, strategies, regulation Utilitising the child's ability to self-regulate and look for space to engage at a distance is a good compromise. Still leaves room for isolation however the parent did report that the child does have friends that understand and accept them in a later interview.
"...All children have the ability to play but do so in their own ways and I believe their boundaries are important and should be accepted by all as there is nothing wrong with solitary play"	Reflection, play, condition The same rules and expectations applied to NT children are not applicable to ND children as they develop differently. Acceptance is important.

Figure 27: Key quotes and analysis from survey participant 8

The main concepts raised by ND parents was inclusion and support for their child. Both suggested their child yearns for social connection through play however their conditions limit their ability to engage. This appears in the form of "poor recognition of social cues" (participant 7) and they can't "understand what their expectations are" (participant 8). As a result both parents attributed this difficulty to them sitting on the fringes of play groups.

Results | Interviews

In person interviews were audio-recorded and transcribed using Premier Pro then cleaned up to alter or remove names and places to protect participant's identity. These transcriptions were read through several times and coded to identify concepts and insights. Additionally, systems mapping was later applied to gain a visual understanding of each individual's needs and experiences as well as identifying leverage points for design.

Textual interviews were formatted and distributed using Google Forms and were tailored to the interviewee's role with ND children. These included multiple choice answers, however was mainly made up of text responses to allow the responder to reply freely.

Parents

Amelia has two children with ASD, ADHD and sensory rejection disorder. This impacts their lives in many ways as discussed in the interview. Reoccurring themes included communication difficulties, conditions of play, and strategies.

Communication was something both children struggled with, to which Amelia attributed their "rigid" thinking. The children would speak abruptly and couldn't build on conversations, causing other children to interpret that as disinterest in play, thus the activity breaking down.

Additionally, the son would only engage in play if he found it interesting and there was immediate "gratification". To involve her children in play she would regularly play as well and speak for them. This removed attention and brought familiarity to the unfamiliar space/play.

Using finger puppets, roleplay, and scripts helped the children gain confidence as Amelia said they relied heavily on predictability to feel safe. These strategies are affective until the children enter group situations. Conversations become more complex and sensory inputs increase, overwhelming and dysregulating them.

Amelia	
Key Quotes	Code
"He thought that was silly and he didn't see the point of them" (games other children played)	Social, guided play, condition, fear of rejection, anxiety
"...too abrupt in saying, "I don't like that"... ending things as opposed to changing the conversation , going, "should we do something?"... So it was, probably not understanding the other person's point of view in the conversation"	Communication, social play, condition
"learning the script was really good, but I think that only works for a little while before the kids develop further... In large settings that didn't work because it's more a one on one. Because talking to a group was very overwhelming . So, learning the script gave them more confidence "	Communication, social play, overstimulation, regulation, strategies, emotions, safe
"If I went back, I would absolutely just sit and we could watch for a while. But back then, you wanting them to know it's okay to join in , which sometimes it isn't for my kids. So I probably tried to talk too much and talk the situation through, which might have actually made it worse."	Reflection, regulation, social play, guided play, emotions, strategies

Figure 28: Key quotes and code from interview participant - Amelia

Michelle reported similar experiences with her daughter (ASD, OCD, demand avoidance). To make social play manageable for her child, Michelle spent time teaching her strategies such taking turns and asking for help through roleplay.

Additionally, Michelle became aware of the sensory needs that her daughter has and supplied stimming tools such as fidget toys and experimenting with water to fulfill those needs and maintain emotional regulation.

Michelle	
Key Quotes	Code
"... often we would talk about, taking turns or, respecting somebody else while they're using something... But once she understood, she was pretty good with that sort of thing... We still definitely discuss through scenarios "	Roleplay, strategies, regulation, condition, social play
"Water was always her calming down type thing. I could usually fill that bath up and she would play in there. But if she was really hot and I would just let it go outside with the hose... So you had the oral, the cold, the often the noise of the water as well. The sort of running water sound probably quite soothing as well."	Emotion, calm, content, safe, regulation, sensory/ stimulation, strategies, play
"She learned so much from mimicking older children and always preferred either really little kids or much of the kids that you could copy . And now I understand that was masking , copying the older kids and then little kids are easy to understand because they're just little. They're not very complicated at all. Whereas kids your own age can be quite complex and you can be left out and not understand what's going on."	Guided, social, parallel play, condition, regulation, strategies, emotions

Figure 29: Key quotes and code from interview participant - Michelle

Occupational and Child Therapists

Both therapists had similar commentary to the parents in terms of types of play and strategies to be utilised. Interestingly, both therapists stated they used play to connect with children in the clinical setting and make them feel comfortable when discussing difficult topics or implementing scripts.

Additionally, both therapists recommended that parents stand back and allow the child to navigate social play, only stepping in when necessary.

"When play is at the child's pace and direction, they are more regulated for extended period - this reduces the risk for them to feel threatened, shamed, or judged" - Ruby

Figure 29: Key quotes from interview participant - Ruby

After-school Carer and ADHD Coach

With similar roles, the after-school carer (ASC) and ADHD coach use play and curiosity to care for children. Key insights from these interviews is their observations of common ground in play. According to both participants, ND and NT children play well together in roleplay, sports, and games based on exploration and shared interests.

Additionally, both site that communication differences is the main cause for breakdowns in play.

"Children don't learn unless they are having fun. It's what drives their curiosity and motivates them to progress and develop" - Jason

Figure 30: Key quotes from interview participant - Jason



03

SECTION

DISCUSSION

After processing the primary research, the secondary research, interviews, and surveys were examined using triangulation to connect theories and concepts. This process fills gaps in understanding and formulates new ideas supported by research and real-world experiences (Hassan, 2024).

