

Designing Everyday Household Items for Children

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Introduction

This research project investigates the challenges and significance of everyday household items for children. By utilising scholarly and web-based research, design principles (such as Nielsen's Heuristics and Norman's Principles), interviews, direct observation and diagramming techniques, a greater understanding of how children interact with and perceive household products has been achieved, and a problem domain requiring a design solution identified.

Development of Children

Developing products for children (for the purposes of this report, ages between 2 to 7 years of age) requires knowledge of developmental stages, play patterns, age transitions, playtesting, safety standards, materials, and their routines. These factors provide a primer on the differences between designing for children and designing for adults. According to Jean Piaget, children's cognitive ability to reason, infer, and make connections is still developing. This development happens within four stages and will also need to be taken into design considerations.

For this project, Piaget's stages of development were specifically chosen and broken down, with the focus on the pre-operational stage. The pre-operational stage (ages of 2-7 years old) children can think in terms of symbols, but they are not yet able to effectively take other people's perspectives and language skills are still developing (see figure 1).

DEVELOPMENTAL MILESTONES		
Age	Cognitive Abilities	Physical Abilities
2	<ul style="list-style-type: none"> - Holds something in one hand while using the other hand - Tries to use switches, knobs or buttons on a toy - Plays with more than one toy at the same time 	<ul style="list-style-type: none"> - Kicks ball - Runs - Eats with a spoon - Walks (not climbs) up a few stairs with or without help
3	<ul style="list-style-type: none"> - Draws a circle, when you show them how - Avoids touching hot objects, like a stove, when you warn them 	<ul style="list-style-type: none"> - Strings items together, like large beads or macaroni - Puts on some clothes by themselves - Uses a fork
4	<ul style="list-style-type: none"> - Names a few colours of items - Tells what comes next in a well-known story - Draws a person with three or more body parts 	<ul style="list-style-type: none"> - Catches a large ball most of the time - Serves themselves, with adult supervision - Holds crayon or pencil between fingers and thumb
5	<ul style="list-style-type: none"> - Count to 10 - Pays attention for 5 to 10 minutes during activities - Writes some letters 	<ul style="list-style-type: none"> - Hops on one foot - Can undo and redo buttons
6-7	<ul style="list-style-type: none"> - Enjoy the challenges of games and puzzles - Expand vocabulary, allowing for expression in detail - Show more independence at reading and writing 	

Figure 1: Developmental milestones between the ages of 2-7. Retrieved: "CDC's Developmental Milestones", 2022; "Brain Development: Ages 6-7", 2018.

Heuristic Evaluation

Based on the development milestones at figure 1, observations of children using products and research into successful product design for children, five of Nielsen's Usability Heuristics (Nielsen 2020) have been identified as necessary for the successful design of household products for children as demonstrated in table 1 below:

USABILITY HEURISTIC	RELEVANCE TO PRODUCT DESIGN FOR CHILDREN
Visibility of system status	Children want instant feedback to learn, and to remain engaged and encouraged. The most effective products provide appropriate feedback within a reasonable amount of time.
Match between system and the real world	Designs which use language and concepts familiar to the user reduce the effort required to understand how an object works. Successful products for children do this while accommodating to their restricted vocabulary, limited reference memories, and tendency to take things literally.
Consistency and standards	Products which follow known conventions appeal to children, who understand and appreciate consistent results from the same action.
Recognition rather than recall	Children learn best with products that have familiar elements (such as words, images, shapes, and colours), therefore minimising the cognitive load on their memory.
Aesthetic and minimalist design	Children often struggle to focus on more than one thing at a time and are distractible. Children's products should therefore only contain the information which is relevant and needed.

Table 1.1: Nielsen's Usability Heuristics.

Product design for children should also consider Norman's principles of design (Norman 2013), with particular emphasis on the following principles shown in table 1.2 below:

PRINCIPLE OF DESIGN	RELEVANCE TO PRODUCT DESIGN FOR CHILDREN
Affordance	Successful products for children factor for both the properties of the object and the capabilities of the child. Given these capabilities have yet to be finalised, other principles (particularly Nielsen's Heuristics and Signifiers) are particularly important.
Signifiers	Given children's limited range of memories and references, signifiers that communicate appropriate behaviours to children are crucial to help them to understand a product's affordance.

