

Creative Work Project | Spring 2021

Home furniture for engaging sensory exploration in young children



Committees: Prof. Silvan Linn, Prof. Hsiao-Yun Chu
Mina Kasirifar

Problem

There are times that keeping children physically and mentally engaged at home becomes challenging for parents. This can be due to restricted access to well-equipped public facilities or the absence of assistive products at home.

This project explores designing a product with a sensory approach for children aged 3 to 6 to keep them productively occupied at home. It aims to enhance kid's indoor activity by providing input for vestibular and proprioceptive senses.



Problem Scenarios



Kids crave movement; they need to play freely, burn their energy out, but not on the bed or couch.



It is hard to meet children's needs at home without the help of creative games, inputs, and assistive products.



Providing enough activity for kids to encourage them to move, explore, and learn is a lot for parents to navigate—especially for those who work from home



Indoor play spaces and outdoor playgrounds are closed, inconvenient, or unavailable.

Problem Scenarios



There are inequalities in access to indoor activities based on financial capabilities and spatial considerations.



Kids are getting easily bored and inactive, especially due to remote learning at home.



Complications of inclement weather can prevent a kid from satisfying their sensory needs.



During a lockdown, gatherings and playdates were not happening, and families couldn't go out like they used to.

Why focusing on Vestibular and Proprioceptive senses in kids' furniture?

Vestibular

The vestibular sense is responsible for the perception of our body in accordance with gravity, movement, and balance. This system defines the connection between the inner ear and the brain and contributes to controlling body movements, sense of spatial coordination, and awareness of the body's position.

Proprioceptive

The proprioceptive sense defines our ability to coordinate body parts in relation to each other and adjust the force and direction of every movement instinctively. A well-developed proprioceptive system helps children coordinate their limbs' movement in a way that is not too rough or too gentle.

The two vestibular and proprioceptive inputs are usually provided in outdoor activities, such as sensory gyms, parks, and activity classes. This means children have limited opportunities to satisfy these two physically related senses at home.

Benchmarking

Dedicated sensory spaces

School/Daycare facilities/Sensory gyms
Outdoor facilities (Playgrounds, Climbing walls, etc.)
Occupational therapy for sensory kids



Transforming portion of an existing space

Climbing nets, Backyard playgrounds, Trampoline, Swedish gyms



Sensory product at home furniture and small product

Multi-function room elements



Sensory product for kids with special needs







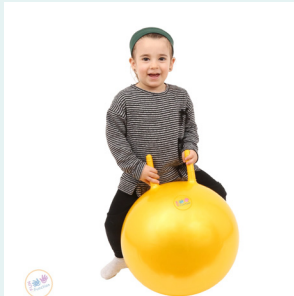
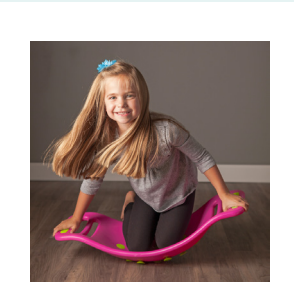



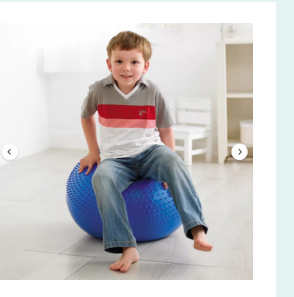
Primarily toys or gym equipment
Specifically designed for autistic children















Competitive Analysis

	Dedicated sensory spaces	Transforming portion of an existing space	Sensory product at home furniture and small product	Sensory product for kids with special needs
Ease of Use				
Space Efficiency				
Affordability				
Accessibility				
Necessity				
Blending in Room				
For Home Use				
Light Weight				

Market Analysis

						
Brand/Name	Viggi Kids Vidget	Children's Factory Rainbow Arch	Children's Factory Cube Chairs	Children's Factory Woodland Hollow	Nola El Ultimo Gritto	Gotchoo Covered
Price	\$ 99-169 (one piece)	\$ 349 (trio)	\$ 129	\$ 566	\$ 195	\$ 45
Size	14.7"x 11.7"x 15.5" small 26.4"x 21.2"x 27.9" large	36.75" x 17.5" x 15"	15" x 15" x 15"	75" x 65" x 14"	17.3" x 11" x 11.6"	10" x 13.5" x 18" Table 11" x 11.5" x 12" Chair
Material	LDPE Polyethylene Plastic	Soft Foam + Vinyl	LDPE Polyethylene Plastic	Upholstered – Cotton + Rayon + Foam	LDPE Polyethylene Plastic	Non-Toxic Soft Foam
Discription	3 in 1 flexible seating module	3 part arch for motor play	2 in 1, chair and desk cubes	Preschool modular furniture	K Blocks modular Table and Seating	Lightweight, Space-saving table and chair set
						
Brand/Name	Fun and Function Bouncy Hopper Ball	Fat Brain Toys Teeter Popper	Kore Design Wobble Stool	Modern Ball Chair	Viv + Rae Yessenia/American Plastic Toy - Scoop Rocker Chair	Weplay Half Massage Ball
Price	\$ 25	\$ 86	\$ 60	\$ 140	\$ 96 (pack of 6)	\$ 96
Size	16" diameter	11.02" x 2.95" x 4.53"	13-3/4" x 13-3/4" x 14"	22" x 31" x 22"	23" x 24" x 16"	16" Circumference
Material	PVC	Plastic + Silicone	Antimicrobial Plastic	Chair & back: PE plastic Ball: PVC Fixed bar & Wheels: Nylon Pump: PP plastic	Plastic	PVC
Discription	Exercise Ball with Handles helps Improve Sensory Integration, Coordination, Balance, Motor Planning	Concave board covered with silicone suction cups that make a pop sound	A kid's stool that wobbles	Seat for kids who need to wiggle and move to help focus, but need some extra support	Colorful rocker chairs for kids	Equipped with pimped surface which is suitable for rehabilitation, gymnastics, and massages

Market Analysis

						
Brand/Name	ActiveWood Playground	Southpaw Enterprises Advantage Line Platform Swing	JBailmx Kid's Swing	KateHaa Waldorf Rocker	Fun and Function Mushy Smushy Bean Bag Chairs	Abilitations Inflatable Dream Chair
Price	\$ 788	\$ 283	\$ 155	\$ 164	\$ 34 - \$ 80	\$ 77
Size	59.06" x 43.31" x 45.26"	31" x 31" x 60"	17" x 17" x 15"	34.3" x 18.5" x 19.3"	13" and 18" & 24" diameters	5" x 40" x 24"
Material	Siberian Pine Wood	Wood + Rope + Metal fixture + Vinyl	Polyester Fiber + Metal	Baltic Birch Plywood	80% polyester 20% spandex + Filled with 2-3mm polystyrene pellets in 80% polyester 20% cotton lining	Vinyl + Foam
Discription	For home and yard, Climbing triangle, Baby gym, Montessori Ramp, Climbing Gym, Toddler Climber, Kids Ladder	Suspended equipment providing physical challenge for indoor use in therapeutic applications	Hanging comfortably for long hours of relaxation	Aiding children to develop a variety of different skills and unleash a child's boundless energy	Seating solution with multiple uses for kids with low muscle tone and sensitivity to hard surfaces	Inflatable Sensory Peapod for Children with Sensory Needs - Therapeutic Compression Sensory Chair
						
Brand/Name	Harkla - Hug	Fun and Function Concentration Rocker	Theodore Airplane Kids' Rocker	Peanut Balls	Children's Factory 7 Piece Climber	
Price	\$ 85	\$ 170	\$ 109	\$ 32	\$ 580	\$ 75
Size	15.3" x 10" x 5.9"	36" x 24" x 18"	20" x 25" x 18"	28" x 14" to 38" x 20"	70" x 69" x 17"	15" x 15" x 7"
Material	Vinyl + Foam	Vinyl + Foaml	Wood + Electronic components + Foam + Fabric	PVC	PVC + Dense Foam	Wood
Discription	Inflatable Sensory Peapod for Children with Sensory Needs - Therapeutic Compression Sensory Chair	Rocking chair for children with autism, ADHD and sensory processing aged 3+	Airplane Rocker chair with Music	Inflatable peanut shaped ball	Bright colored soft climber. kids can crawl around and pull themselves up on the shapes or venture through the tunnel	Rocker board

Human Subjects Research Protocol Institutional Review Board (IRB)

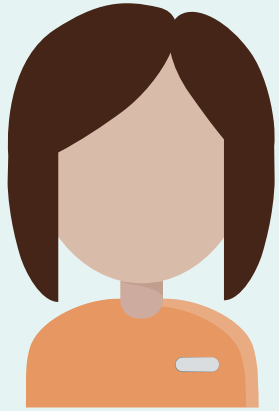
The purpose of the research protocol is to provide a clear and complete description of the research's purpose and benefits, the methodology involved, the informed consent process (Parental permission for children as the vulnerable population), and any questionnaires, surveys, interview scripts, or schedules, or other materials to be used.

For approval from Institutional Review Board (IRB), a CITI certificate for Human Research is necessary.