A limitation of the data is there is minimal information on the experiences of those with “severe” symptoms. Despite this, concepts will be created with this in mind: “I believe all children have the ability to play but do so in their own ways and I believe their boundaries are important and should be accepted by all” (Survey participant 8).

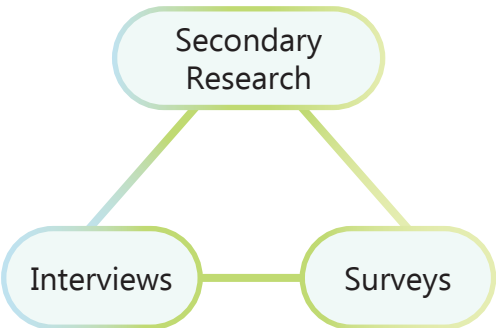


Figure 31: Triangulation

Every insight can be compiled under one concept: creating space. This covers many views and recommendations made by parents, clinical, and industry professionals as shown in figure 32.

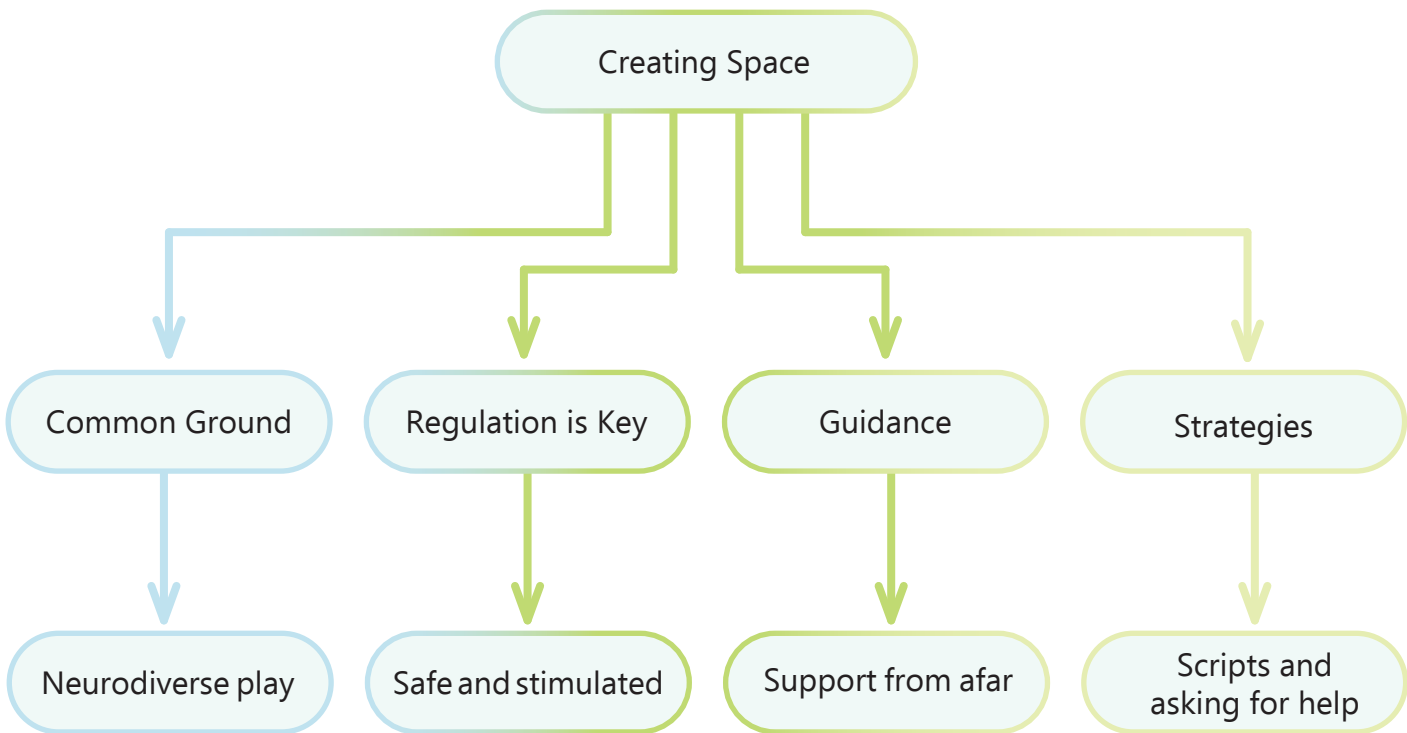


Figure 32: Creating space

Creating space for ND children is about teaching them strategies to stay regulated and allowing them to apply it by participating in Integrated Play Groups (Bottema-Beutel et. al., 2012) where a parent or carer steps back, supporting from afar.

