

Redesigning Toothpaste Tubes for Children

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11656 Design Thinking and User Centered Design

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Introduction

In the previous project, the challenges and significance of everyday household items for children was heavily researched. From this, it was discovered that *2–7-year-olds need household products appropriate for their capabilities so they can develop and interact in the world more independently*. From this, children's engagement was further researched to create a toothpaste tube that would be more engaging and appropriate for their abilities.

Development and Prototyping

When designing a solution for toothpaste tubes, creating a collapsible tube was always at the forefront of the design, whilst remaining engaging for children.

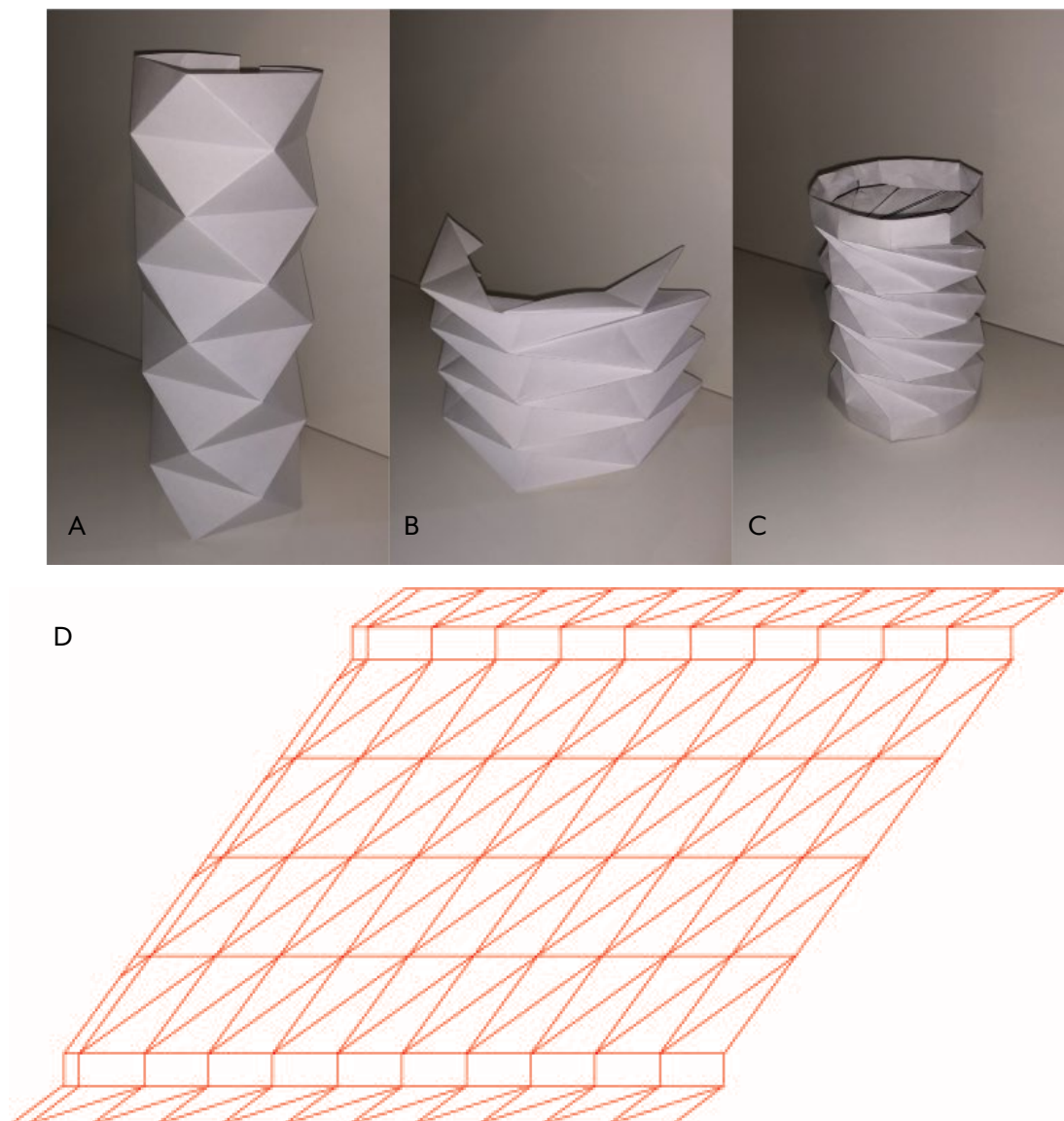


Figure 1: Paper prototyping of collapsible tubes.

