PART 1
DESIGN ARTICLE

SPIN'BUD

Emotional Awareness Puppet for the Neurodivergent Classroom

By Marie-Charlotte Roy

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"Developing and growing in one aspect of your life often has a knock-off effect on other parts of your life." (Honeybourne, 2018)

Introduction

Spin'Bud

Neuro-Inclusive education isn't just important. It's **essential**. Without it, we're widening gaps and shutting neurodivergent people out of opportunities to grow. The impact goes beyond individuals - it affects social connections and progress for everyone. That is why we must start designing for them, so we can advance as one.

What is Neuro-Inclusive Design?

"**Neurodivergent**" is a nonmedical term that describes people whose brains develop or work differently. This means the person has different strengths and struggles from people considered "neurotypical". The term "neurodivergent" came from the related term "**neurodiversity**". Judy Singer, an Australian sociologist, coined the word "neurodiversity" in 1998 to recognize that everyone's brain develops in a unique way (Cleveland Clinic, 2022). Like a person's fingerprints, no two brains are the same. Because of that, there's no definition of "normal" capabilities for the human brain.

Some of the conditions that are most common among those who describe themselves as neurodivergent include Autism, ADHD, Down Syndrome, Dyscalculia (difficulty with math), Dysgraphia (difficulty with writing), Dyslexia (difficulty with reading), Dyspraxia (difficulty with coordination), Mental health conditions like bipolar disorder, obsessive-compulsive disorder, Social anxiety, Tourette's, and more.

Figure 1: *Neurodiversity, Autism, ADHD and learning differences*, Lake Pointe Granbury (2020)

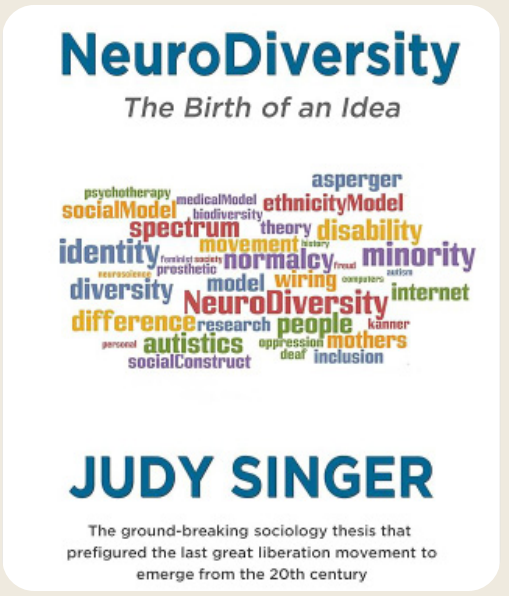

Figure 2: *Neurodiversity: The Birth of an Idea*, Judy Singer (2017)

Key Themes and Debates

In the field of design, there is no official "**neurodiverse framework**" to specifically cater to this community's needs. However multiple works, like that of Kurtsy Groves and Oliver Marlow, authors of *Spaces for Innovation – The Design and Science of Inspiring Environments*, encourage designing for **uniqueness** and **variability**. They researched how different workspaces affect creative performance and psychological behavior. They have proved that adding personal trinkets and small additions like elements of nature improved the general behavior of the workers:

"The psychological impact of a personalized space in the office has been examined. People report a greater sense of psychological comfort when they feel they have control over their workspace, working in a pleasant environment. As a result of simply enriching a lean space with pictures, plants, and personal accessories, both well-being and productivity rise by 27%". (Groves and Marlow, 2016, p.69).

The theoretical "framework" for Neuro-Inclusive design must naturally align with principles of inclusion, which are **equality, access, opportunity, and rights**. It has to encourage a shift toward more diverse design practices. For neurodivergent classrooms, this means creating tools that **support** sensory sensitivities, **encourage** self-awareness, and **promote** emotional well-being. However, Neurodiversity represents such a large window of different minds that the framework should even be to encompass multiple frameworks to appeal to different neurodiverse audiences.

Key debates around this area include the **underrepresentation** of neurodivergent-focused design. There is no "standard" in this area, which makes designing for it increasingly difficult. This is especially apparent for children in classrooms, where emotional awareness and sensory support are **critical**.

Another key debate concerns the use of **craft** instead of industry machines for toy-making. Craft is a medium for creating tactile, engaging tools and embedding care, thoughtfulness, and adaptability into design for the neurodivergent community. Since there is no "normal", having a standardized artefact made repeatedly over and over again by a machine takes away the **authenticity** of the object. (Gordon and Cox, 2023).

Figure 3: *Helping Your Child Adjust to School Life*, ChickyOlive (2025)

Informed by these themes, a question is raised: **How might craftsmanship instigate emotional awareness in young neurodivergent students?** This inquiry links contemporary design debates with practical solutions, blending craft and neuro-inclusivity to propose playful, engaging, and impactful tools for neurodivergent children.

Theoretical and Contextual Background

Spin'Bud

Contextual Framework

As stated before, there is no official framework for designing for Neuro-Inclusivity. It mainly prioritises accessibility and engagement for diverse groups, addressing the needs of these underseen communities. However, it remains underrepresented in the design world to this day because of societal biases, a general lack of understanding, and the challenges of embedding inclusivity into traditional design processes (Chapman, 2005). Liz Jackson, founder of *The Disabled List* (2020), advocates for inclusive design that is **"for and by"** the people it serves, emphasizing collaboration and empowerment. Despite growing awareness, neuro-inclusive design is still a small portion of the design world, especially when applied to neurodivergent children who face unique challenges. These children often "mask" their emotions, suppressing or imitating neurotypical behaviours to fit societal expectations. This makes it difficult for them to **identify, express, and evaluate** their emotions, leading to potential conflicts in the classroom with teachers and caregivers (Honeybourne, 2018).