Table 1.2: Norman's Principles of Design.

These heuristics and principles were used to evaluate a few everyday household items designed specifically for children (see figure 2) and provide further insight into what makes a successful product.








Product	Image								
	Description	Eating utensils	Silicone suction sectioned plate	Silicon lids for children's cups	Bowl with food catcher and suction cup bottom	Animal-themed junior chair	Kids safety scissors	Toothbrush	Shoes
	Age	Toddler	9 months +	9 months +	Toddler	not stated	3+	2-5	1-4
Nielsen's Heuristics	Visibility of system status	✓	✓	✓	✓		✓	✓	✓
	Match between system + the real world	✓		✓	✓		✓	✓	✓
	Consistency + standards	✓	✓	✓	✓	✓	✓	✓	✓
	Aesthetic + minimalist design	✓	✓	✓	✓	✓	✓	✓	✓
Norman's Principles	Affordance	✓	✓		✓				
	Signifiers	✓		✓					
Comments		This is a very good example of product design for children.	The product does not look like a traditional plate or bowl and therefore lacks a match with the real world.	Lids are not simple for children to remove – therefore do not take into account their capabilities.	This is a good example of product design for children. It lacks signifiers, but this is compensated for by its match to real world bowls, which children are likely to have seen used.	This does not look like a seat and therefore lacks a match to the real world. It lacks affordance – its properties are not clear and it requires a level of core strength which may be beyond the physical capabilities of the child.	To the uninitiated, it is unclear how to hold the scissors, or how to make them cut. Design does not take into account user's capabilities / physical development.	Handle is too long for smaller children to manoeuvre the toothbrush effectively. Design does not take into account user's capabilities / physical development.	2 different fastenings devices (laces + Velcro) are too confusing for children in this age range. Design does not take into account user's cognitive and physical capabilities.

Figure 2: Nielsen's Heuristics and Norman's Principles applied to children's products.

Empathy Based Research and Diagramming

Parents

The perspective of parents was examined because they often select products for their children, teach them how to use the products, share their difficulties and frustrations. Research on blogs, forums and websites about parenting and child development was combined with an interview of the mother of a three-year-old (see appendix A) to inform an understanding of parents' perspectives, concerns, and observations. This contributed to the development of a parent's journey map (figure 3) and the identification of numerous themes (emotions, questions, and requirements) common to parents' experiences with their children's household items (figure 4).

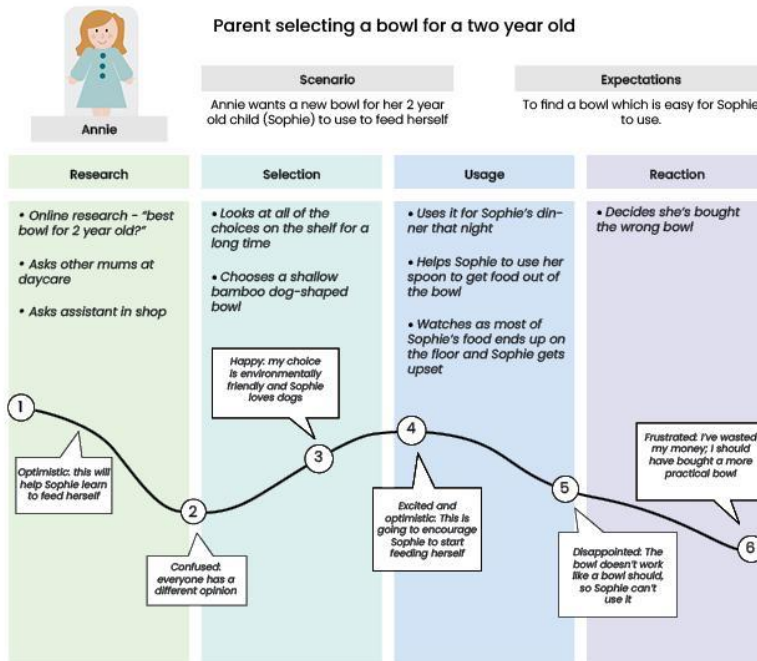


Figure 3: Journey map of a parent of a two-year-old.



Figure 4: Common themes found within the parenting community.