Common Ground

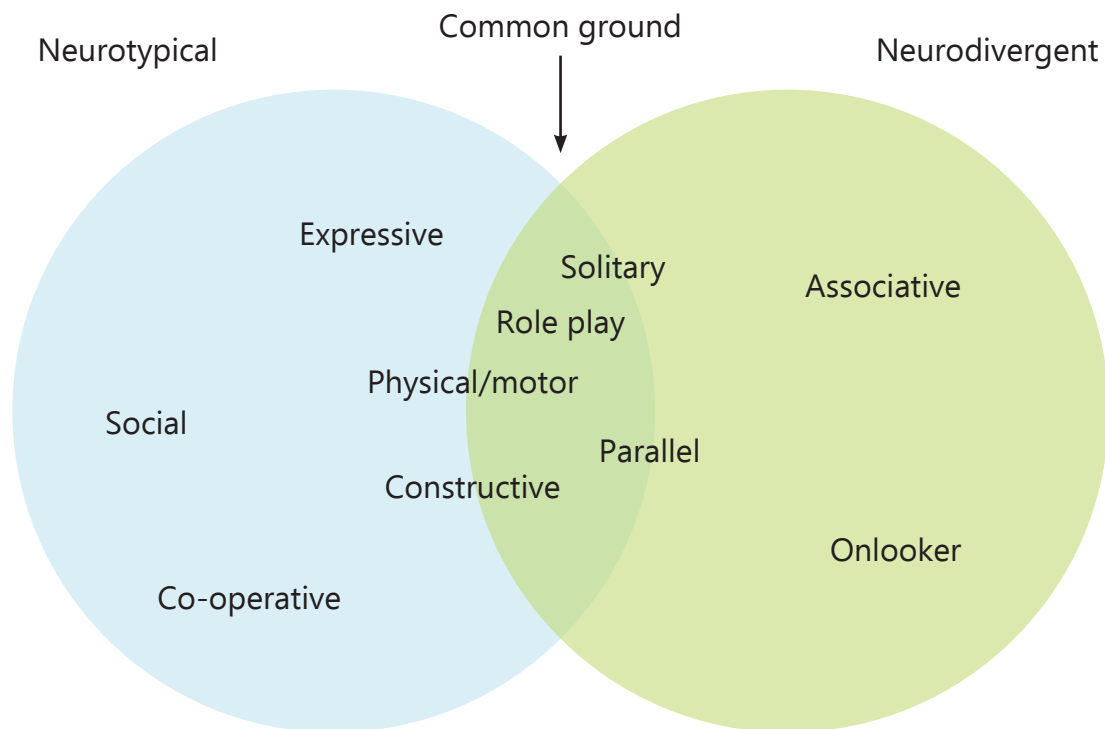


Figure 33: Common ground

By breaking down the survey and interview responses to play and product-based questions, it can be interpreted that the common ground between ND and NT children is strongest in roleplay followed by physical, constructive and parallel play (appendix 1). This is supported by the child therapist's statement "there's less of those sort of complex interactions" in physical forms of play rather than communication-reliant play.

Placing ND and NT children together in IPG's (Bottema-Beutel et. al., 2012) and supporting that with play they both engage in will be beneficial for all parties. The ND child who will learn rules and expectations through parallel play will gain confidence in their ability to engage. Additionally, they will be exposed to NT children where they can learn their "language" including body language, social cues, and potentially sarcasm. This is important as the main reason that play breaks down is communication differences. Further, NT children will be exposed to ND individuals, normalising the differences and raising accepting individuals.

Regulation is Key

Another common theme was emotional regulation and its impact on the child's play. Regulation was consistently linked to feelings of safety, confidence, and structure. By creating a space that is predictable and safe a ND child is more likely to engage in play, offering more opportunities to develop and be included.

Proprioceptive and vestibular stimulation were the most common tools of regulation mentioned in the primary research. These were mentioned in the products used such as swings, crash mats, and fidget toys however they can also be observed in the way furniture was used (figure 35). Multi-functional, playful furniture can support regulation in play environments by creating space, structure, and sensory stimulation (market research source).

Furniture supports development...
"Through its interaction for the individual. The way things are laid out and utilised. Sensoryspace... easy organisation" - Jason

Figure 34: Key quote from interview participant - Jason

Unconventional Use	Type of Play	Stimulation
Fort/cubby (3 mentions)	Constructive, solitary, social, associative, ex- pressive	Proprioceptive
Comfort (2 mentions)	Constructive, solitary, social, associative, parallel, expressive	Proprioceptive

Figure 35: Unconventional use of furniture and regulation

Guidance

Healthy guidance is a difficult thing to gauge for parents as they want to protect their child from exclusion and feelings of sadness and rejection. However therapists and parents upon reflection suggest that giving the ND child space to experience these situations is the best for them. Experiencing the bad feelings will expose them to situations where they need to learn how to self-regulate. Supporting from afar in play will provide the child with opportunities to practice this skill in a familiar and light-hearted environment, similar to a therapist using play to create an open and comfortable space to tackle difficult topics. This can occur by setting the scene, allowing the children to play, and intervening with prompts when necessary as recommended by Bottema-Beutel et. al. (2012).