A specific design tool can be created to help children recognize and **articulate** their emotions. Such tools, like a puppet with different facial expressions, could promote emotional intelligence and better communication by allowing children to externalize their feelings, offering a critical step toward **self-awareness**. In classrooms where neurodivergent children face challenges, a playful, neuro-inclusive design approach is essential for mental well-being and learning.

"Creating an overall calm, positive atmosphere in your classroom will have a positive impact on group work as well as everything else. Encourage all students to get into the habit of asking when they are unsure about something, promote helpfulness and friendliness, and reiterate that it is OK to make mistakes and that it is OK to have different opinions." (Honeybourne, 2018, p.117).

Figure 4: *Neurodivergence at a Glance*, John Hopkins University (2025)

Critical Engagement

Figure 5: *Neurodiversity and Personalised Learning*, HyperSpace (2024)

"Neurodiversity is the future of innovation and progress." (Silberman, 2015). In Steve Silberman's words, it's time to stop fearing and avoiding neurodiversity and recognise its enormous **potential** for progress and innovation. It starts with **educating** the neurodiverse children properly, without leaving them out or turning a blind eye to their needs. To help with this, handcrafted products are a good start, as it emphasizes thoughtful, meaningful design rooted in **tradition and materiality**. Craft fosters warmth, authenticity, and a sense of connection, which are crucial for neurodivergent children to engage emotionally. Unlike mass-produced objects, handcrafted designs offer variability and **sensory richness,** ensuring that the products cater to diverse sensory needs. This tactile engagement creates emotional connections that standardized, uniform products cannot replicate. (Gordon and Cox, 2023). This will help in educating the children in a proper, stress-free way.

Human-centered design, grounded in the lived experiences of neurodivergent individuals, ensures that designs are relevant and effective. **Collaboration** with teachers, caregivers, and neurodivergent children helps ensure that the designs meet **real-world needs**.

Synergy and Future Direction

These aspects create **synergy** between craft, inclusive design, and human-centered design. Craft's emphasis on materiality enhances the **tactile** aspects of inclusive design, while human-centred design ensures that the products **serve** the user's specific emotional and sensory needs. Together, these approaches provide practical, user-centered solutions that **improve** classroom environments for neurodivergent children.

Moving forward, this approach can be **scaled** to address broader societal needs, especially in other educational settings. Tools like emotional regulation puppets help children manage anxiety through mindfulness and demonstrate how design can foster mental well-being in neurodivergent classrooms.

Research and Methodology

Spin'Bud

Primary and Secondary Research

Primary Research:

In order to gain a deeper understanding of the real-world needs of neurodivergent children, the designer conducted **surveys and interviews** with educators, caretakers, and therapists. A questionnaire was also sent out to multiple companies specialised in neurodivergent care. Their feedback revealed key insights into the tools and toys that have proven effective in classroom environments, as well as the most common challenges they face (half of the answers stated it was difficulty expressing emotions). This practice also included visits to toy stores such as *Hamleys*, *Liberty*, and various toy shops and puppet shops in London, which helped assess what types of sensory toys and puppets are available on the market today and serve as a starting point for how they can better serve neurodivergent children in educational settings.











Figures 6-17: *Primary Research Trip Pictures*, Marie Roy (2024)

Secondary Research:

Based on the questionnaire's responses, this practice examined various toys commonly used in **neurodivergent classrooms** to understand what has been proven effective in promoting self-regulation and emotional awareness. This was done in a demographic of a 3-8 year old age group, which was the target audience for the designer's project. Common examples include:

•**Fidget spinners, stress balls, and pop-it sensory toys:** These tactile tools are widely used to help children manage anxiety and reduce restlessness, allowing them to focus better and self-regulate.

•**Emotion dolls or puppets (Mood Bears, Kimochis):** These tools are specifically designed to assist children in recognizing, expressing, and communicating emotions in a safe, engaging, and playful manner.

•**Building and creative toys (Lego, Play-Doh):** These toys promote problem-solving and creativity while also encouraging collaborative play in group settings.

Figure 18: *Mood Bear Bundle*, MoodBears (2024)

Figure 19: *Kimochis for Every Kid*, Kimochis (2024)

This practice also analyzed design case studies to understand the impact of various toy designs on neurodivergent children. Notable examples include:

•**Social Stories Dolls:** These dolls have interchangeable facial expressions and accessories helping children practice social interactions and express their emotions.

•**Tangle Therapy Toys:** Designed to enhance fine motor skills, these toys also provide a tactile outlet for nervous energy, improving focus and attention.

•**Bilibo by Moluk:** A toy that promotes physical activity and creativity through its simple yet versatile design, allowing for various play activities.

Figure 20: *My Felt Story*, Social Stories Dolls (2018)

Figure 21: *Bilibo*, Educational Toys (2024)

Figure 22: *Tangle Therapy*, ThinkStink (2013)

Another example of good neuro-inclusive toy design is **puppets**.