Children

Direct observations within a day-care environment were made over a six-month period. Across the preoperational-aged children, there were several varying struggles that all correlated to the lack of a developmental skill (see figure 5).

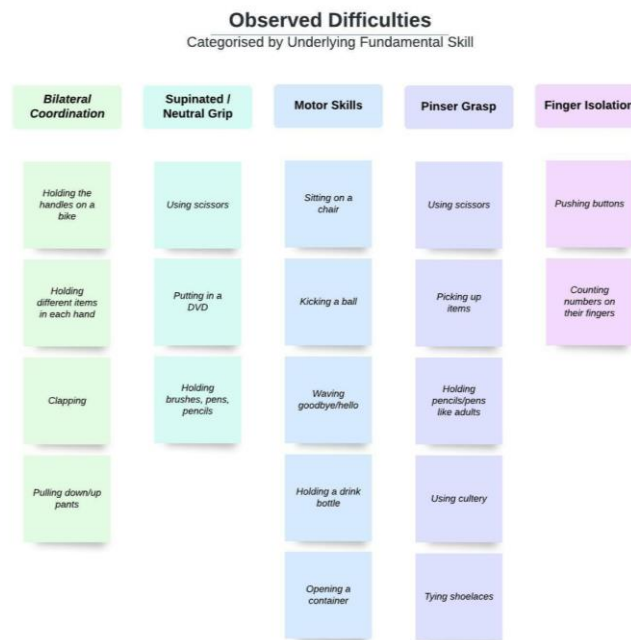


Figure 5: Observed difficulties categorised by underlying fundamental skill.

To comprehend the mental and physical processes children undertake when tackling these difficult challenges, two empathy maps were created through the means of observations and empathising (see figure 6).



Figure 6: Empathy maps of two children.

Furthermore, a direct observational and informal interview was conducted with a child from the day-care to create an accurate journey map which further expanded upon the aforementioned process (see figure 7). It was found that despite the excitement that arose at the prospects of creating or doing an action, if the task proved to be seemingly impossible, the

children would either display an emotional reaction or simply move onto something else entirely.

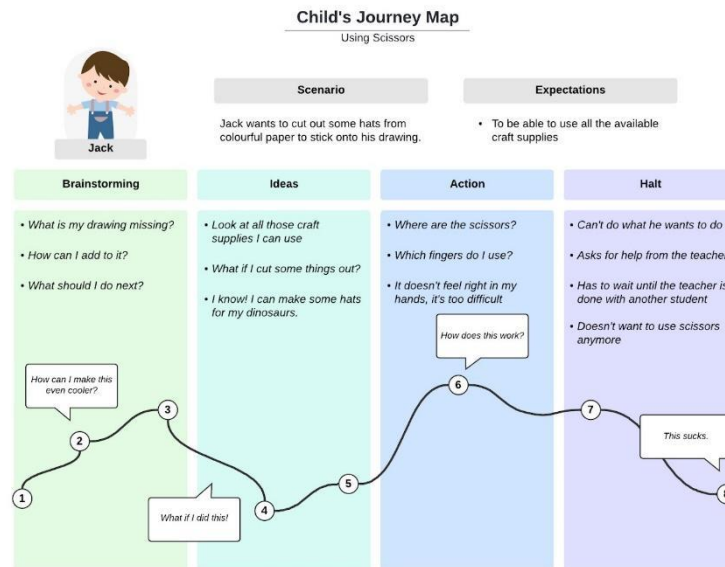


Figure 7: Journey map of a child, aged 2, using scissors.

From these mapping exercises, numerous common themes were identified around children's use of household products. Initial stages of enthusiasm, willingness to try and curiosity can quickly turn into the child feeling anxious, frustrated, and disengaged if the product does not match their capabilities. This can both impact the child's willingness to use the object and foster longer-term reluctance to try new things (see figure 8). Therefore, designers should focus on amplifying and leveraging the initial positive factors to create successful products for children.

Using the 2x2 matrix, it was found that there are few tools available for children that are challenging without being impractical since age-specific capacities are not considered (see figure 9). Due to this, there is a lack of tools on the market that effectively cater to children's abilities.