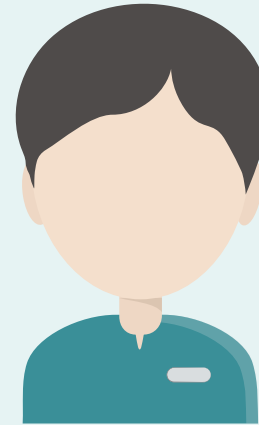
Recruiting Script	
Hello, my name is Mina Kasirifar. I am a graduate student at SFSU in the Design Department. I am conducting research on home furniture for engaging sensory exploration in young children.	
Parti relat min	San Francisco State University Verbal Consent
If yc <41:	Hello, my name is Mina Kasirifar. I am a graduate student at SFSU in the Design Department. I am conducting research on home furniture for engaging sensory exploration in young children. I am inviting your child to take part in the research because he/she is in the specified age group. By participating in this research, he/she can help me design and develop a useful product for kids to be physically active at home.
The interv voluntary, time durin	Photographic Release Form
Your ansv answering	As part of this project, we will be taking photographs of you or your child. Please initial in the spaces below what uses of these photographs you consent to, and sign at the end of the release form. Photos will only be used in the ways you consent to. Your name will not be identified in these photos.
	Video Release Form
	As part of this project, I will be making video recordings of you and your child during your research participation. Please indicate what uses of these video recordings you are willing to permit, by putting an initial in the spaces below. This choice is completely voluntary. You may agree to in any of the following ways: 1. _____ The video recordings will be used for research purposes only. 2. _____ The video recordings will be used for research purposes and for educational purposes. 3. _____ The video recordings will be used for research purposes, for educational purposes, and for promotional purposes. 4. _____ The video recordings will be used for research purposes, for educational purposes, for promotional purposes, and for marketing purposes. 5. _____ The video recordings will be used for research purposes, for educational purposes, for promotional purposes, for marketing purposes, and for other purposes. 6. _____ The video recordings will be used for research purposes, for educational purposes, for promotional purposes, for marketing purposes, for other purposes, and for any other purposes. 7. _____ The video recordings will be used for research purposes, for educational purposes, for promotional purposes, for marketing purposes, for other purposes, for any other purposes, and for any other purposes. Name _____ (Signature)
	Parental Permission for a Minor to Participate in Research Home furniture for engaging sensory exploration in young children
	<p>A. PURPOSE AND BACKGROUND Hello, my name is Mina Kasirifar. I am a graduate student at SFSU in the Design Department. I am conducting research on home furniture for engaging sensory exploration in young children. I am inviting your child to take part in the research because he/she is in the specified age group. By participating in this research, he/she can help me design and develop a useful product for kids to be physically active at home.</p> <p>B. PROCEDURES Information derived from observation, user test(s), and feedback will be implemented to deliver a feasible and useful product for children and their parents.</p> <p>If you agree to let your child participate in this research, the following will occur:</p> <ul style="list-style-type: none"> Your child will be asked to play and interact with the prototyped furniture, with one of his/her parents' presence. This will take 30 minutes. The interaction will be photographed. It will take place in their home as part of their free-play after school time with Covid-19 precautions. Your child will participate in an interview alongside their parents about what indoor activities they like to do after school. The interaction and conversation with the child will happen in the presence of a parent. The interview of the child and the parent will take approximately 20 minutes. The communications and discussions will be audio recorded. <p>Information will be obtained from the subjects through interviews, observations, reviewing children's play and their current room's furniture at home, and using pre and post qualitative data in the research.</p> <p>Procedures in which the participants will take part:</p> <ul style="list-style-type: none"> Initial contact by email or text message The phone call and/or video call with parents introducing the researcher to their child Parents sending videos of current children's furniture and toys Set a time for observation in place if possible In-person observation/interview Getting feedback on visual ideas and mockups Test the mockup proportion and space constraint in the place Children would interact with the prototype and give feedback for the final modification <p>The design solution will be evaluated by observing children's interaction with the designed product with their parents' attendance. The qualitative data will be analyzed through the Narrative method, which focuses on using participants' shared experiences and stories. Content analysis will take place to explore the behavior with the physical product. Collecting data will be in the form of a transcript, taking notes, photographs, and video recording of the user test.</p>

Expert Interview



Nora
Manager, New Generation Le Petit Daycare
Los Angeles

Discussed children's behaviors, physical activities, sensory products and environment, and assistive daycare tools



Jorge
Children Therapist
San Francisco

Discussed children's behaviors and the role of sensory and playful products in children's development and their limited access to efficient products

Insights

- As schools and child care services were cut back or turned virtual, the **home environment** became more important.
- Children need to develop sensory integration by utilizing proper tools and products; however, most of these products are **expensive, space-consuming, or inconvenient for home use**.
- Children have **minimal attention at the age of 3**. Creative movements and wiggling help children stay focused during activities.



User-Centered Research

Non-probability samples for qualitative data

The participant pool includes at least five children aged 3 to 6 years old with no preferred gender and five of their parents. Participants are chosen from typically developing children with no physical disabilities.

The interview and virtual field observation with parents are carried out over Zoom, and children will be asked for user testing.

Users are kept posted during the design process, and their feedback is collected.

Adults seek **safety, price, and practicality** in their children's products. For **children**, properties such as **color, tactility, and shape** are the main factors.

In designing for kids, the design should get the **adult's attention and approval**, then **maintain** the rapidly developing **child's attention**.

Insight Keywords :

Durability
Usability
Practical
Reliable
Convenient
Rigid
Sentimental
Create memories
Fun
Understandable
Challenging
Evolving
Modular
Timeless
Form
Color

Interview

The investigator will introduce the study and explain the consent information

The parent will be asked to show the furniture in the child's bedroom

Identifying parents' and child's expectations from a furniture

Understanding the reasons behind parents' decision in choosing furniture for their child

Investigating furniture use scenarios

In what ways the child may choose to play with their furniture?

How do children interact with other furniture such as the couch and parent's bed in the home?

Do the children modify their furniture in any way? How and why?

What are the physical activity options for the child at home? What do they like?

How do parents engage your child at home?

How much do they invest in buying furniture and toys for their children? Finding the priorities

What do you think it's the most essential investment for children? Which part of their life aspects do you invest more in? (Physical/education/entertainment)

How much sq feet is the child's room?/If they have a separate room, how big is it?

What activities did they do before quarantine?

Did they use to go to the gym, park, play ground? How much time were they spending?

How did the Covid-19 quarantine affect the child's life?

How much screen time do they have now and before the pandemic?

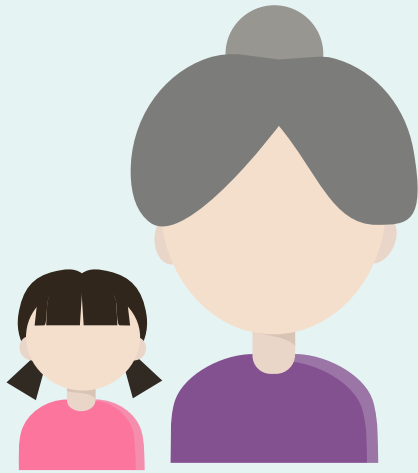
Participatory Observations

Parents give a tour of the furniture their child uses, and photos of the furniture will be taken.

The audio recording of the parent's comments and explanations may be taken. The tour can be done through a video call or with photos/video sent by parents.

The child will be asked to play and interact with the designed furniture prototypes. At least one of the parents will be present during the process. This prototype test will take about 30 minutes. The interaction will be photographed. The parents and children have the option to opt-out at any time if they no longer want to engage with the furniture prototype.

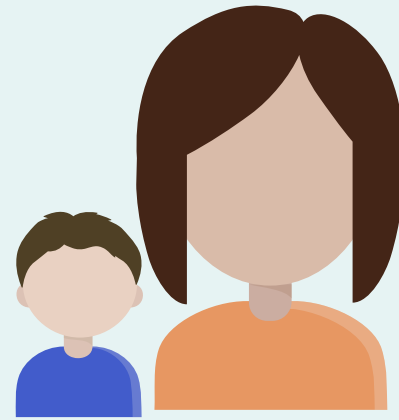
Interviews



Mari, Caregiver
6 year old Rosa

The reason I signed her [Rosa] up for karate class was the **quarantine**. I wanted her to have some physical activity since she doesn't go out much.

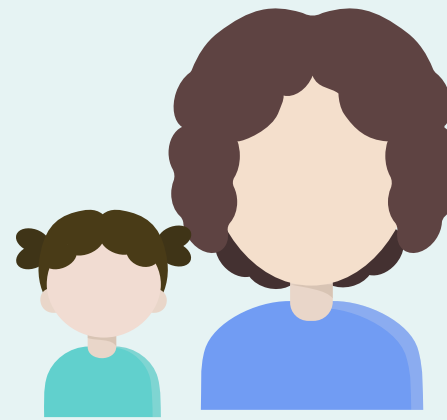
I don't like bringing toys for kids each time they want something or ask me to set up a thing. And **they can't gather up their stuff when it's too big or too complicated**.



Nora, Mother
3 year old Kevin

I don't want to add a large toy in the room I don't have space for. **The furniture you need, but I'd rather keep their toys small and manageable.**

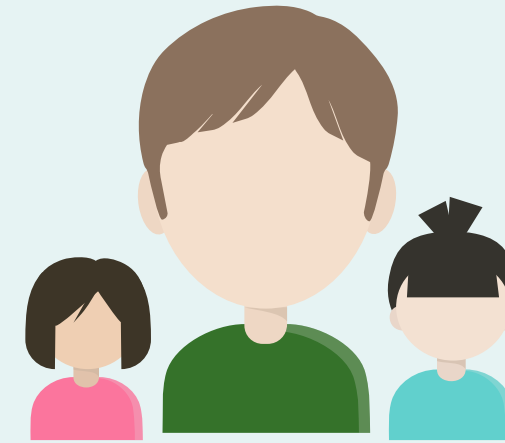
I like things that have **extra features** as long as it doesn't make it a headache to get them running or changing the batteries.



Stella, Mother
3 year old Demi

Since she was getting into the habit of not listening to what I ask her, I took her to therapy, and as part of the practices, they gave her games and tasks to enhance her senses, like understanding **height, depth, and her balance.**

She has total permission to play and **move stuff around her room** however she wants, as long as there is no jumping on the bed or furniture; she has a bean bag to play with.

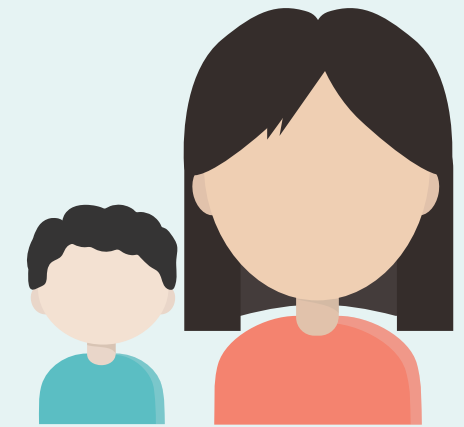


Steve, Father
3 & 6 years old Ava & Anna

My kids have a light **spring-loaded** princess fort that is massive. The last time I set it up, it was up for a year cause **it's not easy to fold it back down**, and they only occasionally played in it.

I pay attention to the price, but I don't want to have garbage at home. The **quality** is really important to me.

Safety is very important; I check to make sure about the reliability of anything I get for my kids.