A documentary-type video from the *Jim Henson Foundation* researches how children with autism **relate** on a deeper level with puppetry. They explain how expressive, communicative, and joyful a puppet can be and how **accessible** it is to the neurodivergent public. The documentary states that it's a **medium** to reach all kinds of people: it makes them feel **involved** and leads them to a world where everything is possible. Leading their studies at the Yale Child Study Center, they discovered that children learn to speak and communicate by **watching others speak**. Autistic children tend to look less at the human speaker and, therefore, pay less attention. So, having a third party to look at makes communication much better. They even conducted an experiment asking children to watch a video of a teacher and a puppet talking. With the help of eye-trackers, they found that the children look much more at the puppet speaker and don't pay much attention to the human speaker. This means the use of puppets could further **enhance** learning for neurodivergent children.

The Foundation also adds that the puppets can be more engaging for children with autism by having **roles** such as role-playing, de-escalation, emotional regulation, and impulse control.

"Puppetry has a special ability to connect with neurodivergent audiences and can be used as an effective learning tool and bridge for communication and motivation.' (Jim Henson Foundation, 2016)

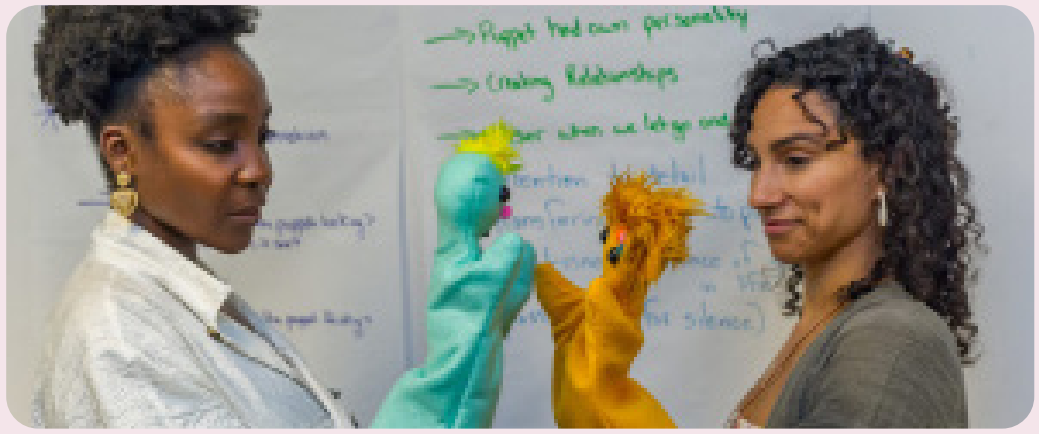

Figure 23: *Autism and Puppets,* Jim Henson Foundation (1982)

Theoretical Framework

This project is built on **neuro-inclusive design** and **human-centered design** principles, focusing on creating playful, adaptable crafted tools for children. The practice's research has highlighted how important it is to choose the right material. If a texture is too stimulating or not engaging enough, children might ignore it completely. This led to the choice of wood as a main material, which feels warm, tactile, and works well for modular designs for children. Wood leaves place for the designer's hands to show even in the finished product, which creates a wholesome and handmade feel that cannot be replaced by machine-made toys.

Collaboration and input from educators and caregivers helped shape the design, ensuring the puppet supports emotional expression. The project embraces customization, making each puppet feel more personal. This approach ties into the practice's research on sensory engagement, showing that flexible, hands-on experiences make learning meaningful.

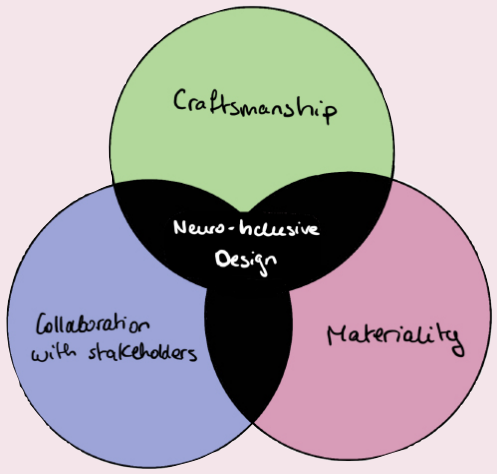

Figure 24: *Theoretical Framework*, Marie Roy [Digital Drawing](2025) Figure 25: *Spin'Bud photoshoot*, Marie Roy (2025)

Conclusion

This research highlights how design can better meet the needs of neurodivergent children. With a big focus on craft, sensory awareness and material choices, and by working closely with experts (teachers, nurses, therapists specialized in neurodivergent care), the tools and toys we can create are not just **functional** but actually get **used** regularly, and genuinely **help** the neurodivergent community.

Moving forward, the design processes will build on these frameworks and research principles to create even more tailored and effective solutions for neurodivergent children in school settings.