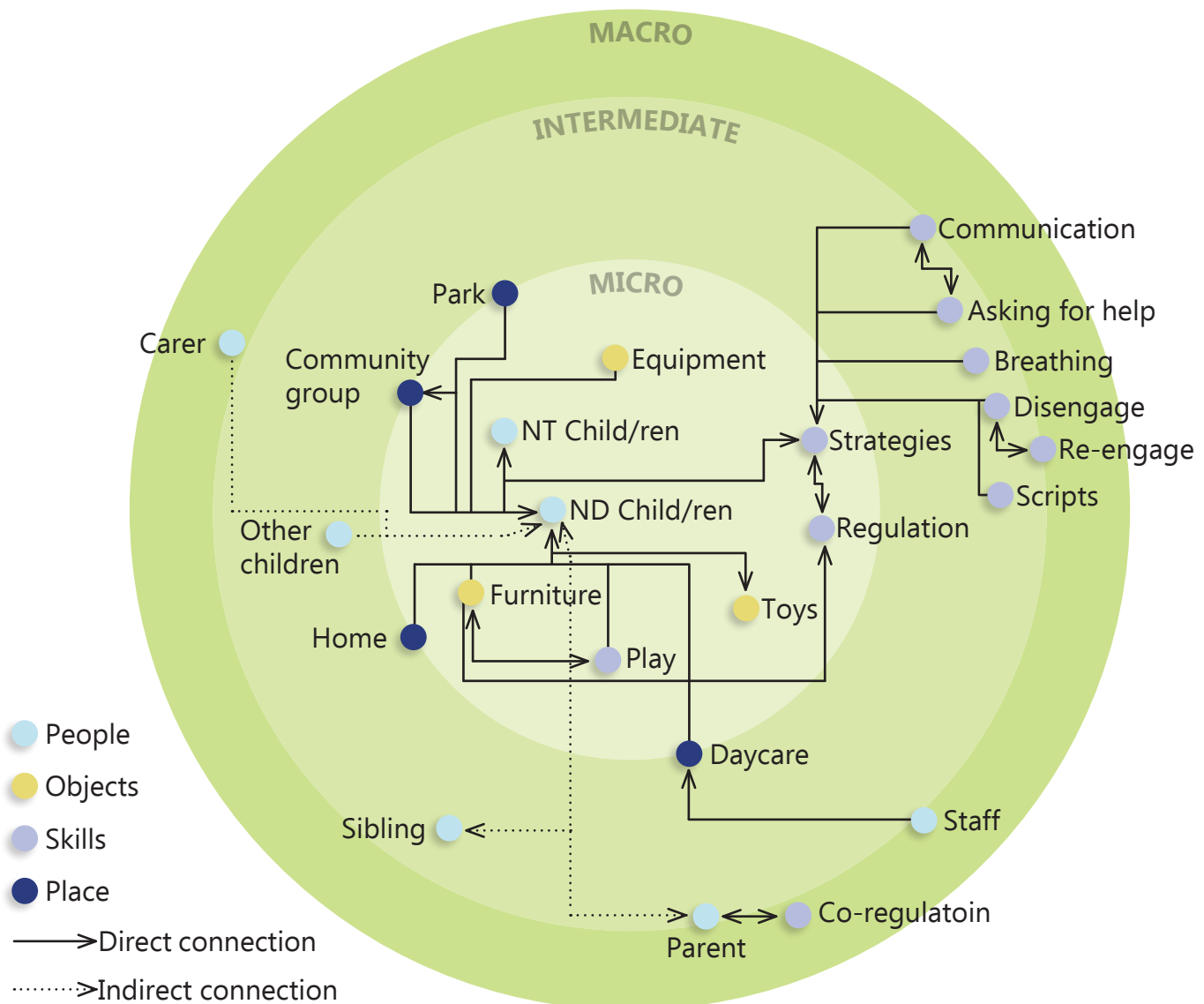


Figure 36: MIM map of what the ND child play system should look like

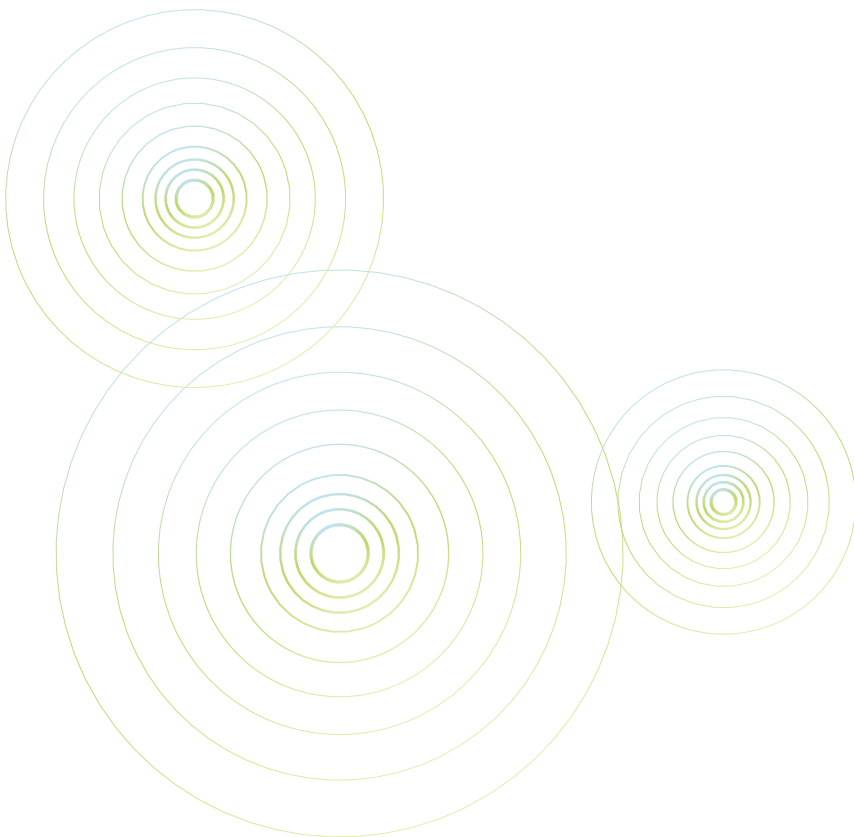
Strategies

There were a number of strategies mentioned throughout the primary research phase that parents, carers, and therapists teach ND children however it is practicing the strategies in real-time that matters. When a child is overwhelmed however, remembering these strategies becomes difficult. That is when meltdowns or shutdowns occur as reported by interview participants.