Mia, Mother
3 year old Ryan

I wish we could have **a bit of a playground at home**. Ryan gets stubborn from sitting still for so long at his online classes. Even his cousins, it's almost impossible for them to spend a moment without moving around and jumping up and down. They just **can't tolerate concentrating** and sitting for their online classes.

He is **constantly tilting** his chair, and I have to **stop him** cause **I'm worried he might fall**.

Persona | Sara and her daughter Mia

Sara is a working mom. She and her husband Rob have a 5-year old daughter, Mia. Since the pandemic, Sara and Rob work from home and struggle to manage their time for Mia and take care of her preschool classes. Sara's mother used to come over to help, but not anymore due to COVID-19.

Keeping Mia active and entertained is a challenge. The increasing screen time is inevitable as Mia's school and Karate classes are virtual. Mia has a short attention span and gets tired during classes. Some days she sits more than 5 hours in front of the laptop. As she doesn't attend in-person classes, can't play at the park, and can't have play dates and sleepovers like she used to, she gets bored quickly, and her energy doesn't tire out. Some days they have virtual dancing and jumping in preschool, but they aren't consistent.

Mia has her taste and opinions. With her parents' help, she carefully decorated her room inspired by Frozen. She would happily dress as a ballerina or a fairy every day if she could. She is wiggly, high energy, and likes to jump on the bed and living room furniture, which she isn't allowed to do. She moves furniture around and makes tents with bedsheets. Sara doesn't want to pressure Mia into doing things she doesn't wish to, but encouraged her to go to Karate class so she could get to wiggle out! Mia likes narrated on-screen books. Sara is good at multitasking, but she can have a little extra time for herself when Mia is entertained.

Demographics

Age: 41 and 5 years old
Degree: MA in Computer science
Occupation: Specialist at
SalesForce | Income: 98k a year

Status: Married, mother of Mia,
a 5-year-old child
Location: San Francisco, live in
a 2bedroom apartment

Motivations

- Providing an enriched environment at home for Mia
- Child's development and parenting books
- Looking for ideas of fun activities and effective products for her child's development
- Encourages her daughter to make her own choices
- Keeping Mia engaged for better learning and also physically active
- Be able to keep working from home

Frustrations

- Concerned about managing time between her job, her young child at home, and herself.
- Lack of products and activities to engage her child productively at home
- Looking for space efficient, long-lasting furniture and toys that Mia doesn't quickly get bored of them
- Keeping her child engaged during her classes
- Organizing home goods as Mia uses them for playing
- Worrying about Mia's safety and home furniture when she climbs and jumps on them.

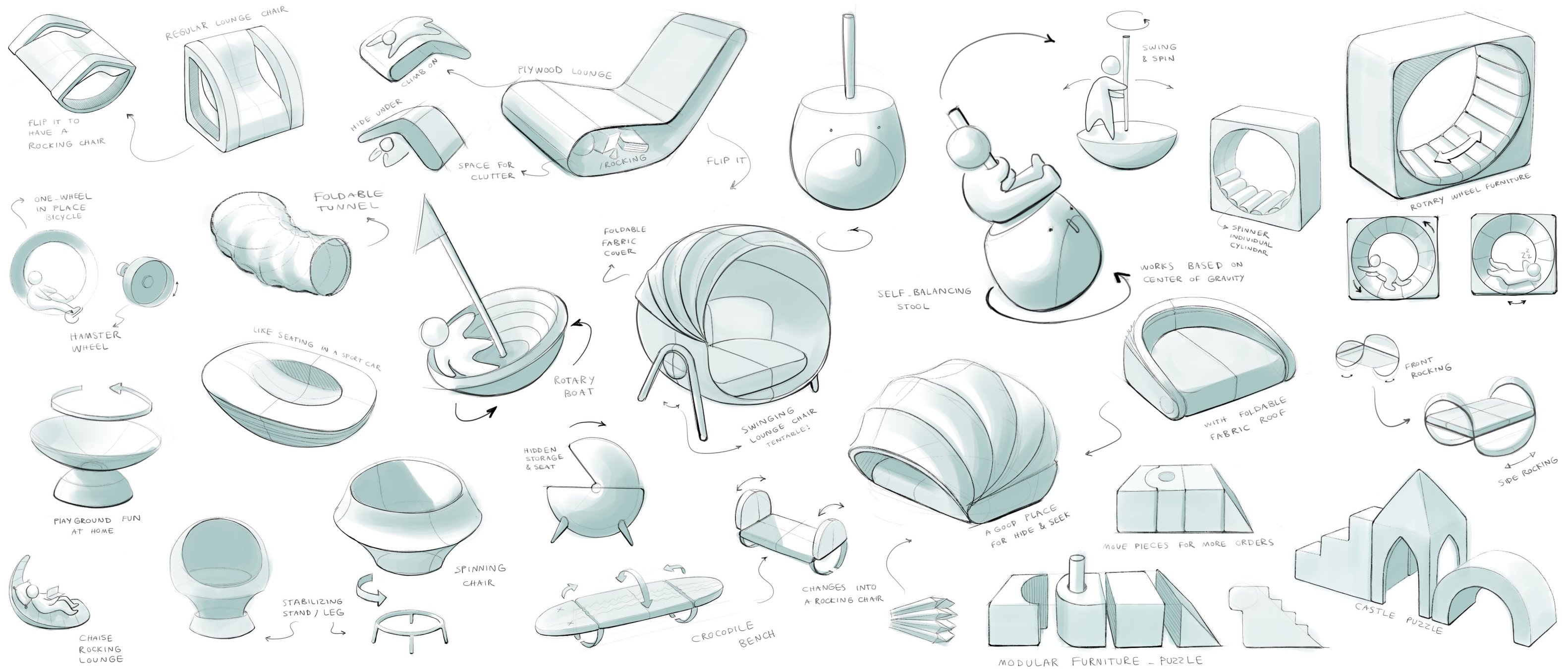
Desktop Research

- + A 2016 study shows the effects of **sensory-based movement** activities in achieving **students' better focus** and work completion and improved classroom behaviors.
- + Since the outbreak, **activity-based products** for entertainment and hands-on learning were the **best sellers** in the toy industry. Even during the recession, the market showed promising demand for such products.
- + As schools and workplaces closed, U.S. parents **loaded up** on things to keep their kids **occupied** at home, help them navigate their new **homeschooling** situation, and also to be a source of entertainment for the whole family as we spend more time at home.

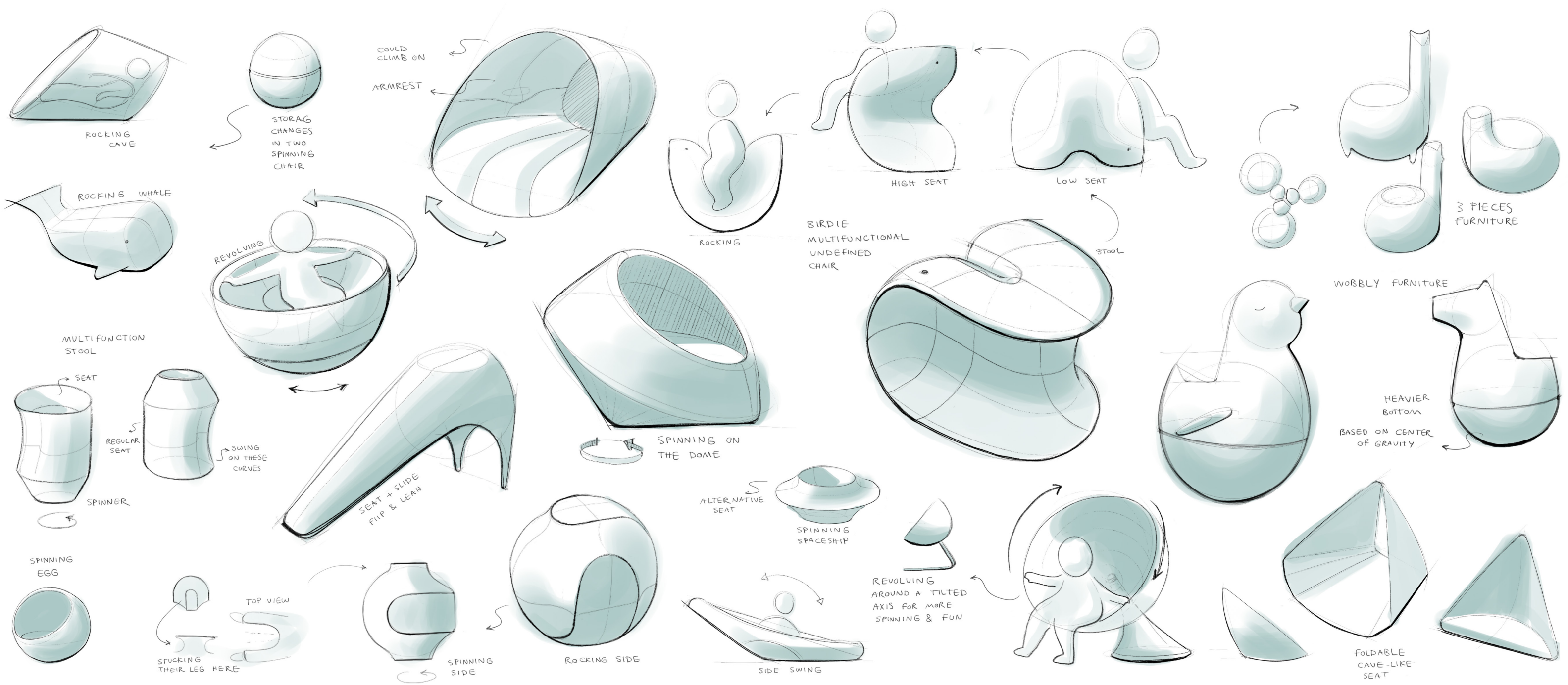
Prompt

Designing a piece of **essential indoor furniture** for kids **aged 3 to 6** which promotes **mild physical activity/active seating** at **home**. This product will help with **vestibular** and **proprioceptive** sensory integration.