Figure 26: *Undertsanding Neurodiversity in Children's Education,* Lumiere Children's Therapy (2024)

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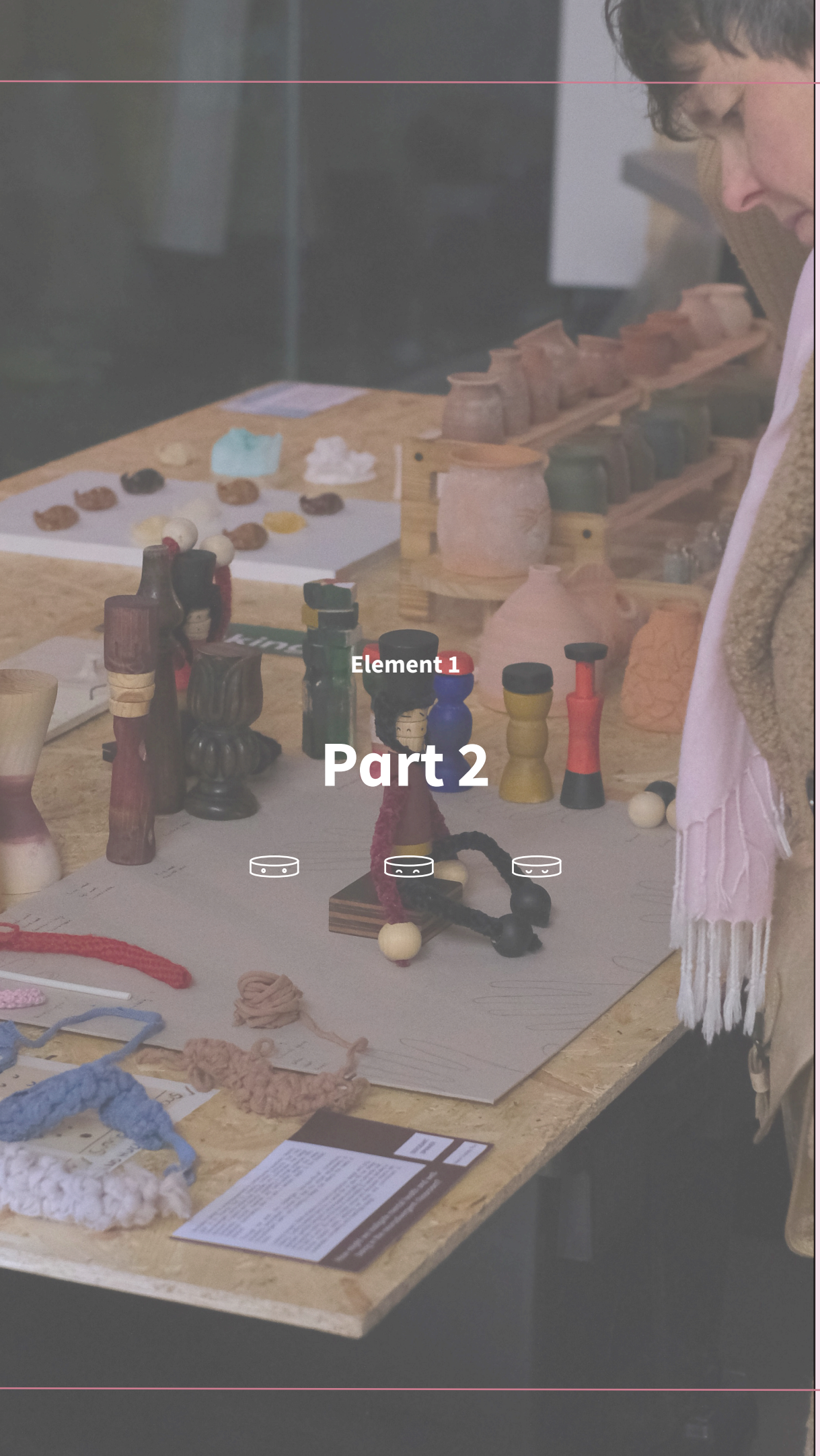

Artist Statement

Neuro-inclusive design is underrepresented in contemporary practices. Marie Roy’s goal is to change that by creating crafted products that help neurodivergent communities feel included and comfortable. Her design approach is playful and colourful, naturally appealing to mostly younger audiences.

Through her work, she challenges “one-size-fits-all” conventions, proposing personalized touches to meet the unique requirements of neurodivergent users, and creating a design that reflects the needs of today.

Critical Reflection

Reflective Writing

The final project was a handcrafted emotional regulation puppet for the neurodivergent classroom, with spinning faces to show different expressions, as well as a flexible body. This reflects my interests as a designer of blending neuro-inclusive design with craft, modular design and playfulness. Throughout my process, research and user feedback have played a big role in shaping the design. Initially, the project was driven by a want to help the neurodivergent community, particularly through craft. The Spin'Bud (unit 9) project emerged from this interest, connecting back to unit 8 from the previous year, where I had already designed for the neurodivergent community. This meant a strong knowledge of how to design accordingly was already present. It also linked to the One Sheet project, where puppets were used to tell a story. This time, puppets were used with a focus on helping people more instead of just being a storytelling tool. While the initial idea of helping neurodivergent people was quite broad, I had to focus the research on one problem to resolve.

As research started, multiple recent studies were found that showed that puppets could be a great tool to help young neurodivergent students (Jim Henson Foundation, 2024). Later, in more research works, it was commonly written that emotional dysregulation within autistic children was a very big problem, and this is what led to outbursts and conflict in the classroom (Honeybourne, 2018). This was even more pressured when half of my questionnaire's answers stated that was the case too (sent to multiple nurseries, schools, therapy centers specialised in neurodivergent care). This weighing problem presented a strong opportunity for design intervention.