Creating space is collectively using common ground and healthy guidance to allow the child apply the strategies given to them to self-regulate and play. By practicing, the space becomes predictable and safe, meaning the child will be regulated and comfortable to play.

"Its simply real world practice. We dont act out scenarios but instead go through them in realtime. Or we break down what happened afterwards and go over why something happened the way it did"
- Jason

Figure 37: Key quote from interview participant - Jason



The diagram illustrates the nested systems model of child development, showing the relationship between MACRO, INTERMEDIATE, and MICRO systems, and how they influence child outcomes.

Legend:

- People (Light blue circle)
- Objects (Yellow circle)
- Skills (Purple circle)
- Place (Dark blue circle)
- Direct connection (Solid line with arrow)
- Indirect connection (Dotted line with arrow)
- Leverage point (Red circle with number)

MACRO System (Outermost):

- Home (Place)
- Community group (Place)
- Daycare (Place)
- Staff (People)

INTERMEDIATE System (Middle):

- Carer (People)
- Equipment (Objects)
- NT Child/ren (People)
- ND Child/ren (People)
- Parent (People)
- Co-regulation (Skills)
- Regulation (Skills)
- Strategies (Skills)
- Scripts (Skills)
- Disengage (Skills)
- Re-engage (Skills)
- Asking for help (Skills)
- Communication (Skills)

MICRO System (Innermost):

- Park (Place)
- Furniture (Objects)
- Play (Skills)
- Toys (Objects)

Connections and Leverage Points:

- Home** connects to **Carer** (Direct) and **Daycare** (Direct).
- Community group** connects to **Carer** (Direct) and **Park** (Direct).
- Daycare** connects to **Staff** (Direct) and **Parent** (Direct).
- Carer** connects to **NT Child/ren** (Direct) and **ND Child/ren** (Direct).
- Equipment** connects to **NT Child/ren** (Direct).
- Furniture** connects to **ND Child/ren** (Direct).
- Play** connects to **ND Child/ren** (Direct).
- Toys** connects to **ND Child/ren** (Direct).
- NT Child/ren** connects to **ND Child/ren** (Direct).
- ND Child/ren** connects to **Strategies** (Direct) and **Regulation** (Direct).
- Parent** connects to **Regulation** (Direct) and **Co-regulation** (Direct).
- Strategies** connects to **Regulation** (Direct) and **Communication** (Direct).
- Regulation** connects to **Co-regulation** (Direct) and **Scripts** (Direct).
- Co-regulation** connects to **Scripts** (Direct).
- Scripts** connects to **Disengage** (Direct) and **Re-engage** (Direct).
- Disengage** connects to **Re-engage** (Direct).
- Re-engage** connects to **Asking for help** (Direct).
- Asking for help** connects to **Communication** (Direct).
- Communication** connects to **Strategies** (Direct).

Leverage Points (Red Circles with Numbers):

- 1** NT Child/ren
- 2** Communication
- 3** Parent
- 4** Regulation

6. *Chlorophyll a* and *Chlorophyll b* (mg/g)

2. Communication

Communication is the main cause for relationship and play breakdowns. This is due to the difference in style and misunderstanding of subtle, unspoken forms of communication. This can be approached two ways: Teaching and application or removing communication.

Creating neurodiverse space to teach and apply strategies of communication will bridge the gap and develop language skills. Mirroring their peers and practicing what they have learned will help ND children understand the social cues and gestures of their NT friends while the NT children will become accustomed to ND short-form speech, understanding that the words matter, not the tone.

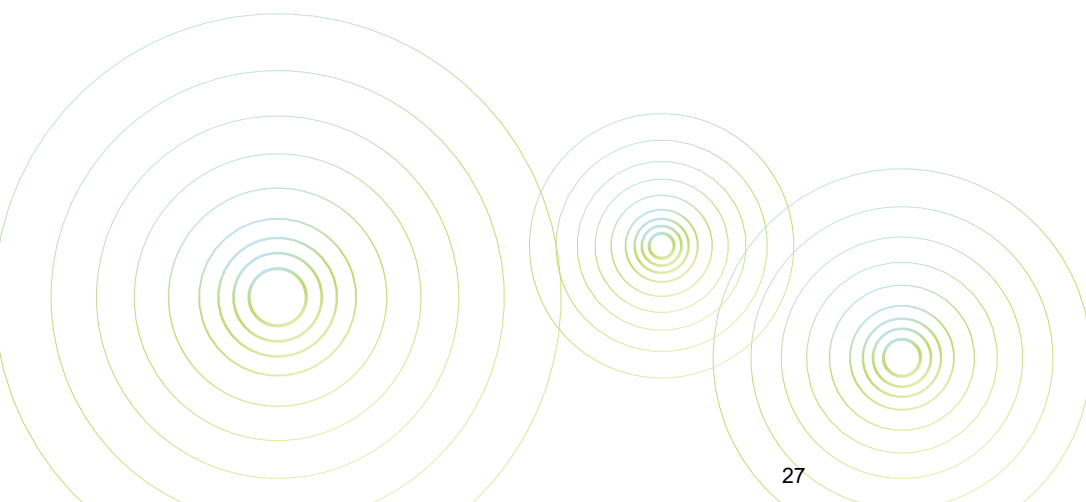
Alternatively, as suggested by Pearl, play such as sports removes the complexities of communication. Designing a space of minimal communication will reduce the risks of these breakdowns, maintain regulation, and support play that doesn't overwhelm ND children. The limitation of this however is that it would not support language development.