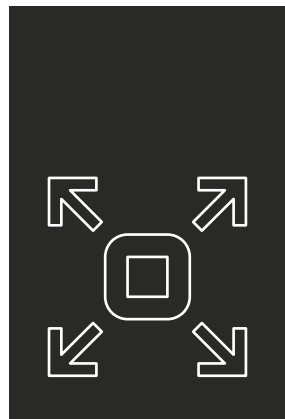
Ideation



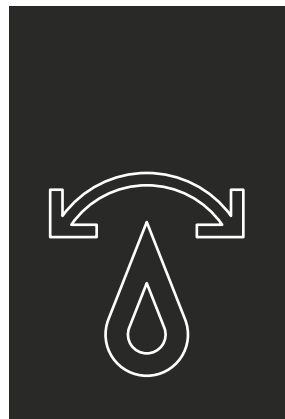
Ideation



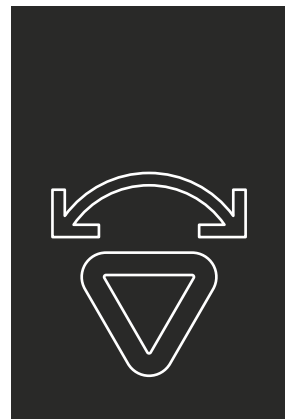
Movements Exploration & Bodystorming



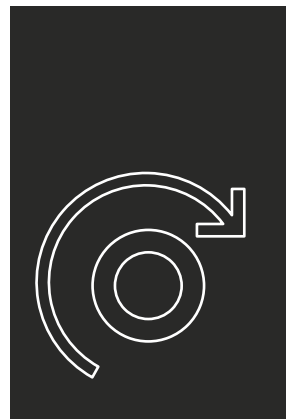
Drag/Pull/Push



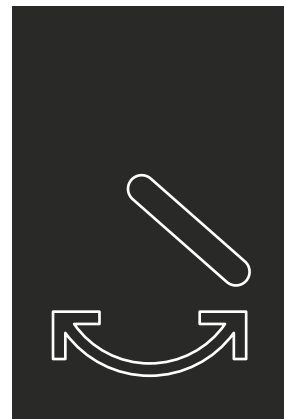
Rocking



Balancing



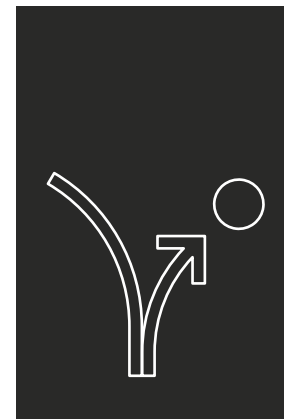
Rolling



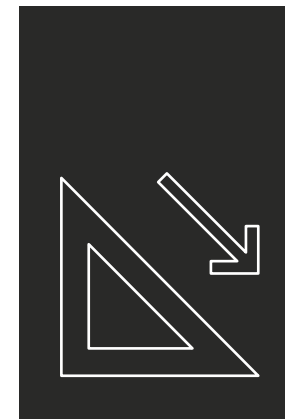
Swinging



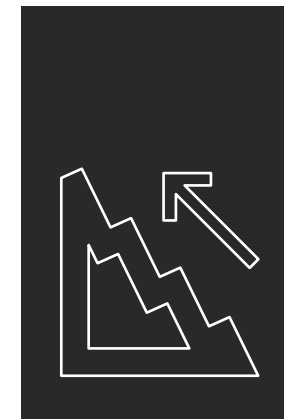
Spinning



Bounce

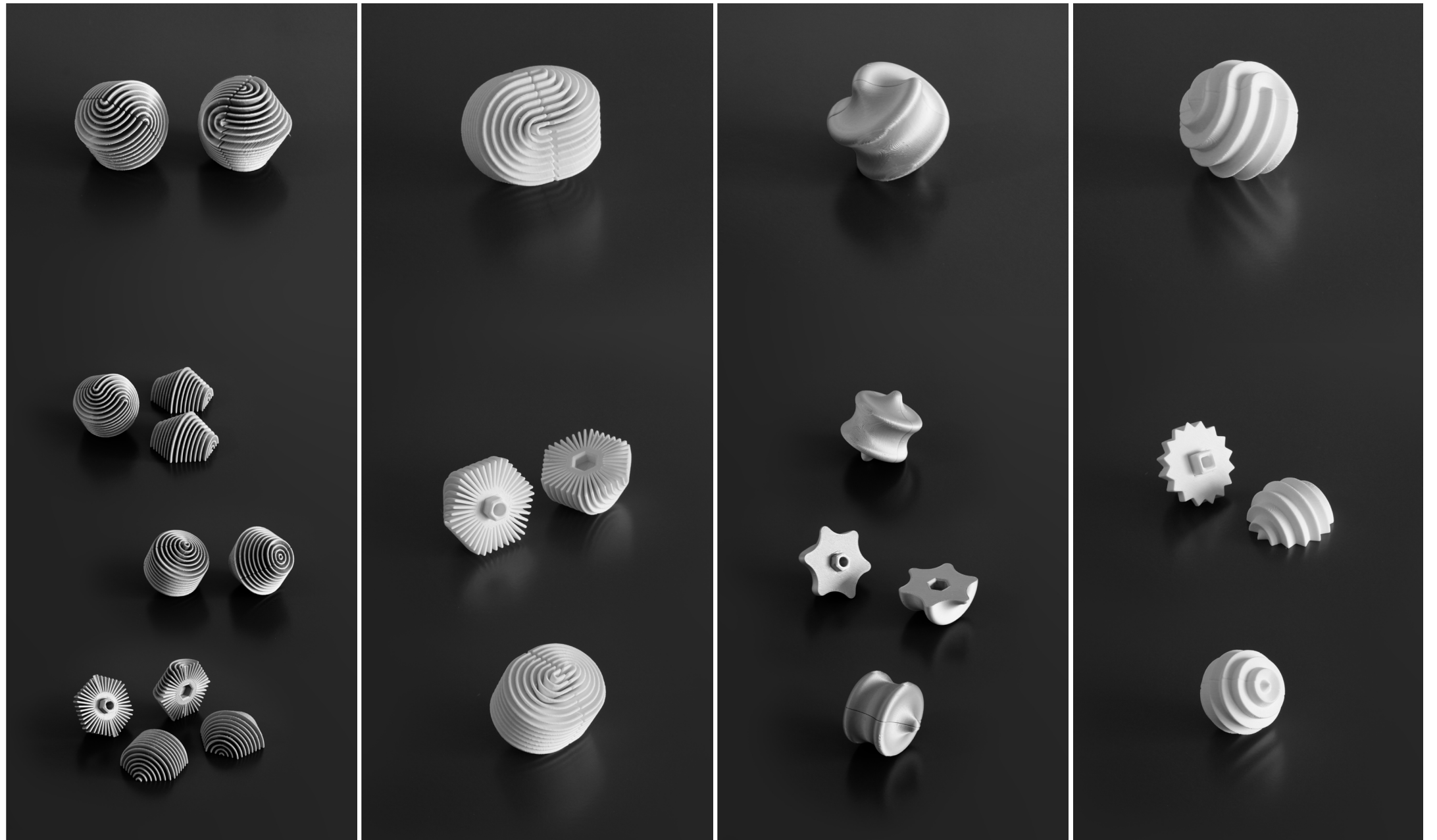
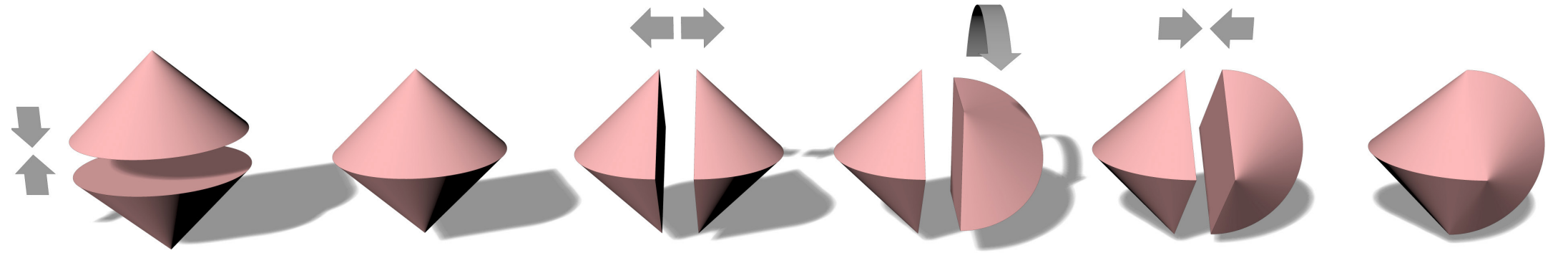


Sliding



Climbing

Geometry Exploration

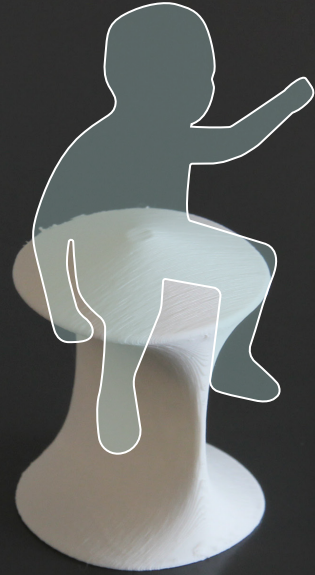


Sphericons is a three-dimensional solid geometry created by revolving half a polygon for 360° around an axis that goes through its midpoint, then slice it down in the middle, rotate one of the halves 90° , and rejoin together. The Sphericon has one continuous surface and two discontinuous edges, enabling them to roll on a surface until the inertia is over. (Stewart, 1999)