During the first concept sketches of the product, one of the biggest turning points was realising that "sensory engagement" isn't just about the texture or the look of the object; it's also about accessibility, intuitiveness, and the perception of it. This insight significantly influenced my design. For example, I changed the aspect that the puppets didn't need to have pre-defined expressions. Initially, the faces were designed for readability, using magnets on an unmoving face base to switch to pre-made, non-changing faces with the most basic emotions. However, through user testing, I found that offering more possibilities actually made the puppets more engaging to children. By allowing unexpected combinations of eyes, mouths, and eyebrows to appear, the puppets encouraged more personal interpretation. This insight reinforced the idea that modularity in puppetry can create richer, more open-ended narratives rather than restricting users to predefined play. This is also how the crocheted wired limbs came to life, instead of having a puppet that is entirely made of wood and with stiff limbs. The moving body offers children liberty in expressing their emotions through body language as well, allowing for even more creative expression. This ties back to my interests in combining craft, playfulness, and modular design.

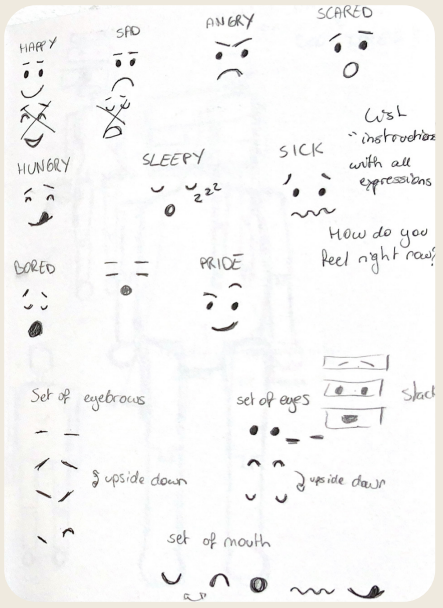

Figure 27 : *Different facial expressions face stacks*, Marie Roy (2025)

Figure 28: *Crochet limbs prototype*, Marie Roy (2025)

Critical Analysis

While this intuitive, hands-on approach has allowed for creative exploration, I've also faced challenges in translating a research concept into a practical, functional design. Although, a shift towards a more research-driven and user-based methodology has improved my decision-making.

One of the biggest strengths of this project was its emphasis on interaction. The spinning mechanism provided an immediate, satisfying form of engagement, making the puppets feel dynamic and alive. However, some user feedback stated that there was frustration that they couldn't show exactly the emotion they wanted without spinning the face and manipulating the body for a lengthy amount of time. This highlights a challenge in balancing controlled design elements with open-ended play. It would be a challenge to tackle in future directions of the project.

Another challenge was refining the mechanics. While the concept of spinning faces was clear, ensuring smooth movement required multiple iterations. Early prototypes had issues with stability, usually getting stuck mid-turn. This was fixed through iterations in height and gaps in the stacks of wood, to leave a small space for the disc to spin with a correct resistance level (easy to turn with the fingers, but stays in place once you let go of the face and move the puppet around). Although the final version functioned well, additional refinements could make it feel even more precise and satisfying. This was explored in future directions sketches, where I added notches on the face for a better grip as well as tiny rivets in between the face stacks so that the face clicks into place in a satisfying manner (a fidget toy staple), and adds a sense of finality to the gesture. I also would like the puppets to be entirely customizable, so the child can choose which colors and patterns resonate best with them.

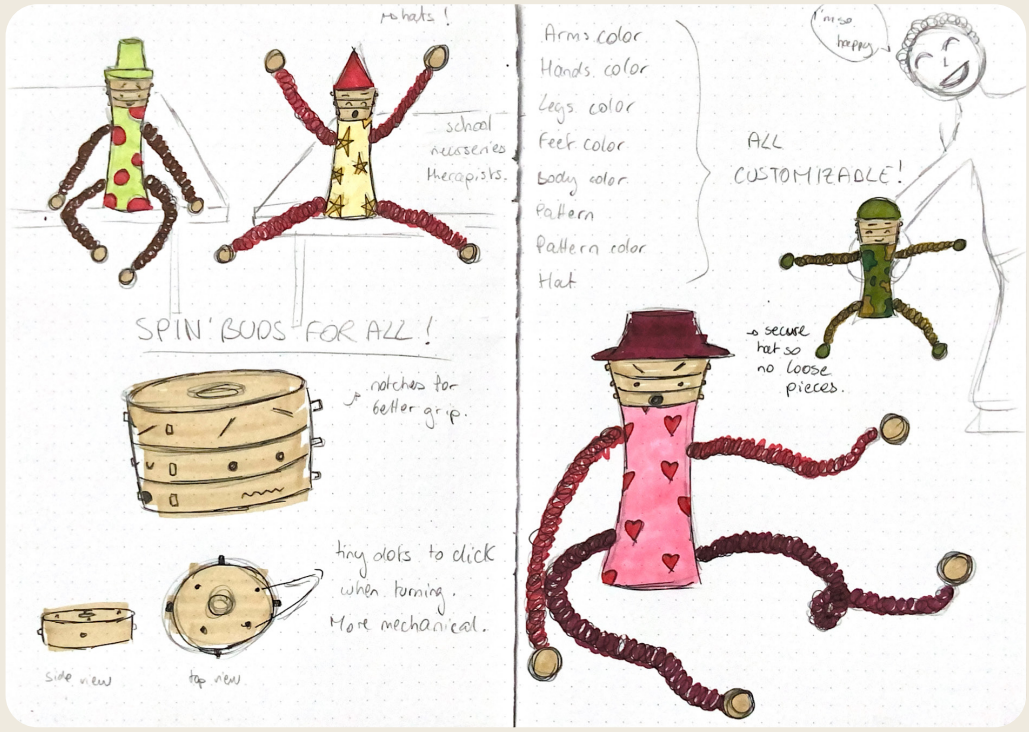

Figure 29: *Future directions sketches*, Marie Roy (2025)

In a broader design context, this project connects to interactive toys and puppetry as a tool for emotional exploration. The ability to shift between different expressions ties into ideas of self-expression in play, which are central themes in both open-ended toy design and puppetry. Moving forward, I want to explore how these ideas can be connected and expanded - perhaps by introducing more modular components to puppets and less concrete shapes for a more imaginative approach from the child.