3. Parental Awareness

Commonly found in the research was the constant surveillance and intervention conducted by parents when their ND child played. The bond of a parent and their child is unique. When that child is neurodivergent it is understandable that they will become protective and step in to avoid meltdowns and feelings of rejection. Despite this coming from a place of love, sometimes this is not the best for the child. Raising awareness for parents that they need to let go and support from afar will create space for the children to learn through experience.

4. Regulation

A regulated child is a happy child. A happy child is a playful child. Stimulation is the key to this. Overwhelming and overstimulating environments can confuse the ND child, leading to a disinterest in play. Whereas spaces that offer stimulation inputs and outlets will create a safe play environment. A semi built environment (furniture) that can offer a range of stimulation opportunities, catering to the child's current needs, can create this space.



CONCLUSION

This report investigated the relationship between play and furniture and how it supports the social development of neurodivergent children aged 3-6. Secondary research revealed the types of play children engage in, socialising on the spectrum, and isolation. Additionally, research suggested that the child furniture industry is growing, thus making it vital that the products are designed for childhood development. Benchmarking the market and products revealed playful furniture is limited and toys focused on childhood development are expensive.

Primary research conducted through surveys and interviews revealed the concept of creating space by setting up neurodiverse play, supporting from afar, maintaining regulation, and practicing strategies in real time. By providing the child with strategies and allowing them to apply them in a real setting will allow them to learn through experience, especially when the interaction strays from the script. This space can be created with playful, adaptable furniture to support development in various ways.

There are many design opportunities for this topic however a designer must design with empathy and good intentions. Too often society excludes ND people due to their differences and products are created to assimilate and force the individual to conform to NT standards. Put plainly this is wrong and a shift to a holistic outlook is overdue. These children will develop but they will do so in their own time. Acceptance of this is important. As designers we must provide products that conform to the user rather than products that force the user to conform.

"Having a neurodivergent child is a hard task but you can't let it affect your child or your wellbeing. There is too much negativity in this world and I believe that all children and adults are equal. It's not the neurodivergent children or adults that need to change. It's everyone around them that needs to change. They are perfect just the way they are and should never be asked to change."

- A loving parent

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Figures

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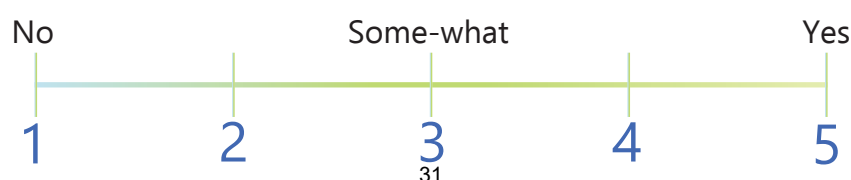
APPENDIX

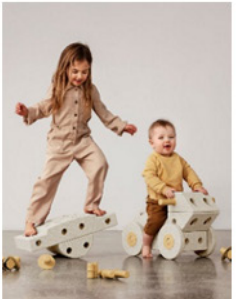
Appendix 1: Analysis of equipment children use and the types of play it supports

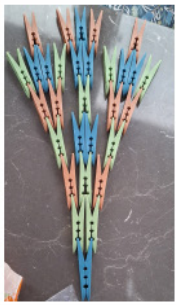
Equipment	Type of Play
Sports	Physical/motor, social, solitary
Lego	Constructive, solitary, social, associative, parallel, expressive
Cars	Physical/motor, roleplay, solitary, social, associative, parallel
Barbies/babies	Roleplay, solitary, social, associative, parallel
Moblio	Constructive, solitary, social, associative, expressive, parallel
Books	Solitary, parallel
Magnetic tiles	Constructive, solitary, social, associative, expressive, parallel
Drum	Expressive, solitary, social
Bike	Physical/motor, social, solitary, associative
iPad	Solitary, parallel
Puzzles	Constructive, solitary, social, associative

Appendix 2: Benchmarking process

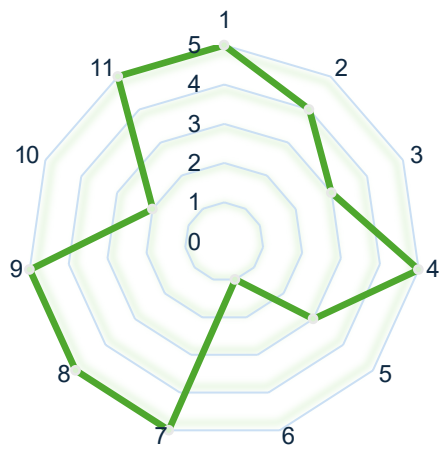
1. Does the product support social play?
2. Does the product support solitary play?
3. Does the product support solitary play in the background of social play?
4. Does the product adapt to the child's physical growth?
5. Does the product adapt to the child's psychological growth?
6. Is the product made using sustainable materials?
7. Is the product suitable for home?
8. Is the product suitable for daycare?
9. Is the product suitable for 3-6 year old?
10. Does the product provide sensory stimulation?
11. Does this product function as furniture?