Integration of Activities and Behaviors



Spinning chair



Stool



Rocking chair



Side-rocking chair



Spinning chair



Seat



Rocking chair



Bench

Form Iterations



3D Printed Mockups

Experiment 1



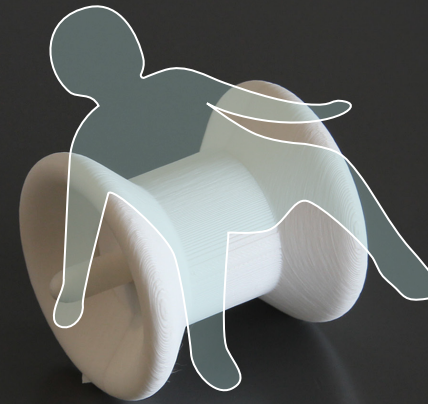
Lounge chair



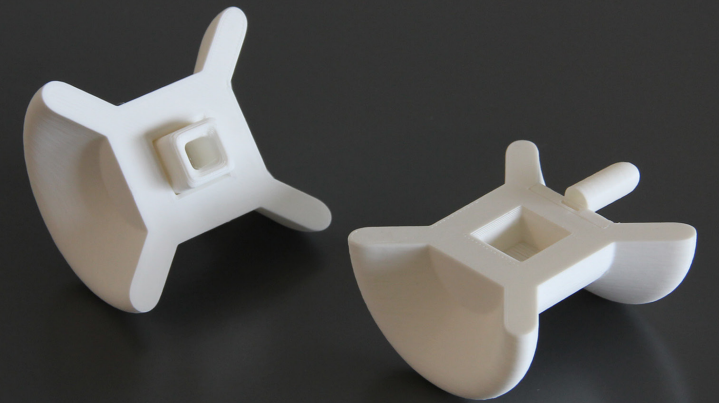
Rocking chair



Spinning chair



Rolling chair



Two seats

Rotate the pieces

Separate the pieces

3D Printed Mockups

Experiment 2



Lounge chair



Rocking chair I



Stool



Rocking chair II



Chair

3D Printed Mockups

Experiment 3



Lounge chair



Rocking chair I



Stool

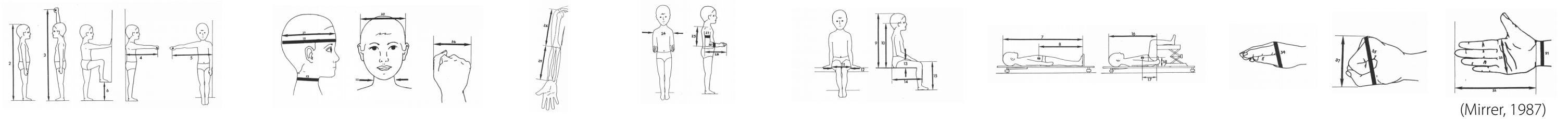


Rocking chair II

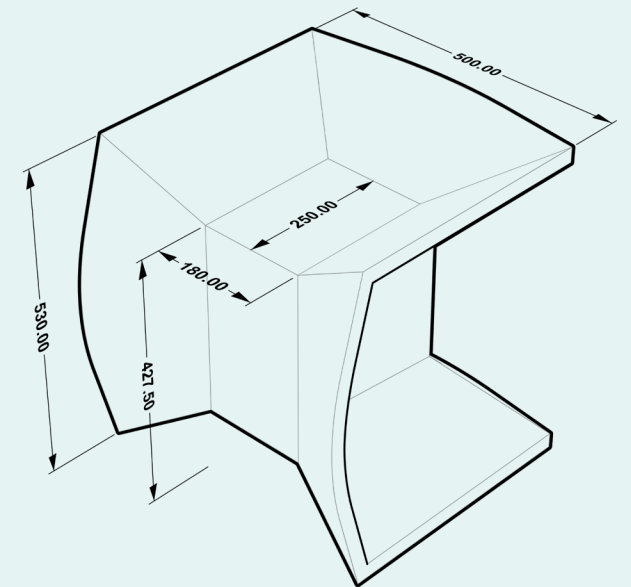
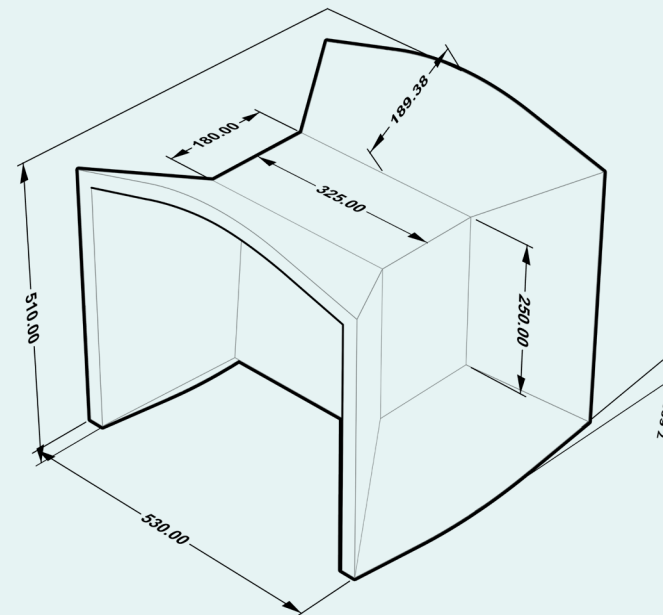
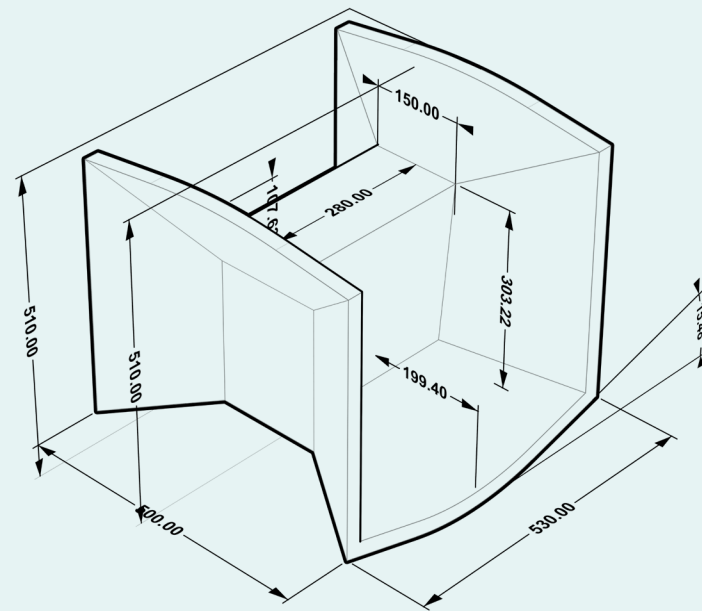
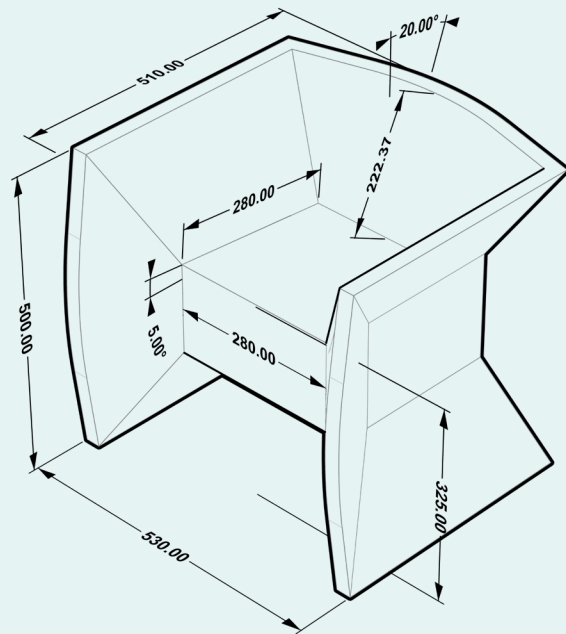