Unit 10 Proposal

Modular wooden puppet toy – interchangeable parts for children's creativity

Figure 30: *Minitremu Mdular Wooden Toys*, Gessato (2025)

The *Minitremu modular wooden toys* show the power of open-ended design, allowing children to explore form, structure, and creativity through interchangeable parts. This approach calls for imagination, problem-solving, and hands-on engagement. By applying a similar modular system to puppetry, we can push this concept further, creating customizable, surreal puppets that evolve with a child's ideas. This not only enhances storytelling and self-expression but also makes play more dynamic, inclusive, and unique.

Subject Area

My Unit 9 research on the Spin'Bud puppets explored how interactive elements can help children engage with storytelling, emotions and playful learning. Moving forward, the unit 10 project will sit at the intersection between children's play-based learning, creative exploration, and modular design. Studies show that open-ended, hands-on play enhances children's cognitive flexibility and problem-solving skills (Lego Foundation, 2021). By adding lots and lots of interchangeable parts, we can make a puppet that encourages a free imagination and self-expression. This allows children to explore creativity in a dynamic, open-ended way.

Brief Outline

Insight/challenge

Children thrive when given the freedom to create and experiment through play. However, traditional fixed-form toys or toys with a single mode of use limit their imagination. By designing a modular, interchangeable puppet with more or less dream-like parts, we empower children to explore creativity and build their own characters, making play more dynamic and expressive.

- **Subject**: Children
- **Need**: Open-ended, creativity building toys
- **Insight/challenge**: Fixed-form toys limit imagination and storytelling. I want to offer infinite possibilities for them to express themselves freely through the puppet, showing creativity and imagination.

Three questions

1. **Speculative** (What if) What if wooden puppets had modular, interchangeable body parts, allowing them to transform into different, more or less abstract shapes and forms—challenging the boundaries of puppetry and play?
2. **Problem-solving** (HMW): How might we redesign wooden puppet toys to allow for modular interchangeable body parts, boosting children's creativity?
3. **Who**? Who might benefit most from open-ended, modular play, and how does it shape their creativity and storytelling?

Value framework

Design Values: Making, modularity, human-centered design

How will you measure the success of your project for example?

I will try and respect the following for a successful project:

Engagement – do children actively engage with it? Do they enjoy using the modular puppet? Do they like the look of it?
Creativity – are children using the puppet differently, creating new characters and stories? Are they straying from the traditional "puppet" look/build?
Usability – is the puppet easy to use, and can parts be interchanged easily? Can they hold well but be changed without difficulty?
Durability – is the design built to last?

What 4 things make this a successful project?

1. Encourages open-ended **creativity**
2. Easily **adaptable** design
3. High-quality **craftsmanship** and durability
4. **Useful** user-centered design

What are the social and environmental values to consider?

Social: Encourages self-expression, storytelling, and creativity within children.
Environmental: Use of sustainable materials and durable craftsmanship to reduce waste. Made of recycled materials or cut-offs of wood. Recycle wooden instruments, cutting boards, furniture that gets thrown away?

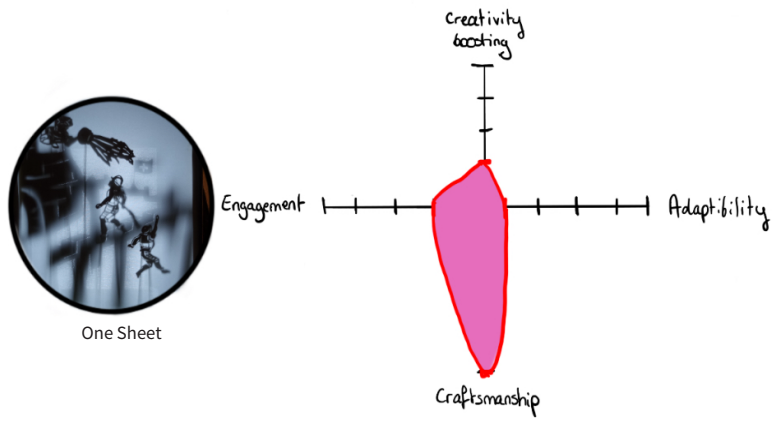

Figure 31: *Value of other projects compared to Unit 10 based on the proposal*, Marie Roy (2025)

Contextual justification

My Unit 9 research on the Spin'Bud puppets explored how interactive elements can help children engage with storytelling, emotions and playful learning. This shows that interchangeable features encourage creativity, allowing users to shape characters freely.