The activities undertaken to this point led to a conclusion that many children's household items are failing to meet their needs as they are not specifically designed with the child's capabilities in mind, and are, therefore, not setting children up to appropriately learn, develop, and succeed. This was further explored through the development of several 'how might we...' statements to help inform the next ideation phase of this project.

'HMW' Statements
How might we make the world more accessible for children?
How might we encourage children to explore by themselves?
How might we give children tools that appropriately suit their cognitive skills?
How might we leverage children's natural enthusiasm and curiosity?
How might we minimize children's frustrations with household products?
How might we enable children to create without the restrictions of their cognitive abilities?
How might we create products for children that factor in their developmental stages?
How might we stop the cycle of creating mini versions of adult products not tailored to kids' abilities?
How might we solve problems in tools for children that may also help other groups?
How can we resolve problems that affect everyone by investigating the difficulties children have?
How might we learn from children?

Table 2: 'How Might We...' statements.

Conclusion

Applying the theoretical basis to the practical means has resulted in a greater understanding of designing household products for children. Therefore, following the extensive research into children based on their capabilities, interactions and perceptions, the problem statement below will serve as a guide to designing individual products:

2–7-year-olds need household products appropriate for their capabilities so they can develop and interact in the world more independently.

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Appendix A

Interview:

Subject: 40 year old female, mother of 3 year old boy

Conducted: 19 May 2022 (via phone)

1. What is your child's favourite household product to use, and why?

He has a few favourites, but at the moment it's probably his new fork and spoon. He likes them because they look more like grown-up utensils (stainless steel heads) but they're easier for him to use than an adult fork because the bits you hold are shorter and wider for him to grip. Also they have bright colours and pictures of animals on them, which he loves. It's like a 'graduation' from all-plastic cutlery, but still easy to use.

2. What is your child's least favourite product to use, and why?

Probably his shoes. He's at that stage where he wants to do things for himself and so tries to put them on, but he struggles with different things – if they're a bit snug he can't get them over his socks, getting the Velcro in the right spot, and especially putting them on the correct feet. It usually ends in him getting crabby and not wanting to put them on at all.

3. How does your child learn to use a new product?

He's pretty smart and curious, so he's usually willing to give anything a go. He'll watch how other people do things and copy that. I also see him looking for clues in how to use it, he might view it from different angles or press buttons to see what they do.

4. How does your child react when he's successful in learning something new?

It makes him really happy and proud – he always wants to tell his dad and grandma as soon as he sees them, and to show them if possible. He particularly likes doing things that show he's a 'big boy' so he can show off to his younger sister. I think that's why the fork is such a hit.

5. How does that make you feel?

It's really sweet. I feel so happy and proud of him.

6. Can you tell me about a time when your child struggled to use a product?

The shoe example is fresh in my mind. We were in a hurry to leave the house for a playdate, but he insisted on putting them on himself. Then he couldn't get it right. We both started getting frustrated – I probably didn't help by rushing him and getting more annoyed. Then he got upset – I think because he couldn't do it, but also maybe felt like he'd let me down. It all got too hard - We ended up in the car with his shoes in my bag.

7. How did that make you feel?

At the time, I felt really frustrated because we were already running late and it would be much easier for me to put them on for him. I also worry because some kids his age can already put their shoes on. But now I feel bad for him because he was trying his best. I also feel guilty for showing my frustration and I'm a bit worried that he won't want to put those shoes on anymore. I think we're going to have to put more effort into making putting on shoes less of a big deal.

8. What things do you look for in the design of a children's product?

I want something which is good value for money and will last and does what it's supposed to. It's good if products are easy for kids to use – though not necessarily too easy. I also like him to be challenged so he learns – I guess it's a balance between something which is challenging but also do-able.

9. What do you think are the most important things for your child in a product?

It needs to be easy to use – he's happy to work things out – a bit like a puzzle – but not if it takes too long. He's most attracted to things that are bright and the noisier the better (unfortunately!). Also, things that are similar to what adults use, so he can feel 'grown up'.

10. What is the one thing you want designers of children's products to know, and why?

Before I had kids I probably didn't appreciate how differently they think and learn to adults. You need to be really patient with them, but you also need to give them things that they actually have a decent chance of being able to use. It's not always easy to know when to push them, when to give them something easy and when to jump in to help them.