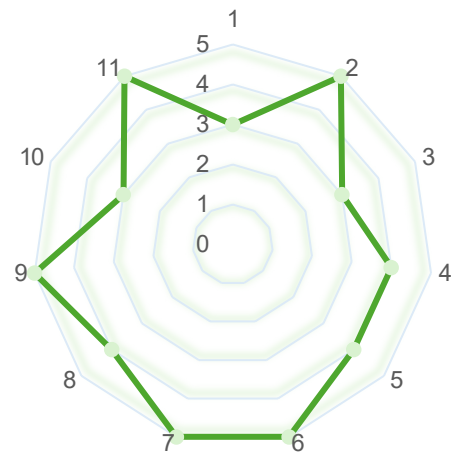
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	3	5	3	4	4	5	5	4	5	3	5
	5	5	5	4	5	1	5	5	5	1	2
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	3	5	2	4	4	4	5	4	5	3	5
	1	2	1	5	2	4	5	1	5	3	5
	1	4	2	4	4	2	5	2	4	2	5
	4	5	5	4	5	2	5	2	1	1	1

	5	4	4	3	5	4	5	4	5	4	3
	1	4	2	3	3	3	5	2	4	3	1
Dungeons & Dragons 	5	1	1	1	4	5	5	2	3	2	1
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	4	5	4	2	4	2	5	4	4	4	1
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	4	5	5	4	5	4	5	5	5	4	1

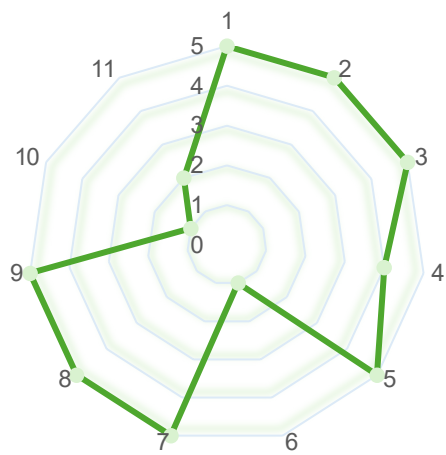
Tetris Sofa



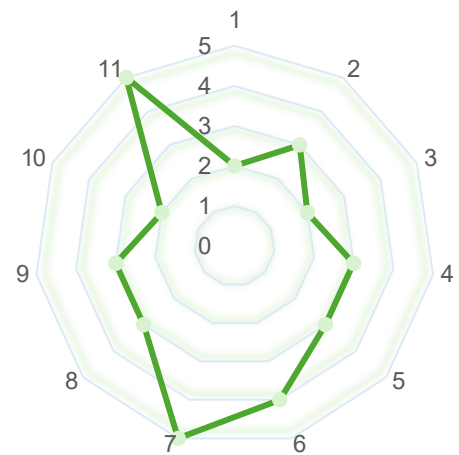
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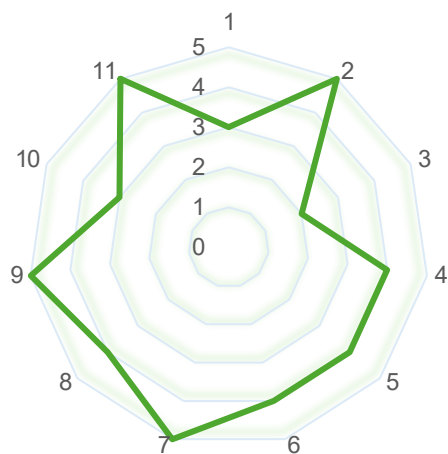
Blocks