For Unit 10, I will expand on this by designing a fully modular wooden puppet with interchangeable body parts. This gives children more freedom to create and experiment. A key insight from Unit 9 that will guide my design choices is that adaptability enhances engagement and creativity (Children's Museum Team, 2024). This will ensure that the puppet remains intuitive and playful, leading the project towards a toy that allows for easy adaptability, boosted creativity, as well as fine motor skills development.

Visual map

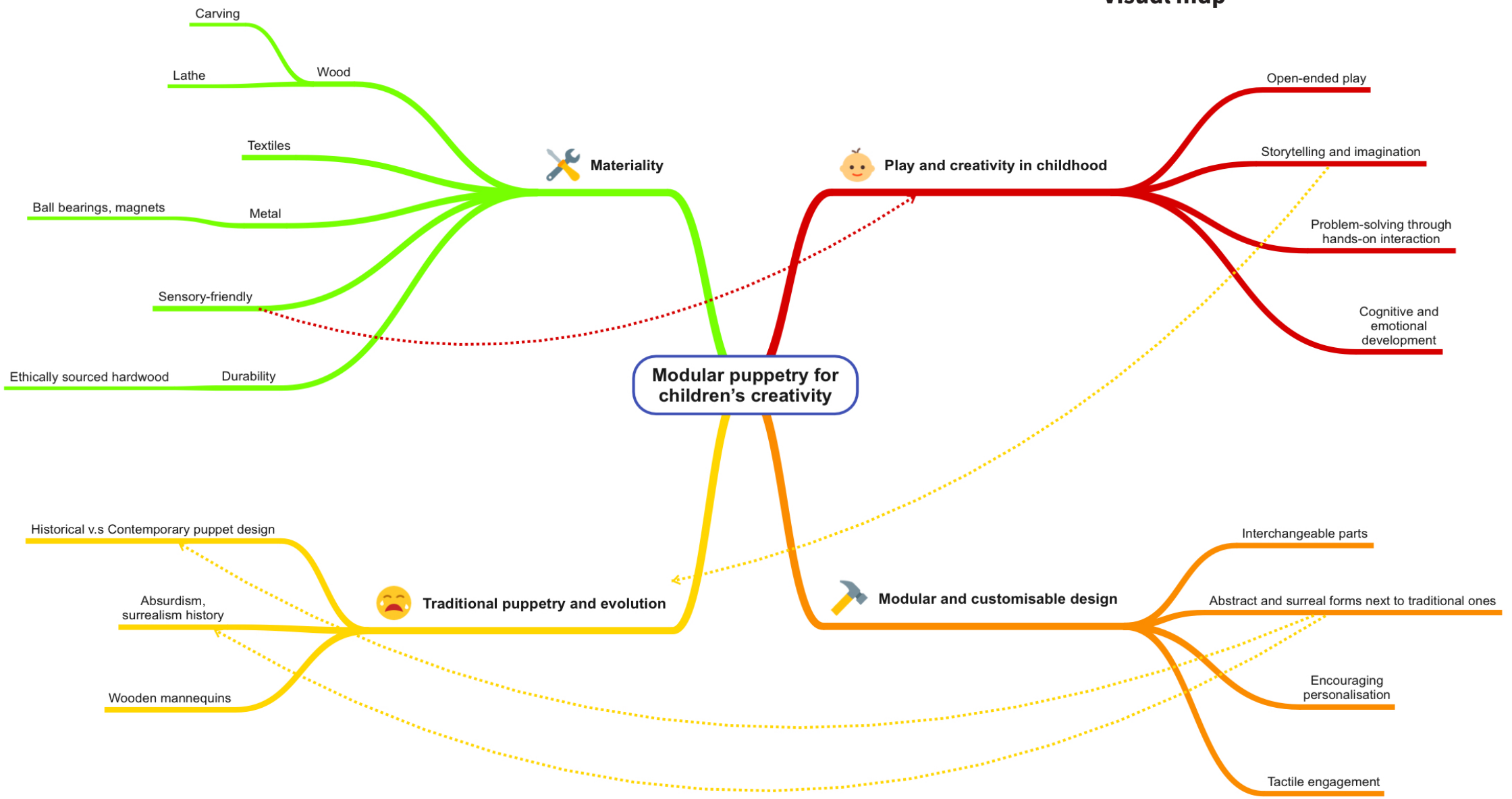

Figure 32: *Visual context map*, Marie Roy (2025)

Proposed methodology

Research probes

Design Processes:

Iterative prototyping using wooden or metal modular joints to test adaptability. Use of magnets, ball bearings, or handmade wooden puppet joints.

Exploring abstract forms to push the boundaries of puppet design.

Research Approaches:

Observational studies on how children interact with customisable toys.

User testing with children to assess engagement, storytelling potential, and usability.

Expert feedback from educators, toy designers, parents on the learning and play value.

Collaboration Plans:

Contact schools, nurseries, therapists, parents around me.

Engaging with teachers and caregivers to understand classroom needs.

Connecting with craftspeople and puppet-makers to refine modularity and durability.

Exploring partnerships with child development researchers to ensure the puppet supports creative and cognitive growth.

Technical requirements

Discussion with Weng, wood workshop technician at UAL Chelsea College:

For joints: Magnets quickest way. Think about north and south system carefully.
Joint that moves all around: One magnet, other side metal ball bearing. Magnet would attract the ball bearing. Movement has a much bigger range. Strong enough to hold, attracts other metal so maybe more possibilities.
Bigger work works better – this will allow to up the lathe game too.
Interchangeable parts are not possible with wood. Except ball joint turned on the lathe? But not ideal, a bit struggling to hold and change parts. Also don't have time to master skill of the ball joint.