Chair

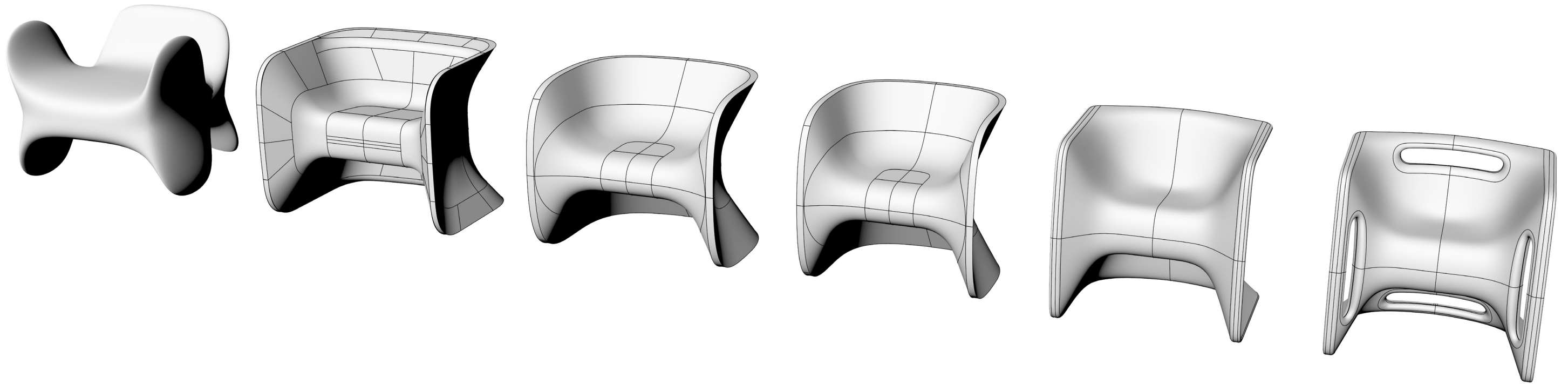
Human Factors and Ergonomics



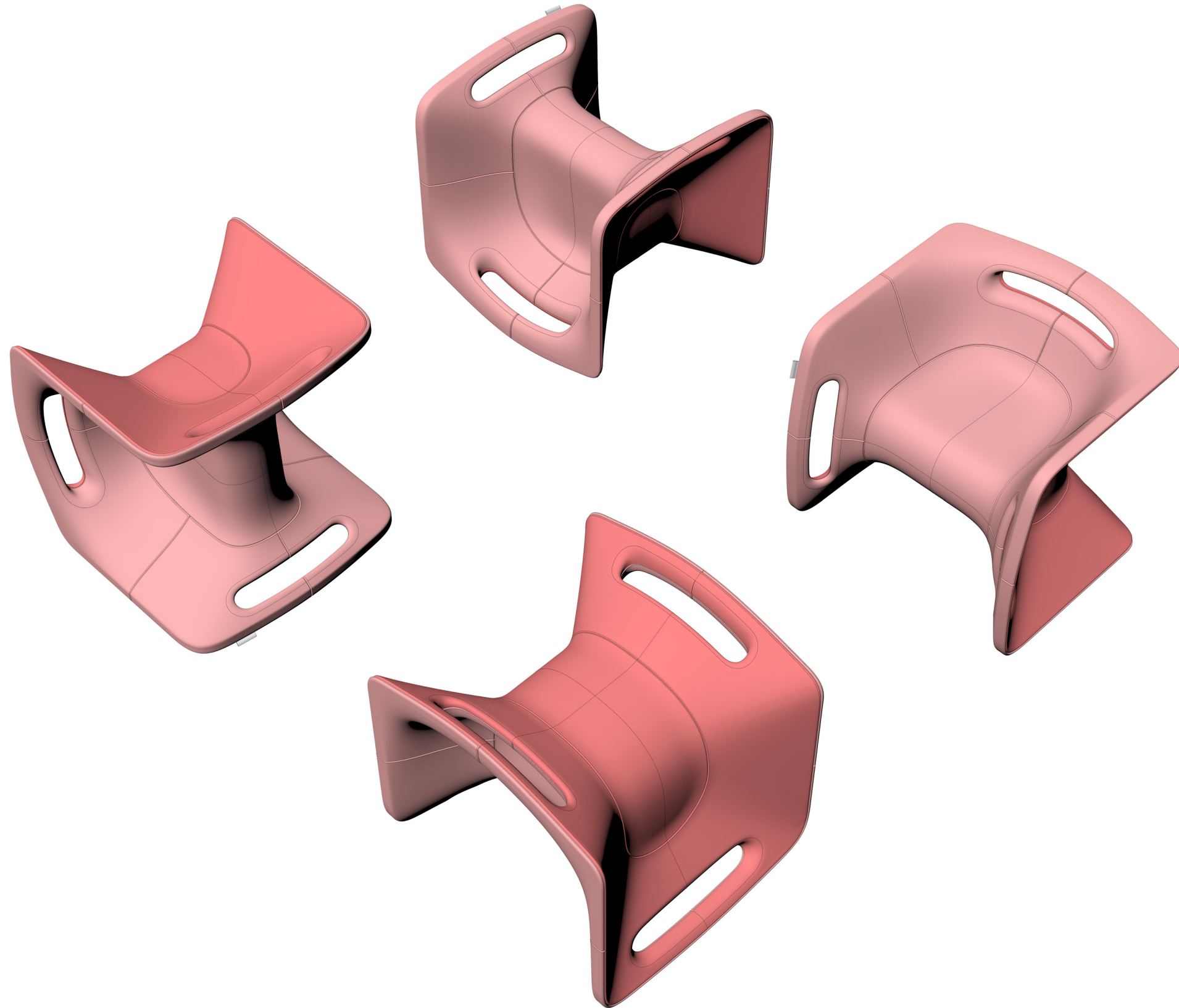
(Mirrer, 1987)



3D Modeling Refinements and iterations



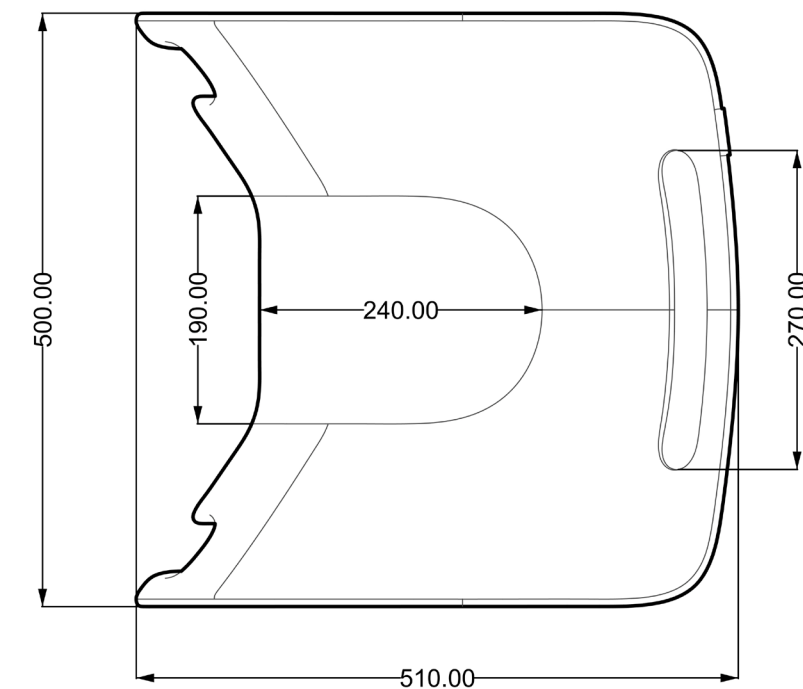
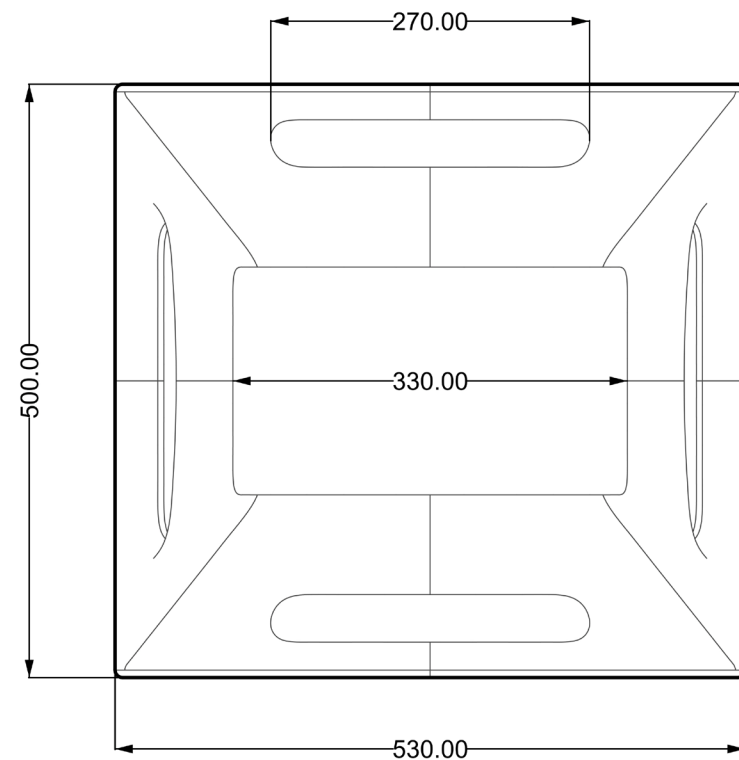
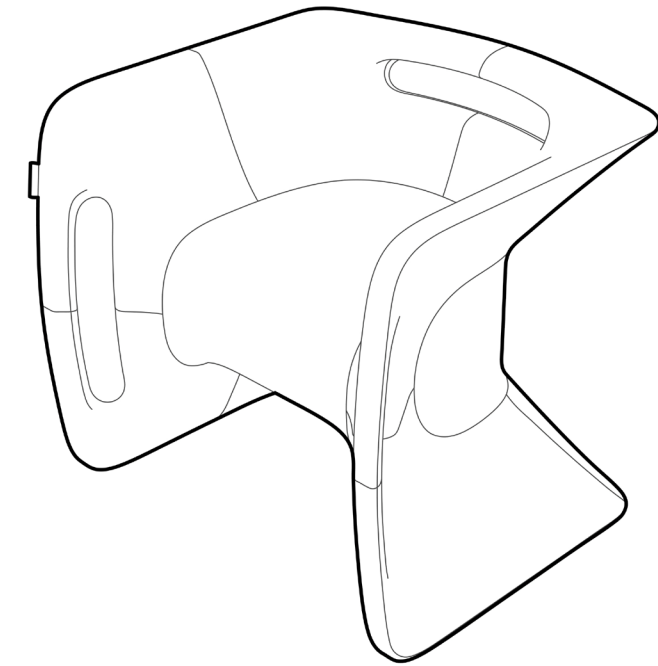
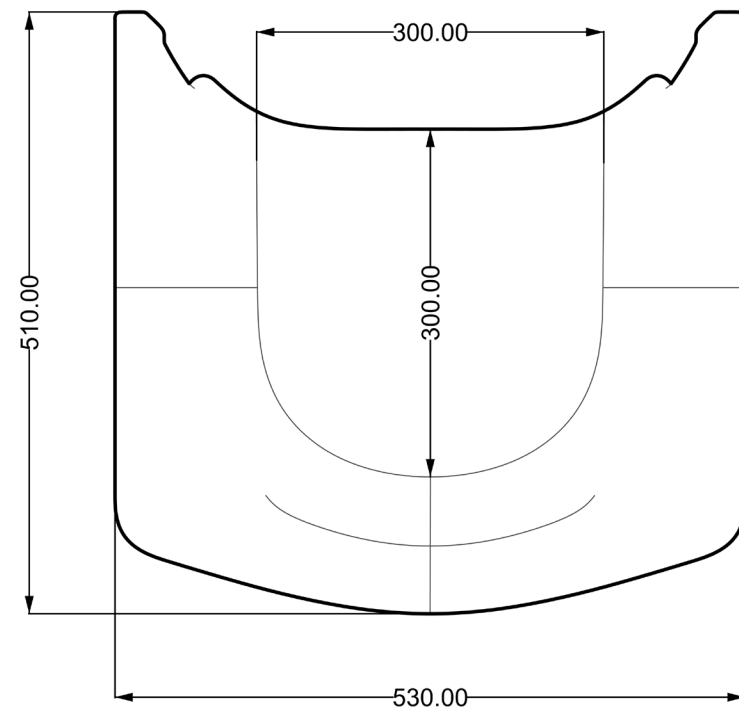
Final Concept 3D Model