Each paper prototype had its own positives and negatives. In figure 1A, the paper was folded in a way that created a diamond-shapes which formed a curve to create a tube.

Unfortunately, this prevented tube to collapse, as was too tall. This tube showed that the folds were too broad and needed to be narrower in order to create something that collapses. On the other hand, figure 1B had narrower folds to the paper, which allowed it to be collapsed. Unfortunately, with this it was not a tube, but it did have an engagement factor to it.

Research by Yasuda et al. (2017) inspired the creation of the template in figure 1D. From here, Illustrator was used to create and edit the template to suit the needs of the design and to create figure 1C. It combined positive the elements of figures 1A and 1B and had the added feature of aesthetics. At this stage, the tube was ready for user testing.

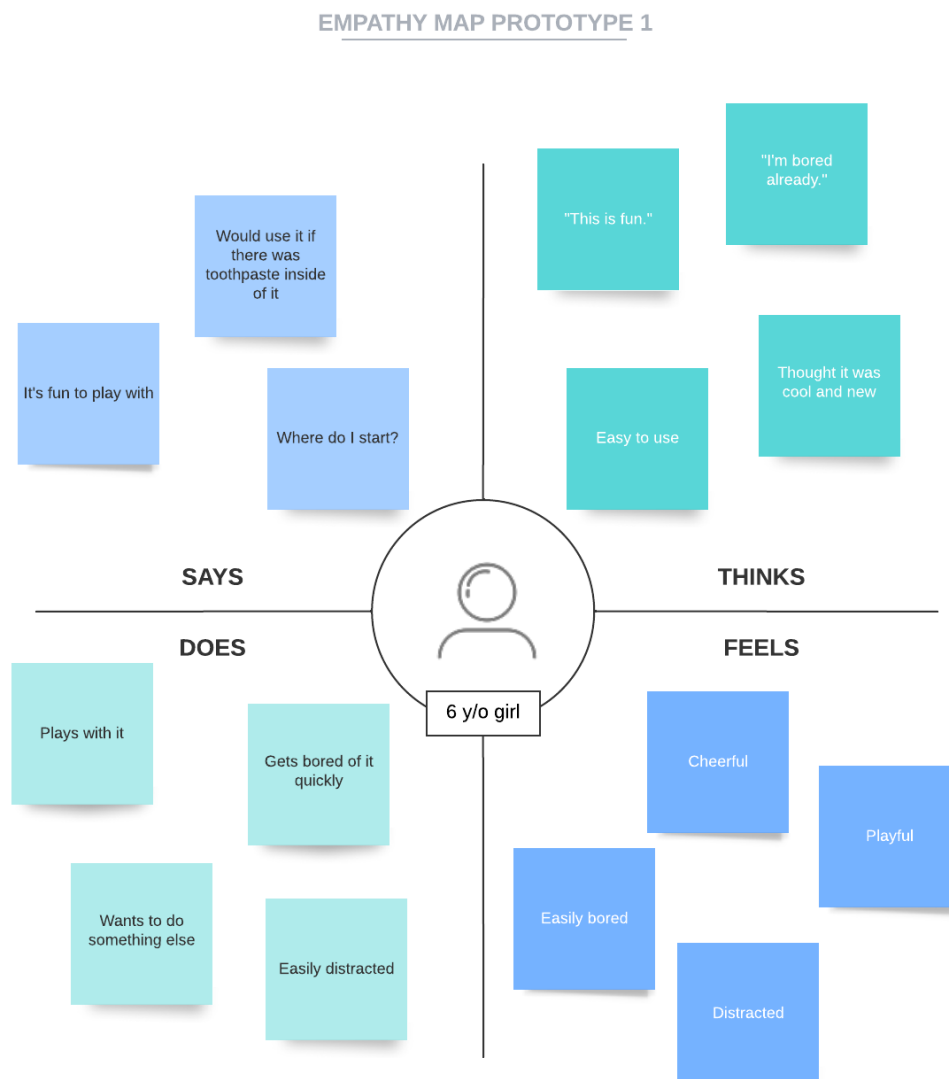


Figure 2: Empathy map of prototype 1C.