Quotes by Weng during the chat:
"The more you give it meaning, the best toy it will become." (Weng, 2025)
"Break down to the basics of it first before going all out". (Weng, 2025)

Skills: lathe, wood carving, drill press and common woodworking-handtools.

Figure 33: *Technical advice from the wood technican,* Marie Roy (2025)

Timeline and feasability

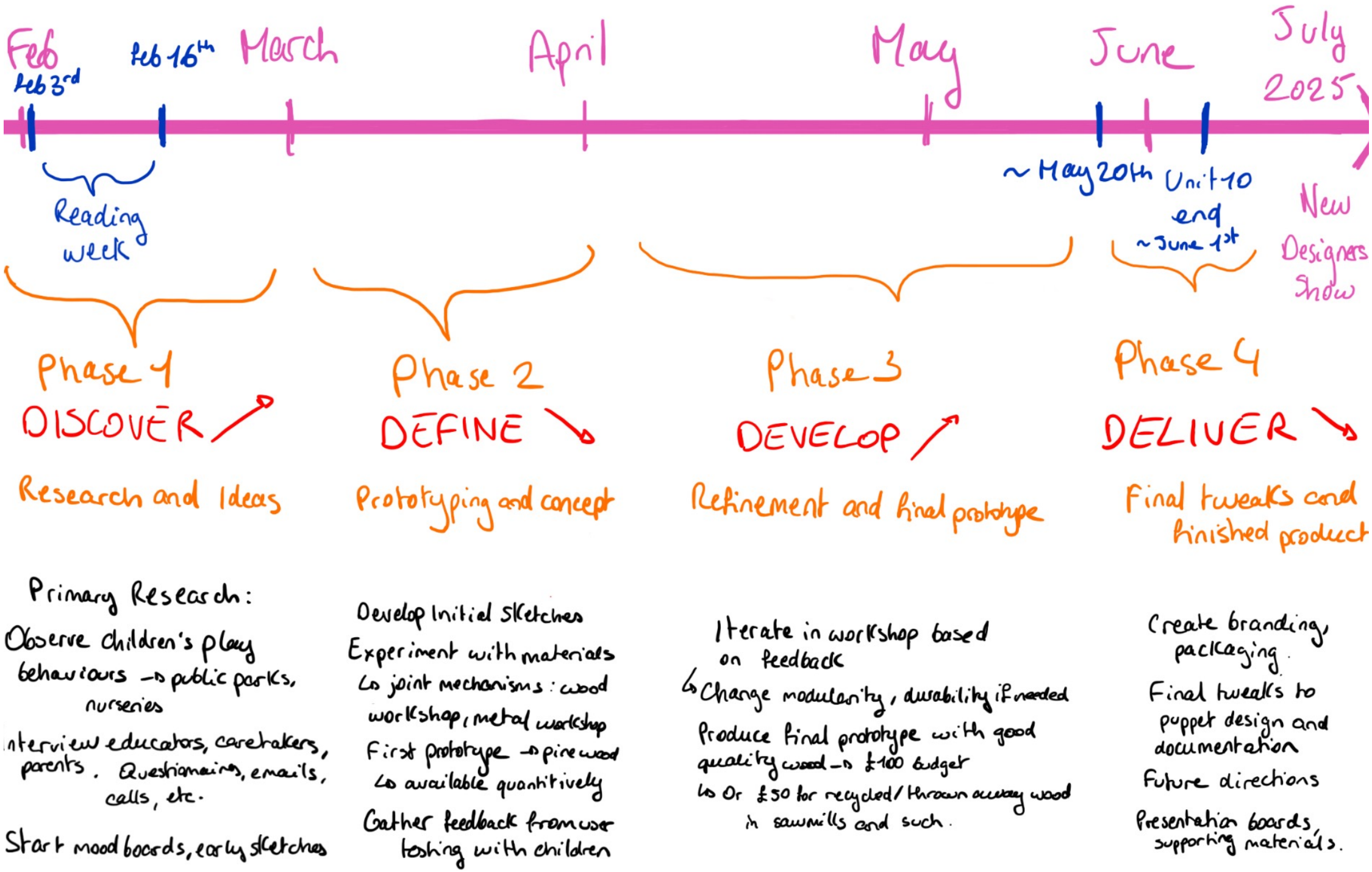

Figure 34: *Timeline for unit 10*, Marie Roy (2025)

CONCLUSION

Overall, the Spin'Bud project has been a great learning experience in combining craft and playfulness with research and a clear goal of helping a community. This project became a deeper exploration of neuro-inclusive design and user engagement. The research helped me refine key aspects like main shapes, material choice, movement mechanics, and how much control I wanted to give the user versus leaving things open to interpretation. While the project worked well in creating a playful and interactive experience, it also made me think more critically about how people engage with personal and emotional expression in design.

In future projects, I want to continue this balance, ensuring that research and experimentation inform each other without one overwhelming the other. Looking ahead, I want to keep exploring even more ways for users to shape their own narrative experiences. I want to leave complete liberty to the child to freely express their creativity and imagination. This project has shown me the importance of balancing structured research with creative making - creating a tangible end product, and I'm excited to take these insights into future work.

Figure 35: *Spin'Bud photoshoot*, Marie Roy (2025)

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