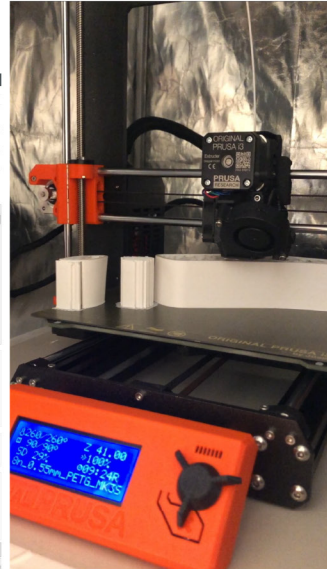
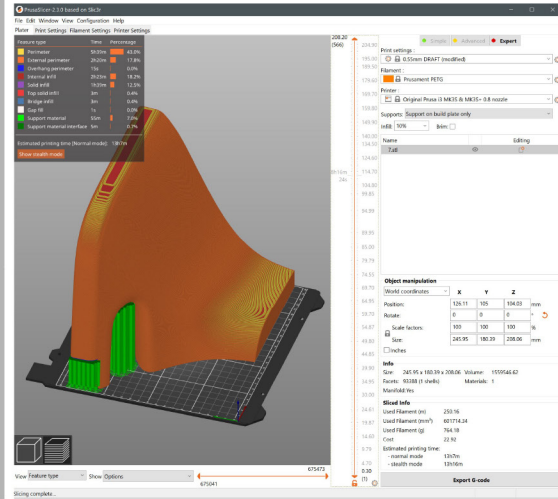
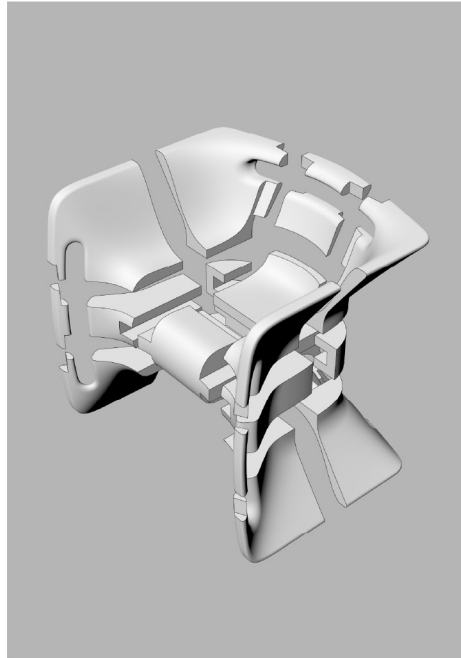
Technical Drawings

The final product occupies a bounding box of 500mm height, x 530mm width, and x 510mm length.

Kids' body measurements and constraints we accumulated and analyzed separately for each use scenario of the product. The dimensions and ergonomic package of these different features were then infused together to reach an optimum solution that works as a whole and doesn't contradict each other.