The paper prototype was user tested on a 6 year-old-girl. When she interacting was interacting with the tube, she found it to be appealing but was easily bored. After observing this, it was evident that this design was optimal for children as it would be

engaging, but also tiresome after not too long of use. When asked if she would use the tube if there was toothpaste inside of it, she responded yes.

Refinement

After user testing the paper prototype in figure 1C, prototyping with acetate sheets was the next step. Acetate sheets were chosen as the material as they are flexible and allow for easy, precise cutting.

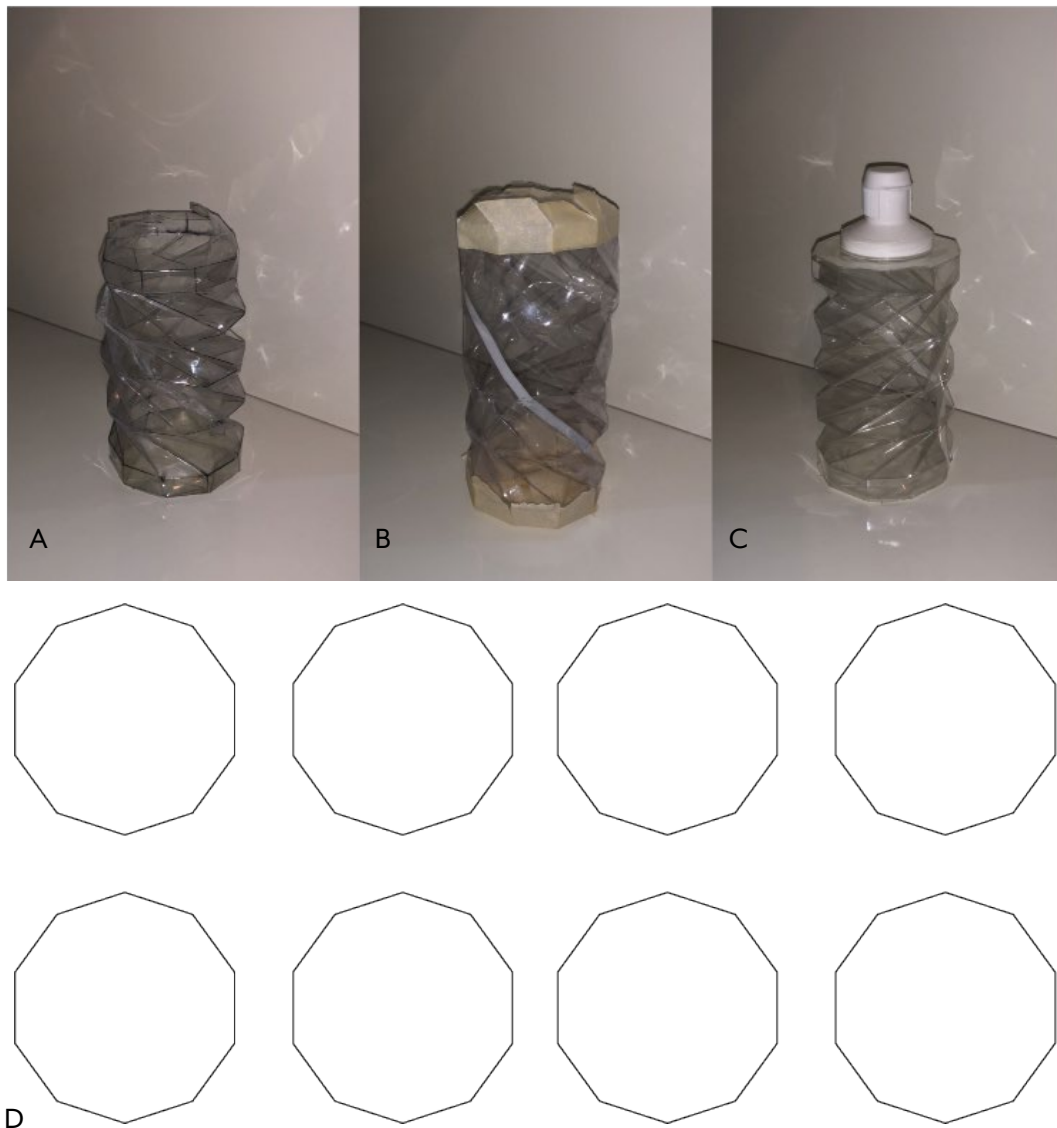


Figure 3: Acetate prototyping of collapsible tubes.

The first acetate prototype (see figure 3A) was partly successful as it had the ability to collapse, but was unsuccessful as the adhesive used was superglue, which left it untidy. To fold this prototype, it was scored with a spoon to get a clean edge, but these edges came undone quickly and was not suitable with continuous collapsing. This prototype was the first to receive the decagon lids (see figure 3D for template). Two decagons were attached to the bottom of the tube using double-sided tape – one to seal the tube and one to hide the tape.

The second acetate prototype, in figure 3B, was scored directly with a knife and had the template drawn on. The adhesive was changed, and this time used heavy-duty double-sided tape. Unfortunately, the lines of this template were not scored precisely, which meant the tube was unable to collapse. This prototype did not receive decagon lids, as masking tape had been placed around the edges as an attempt to create a lid beforehand.

The final prototype in figure 3C follows the final design, which is a collapsible decagon made from acetate sheet, heavy-duty double-sided tape, and a repurposed toothpaste cap lid. The acetate was scored directly on with no template drawn. By doing this, it allowed for more controlled and precise lines. The final step in making this tube was to add the decagon lids and the toothpaste cap. This prototype was able to collapse perfectly without any problems and was ready user testing.