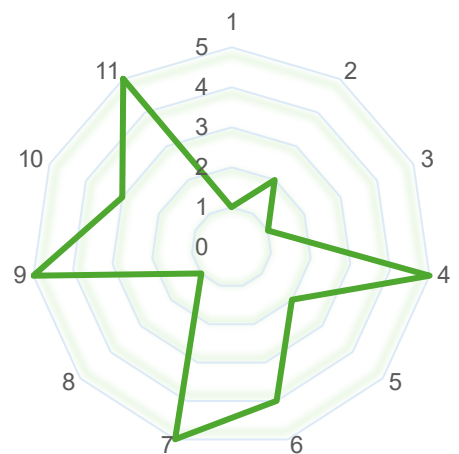
Room Collection



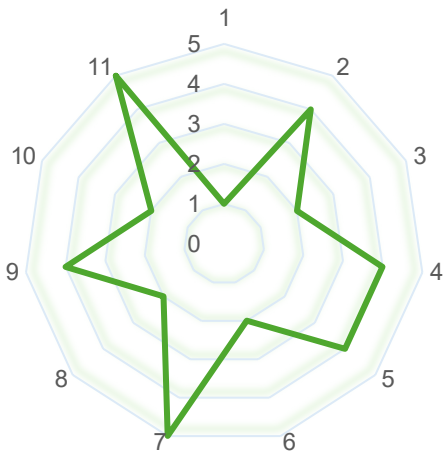
Pin Pres



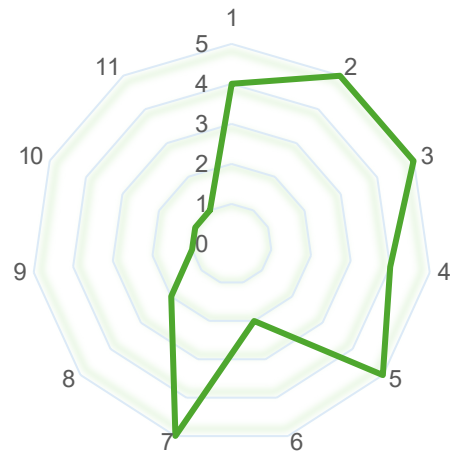
Koala bed



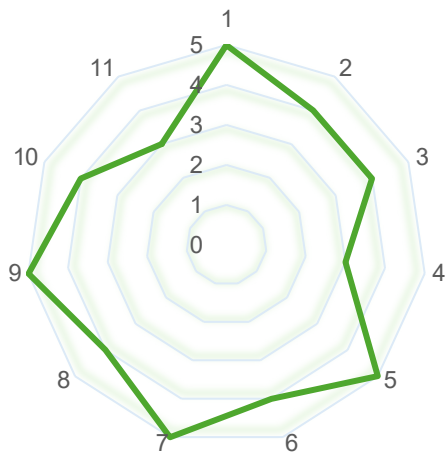
Ergonomic desk and chair



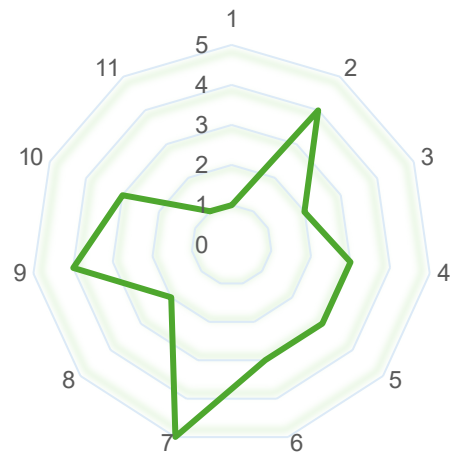
Lego



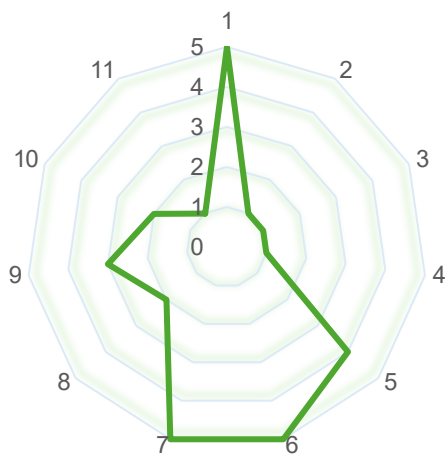
Rigamajig



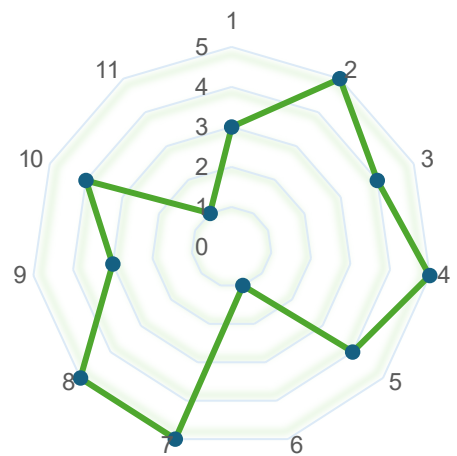
Clothes Pegs



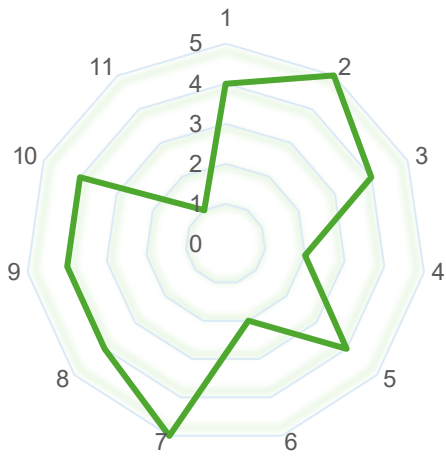
Dungeons and Dragons



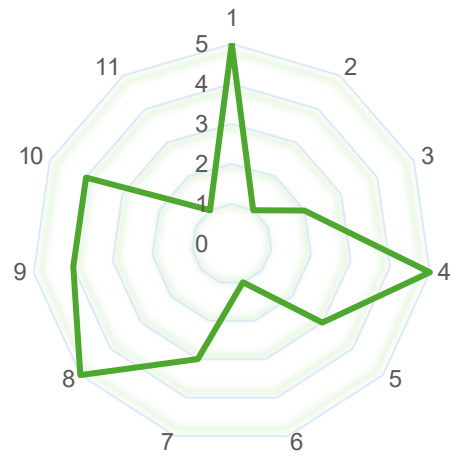
Stilts



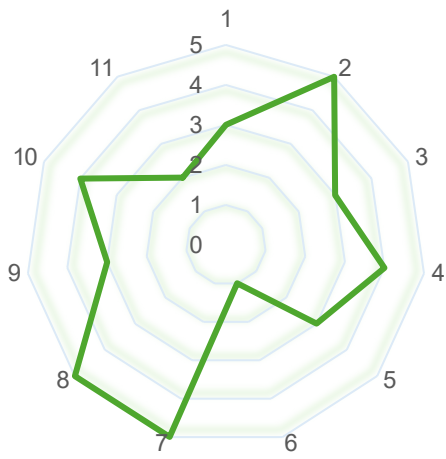
Baby doll



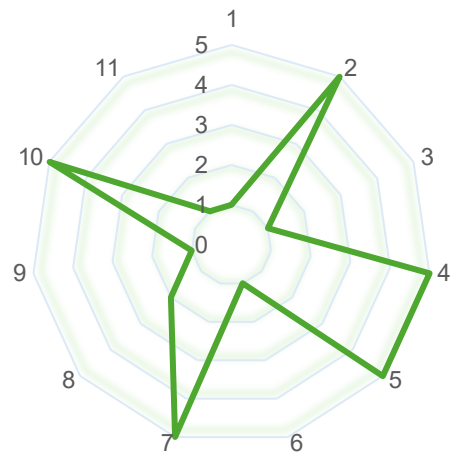
Parachute



Rocking toy



Play station



GEEMO