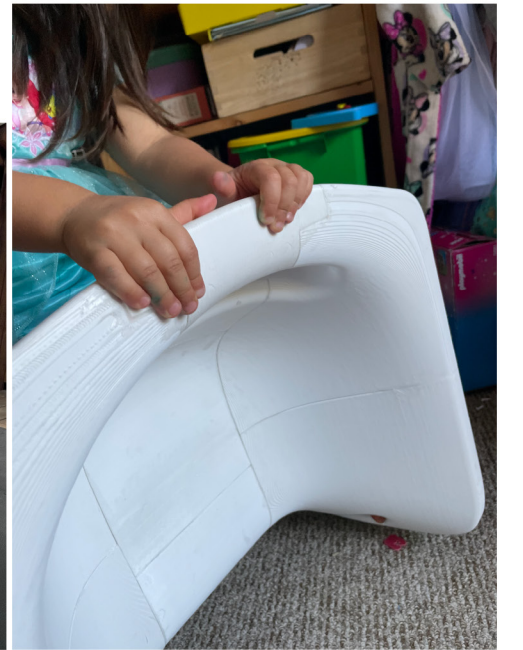
Full Scale Prototype



User Testing

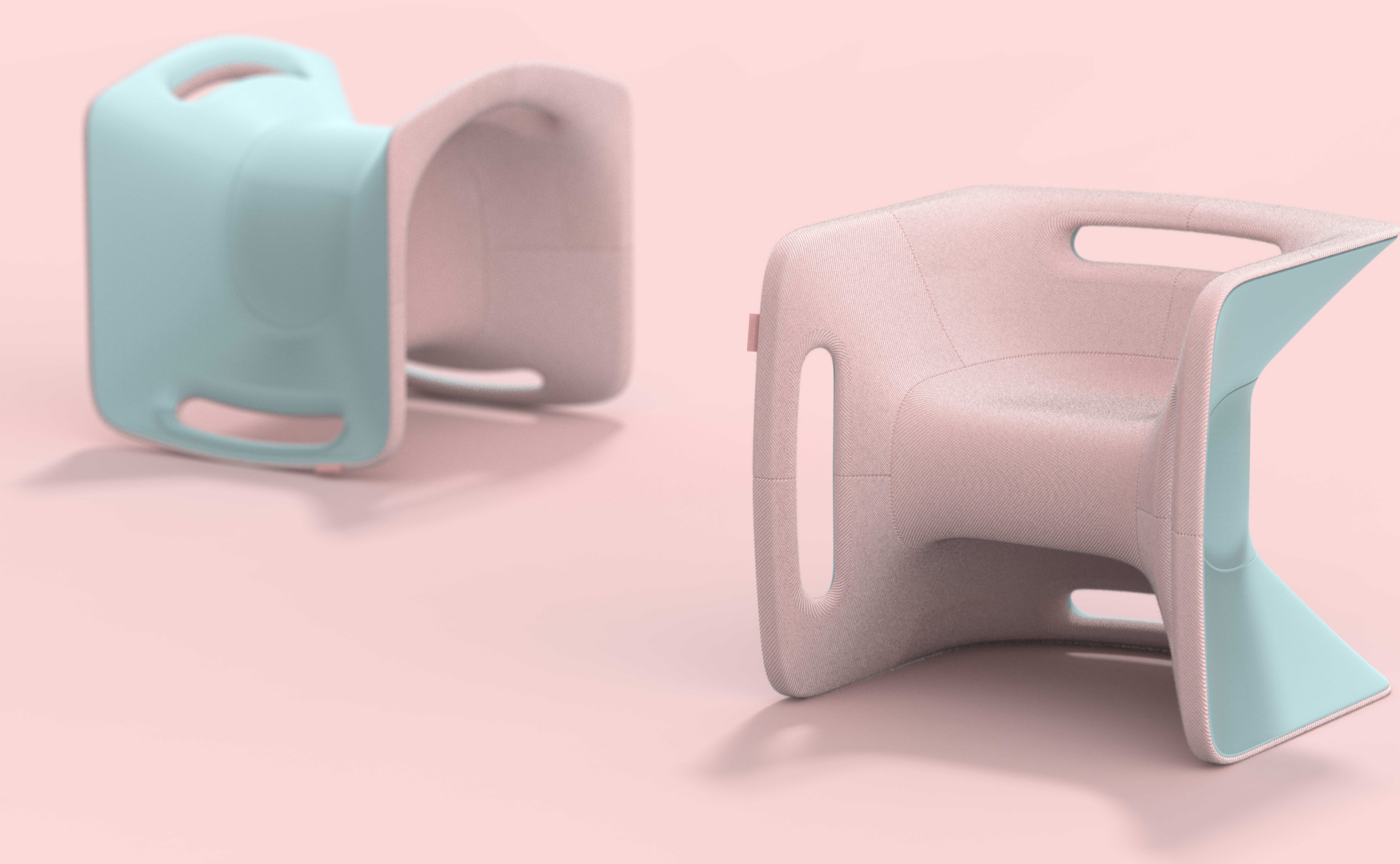


User Testing





Final Concept Rendering



 **Logo and Branding**

FLIP



Color Options



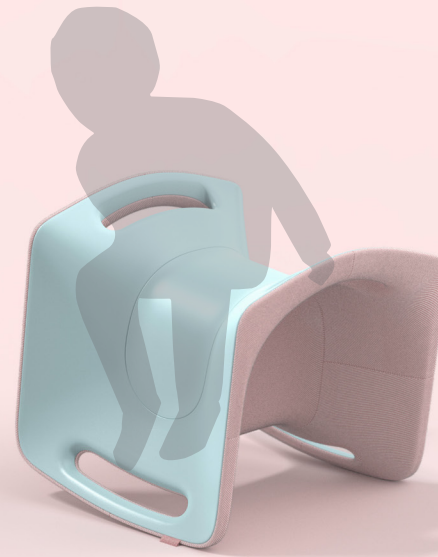
Use Scenarios



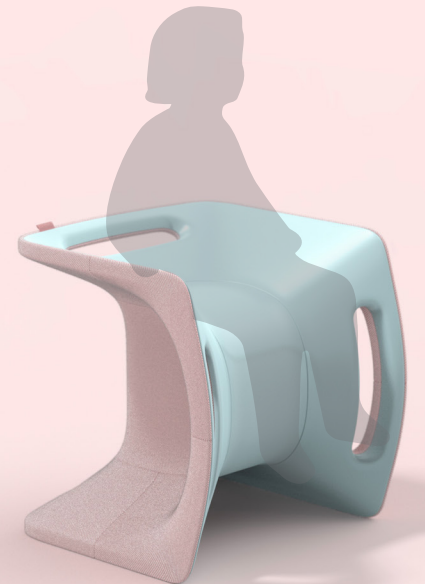
Lounge Chair



Horse Rocking I



Side Rocking I
Horse Rocking II



Stool

Manufacturing



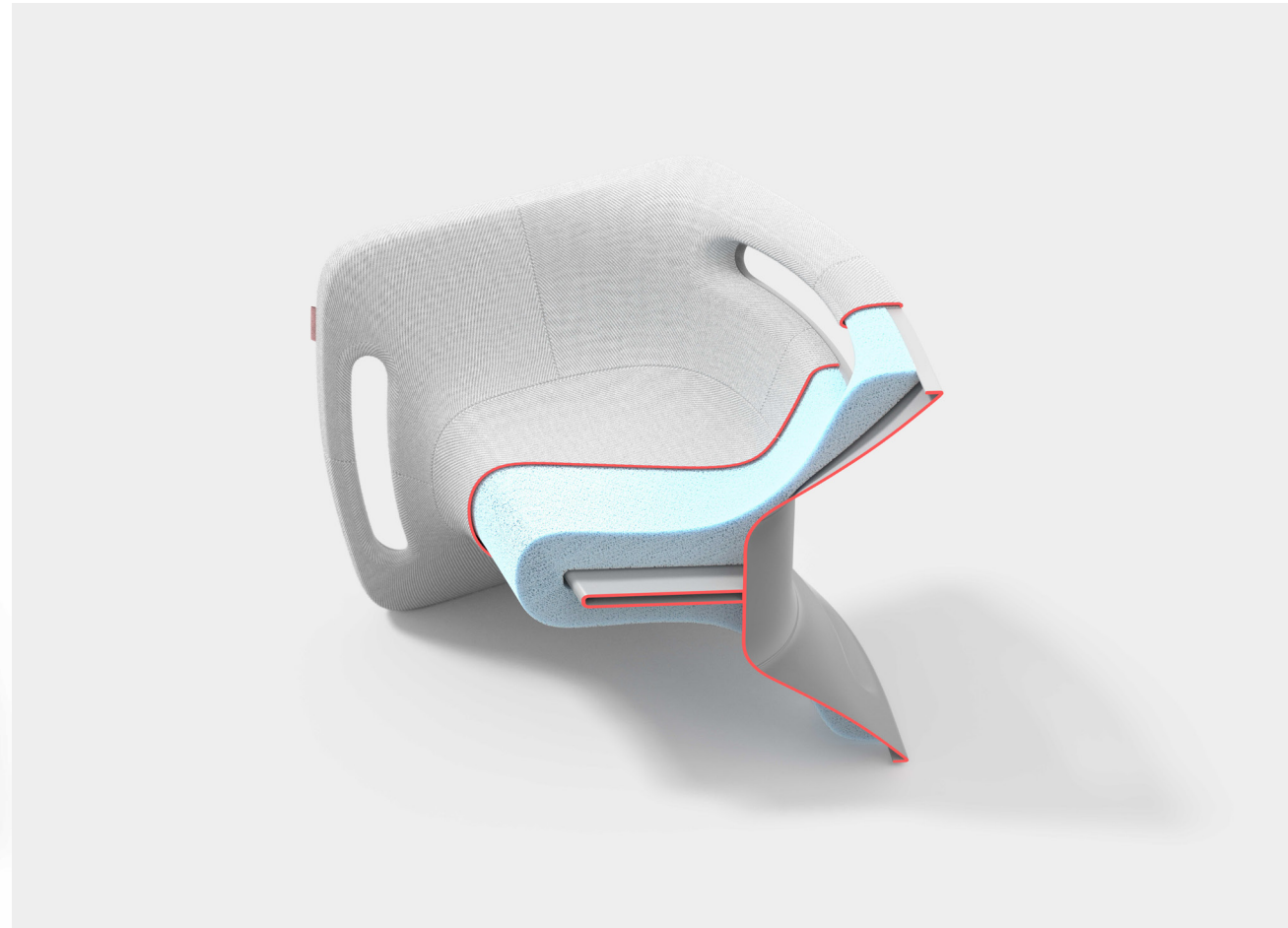
Fabric Upholstery



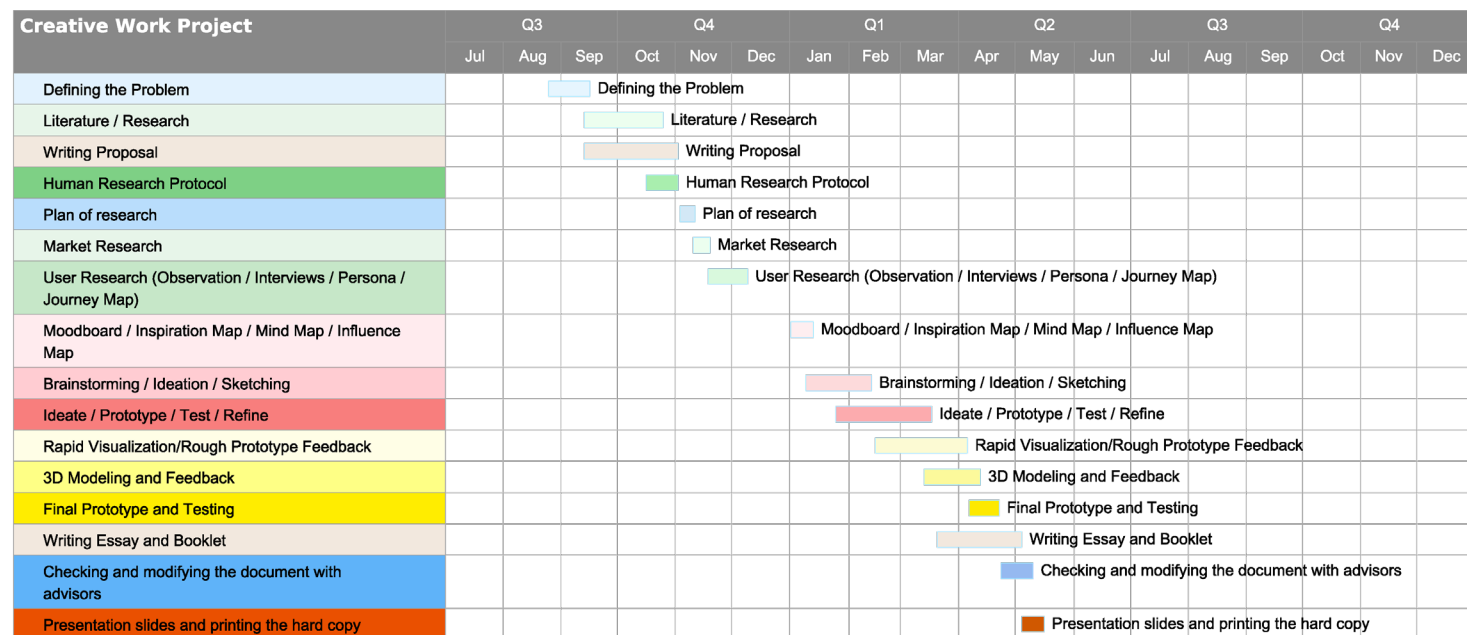
Polyurethane Foam



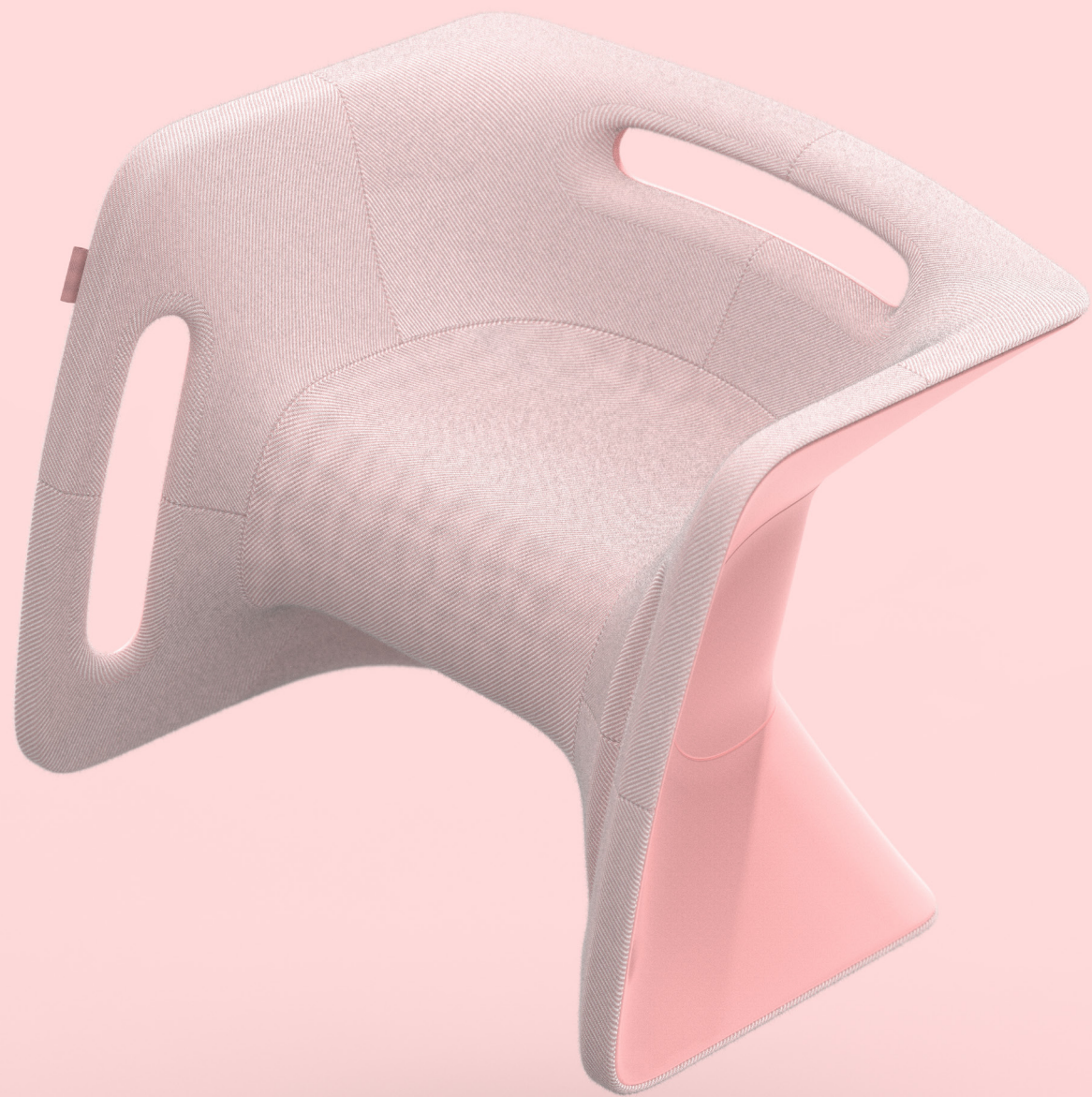
Plastic



Future Direction



- **Refining** the product according to the insights from user testing.
- Deciding the **niche market** to help narrow down the material selection and production method.
- Exploring the implementation of different **production procedures** and estimating the final **weight** of the product in addition to its **cost**.
- Investigating the laws, **regulations**, and liabilities related to selling **children's products**.
- Possibly developing an **adult version** of the Flip chair.



Thank you !

For AR view



Scan me!