The plastic toothpaste tube (see figure 3C) was user tested on the same 6-year-old girl. This tube was durable and could withstand constant collapsing. She was able to use the tube without any troubles and found it easy to use. The tube was captivating and is appropriate for her abilities.

Feasibility, Viability, Desirability

Through research of how children interact with current toothbrushing, it was evident that the process was not interesting (Josel, 2021; Orlinsky, 2022). Parents would accommodate their children's current abilities through reward systems. To make the process teeth brushing more exciting and exciting for children, toothpaste tubes were redesigned to appeal and engage with their current capabilities. The new design is crumple free and allows the user to get all the toothpaste out.

Conclusion

The design reframes the process of toothbrushing by making toothpaste tubes easier. The tube is origami-based and follows a collapsible decagon design. Through research, extensive prototyping, and user testing, the new toothpaste tube is engaging and appropriate for children's capabilities.

References

- Josel, L. (2021). *Q: My Child Hates Brushing His Teeth!*. ADDitude. Retrieved from <<https://www.additudemag.com/my-child-wont-brush-her-teeth/>>.
- Orlinsky, L. (2022). *Why Do Kids Refuse to Brush Their Teeth? - Detroit and Ann Arbor Metro Parent*. Detroit and Ann Arbor Metro Parent. Retrieved from <<https://www.metroparent.com/parenting/advice/why-do-kids-refuse-to-brush-their-teeth/>>.
- Yasuda, H., Tachi, T., Lee, M., & Yang, J. (2017). *Origami-based tunable truss structures for non-volatile mechanical memory operation*. Research Gate. Retrieved from <https://www.researchgate.net/figure/Geometry-of-triangulated-cylindrical-origami-a-Folding-motion-of-the-TCO-b-The-flat_fig1_313844510?fbclid=IwAR2D0gWFzxuvhgLWEQu8OAvzeQ0qiorIqH9F2E4qRy2fQdmhKpssKhUI36E>.