Major Project

De-constructing the Construction of Hot Drinks

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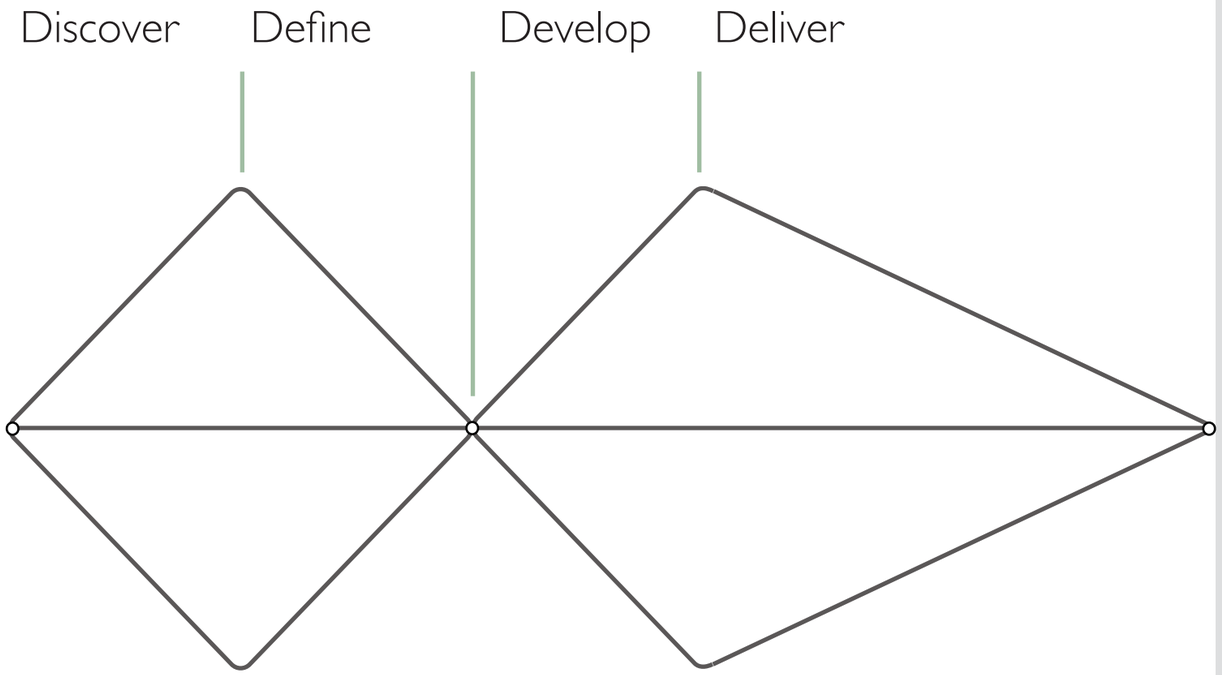

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Executive Summary

After first looking to understand how hot drinks were made it was clear a more specified area of research needed to be explored and a specific user identified to resolve a design issue regarding the making of hot drinks.

After conducting some global research on how hot drinks were made I found one group of people who found difficulty making hot drinks were the disabled. More specifically, it was people that lived with tremors in their daily life. It was originally only people that had Parkinsons that I thought only suffered from tremors but through research I found that tremors can be caused by more than just Parkinsons.

I contacted several societies around Scotland but wasn't able to find a group that would allow me to contact people that lived with tremors. Through my grandmother I knew she was friends with someone who suffered from Parkinsons that had severe tremors. She and her care staff who knew me were happy for me to make Claire a user to chat with and interview.

Claire as well as several other sufferers of tremors were recorded making a hot drink and asked to explain through their process and to verbally communicate what they were thinking. This as well as a simulator device I designed and built were my two main contributors to research and provided me with invaluable insights.

Taking the insights I developed ideas and concepts around trying to resolve the issue of transporting the components of a hot drink between different vessels. Once I decided on one it was thoroughly explored, prototypes were designed and tested with 4 iterations before getting to the stage of where the product is currently.

The current design has been tested by Claire but if I were to continue this project I would continue this process before a product was defined to a marketable state. More research into how ergonomics would play on the design as well as more material research into what the best would be for grip, cost and environmentally friendly.

I thoroughly enjoyed the project and learnt invaluable skills. I have conducted a self-review at the end of this design process journal.

Problem

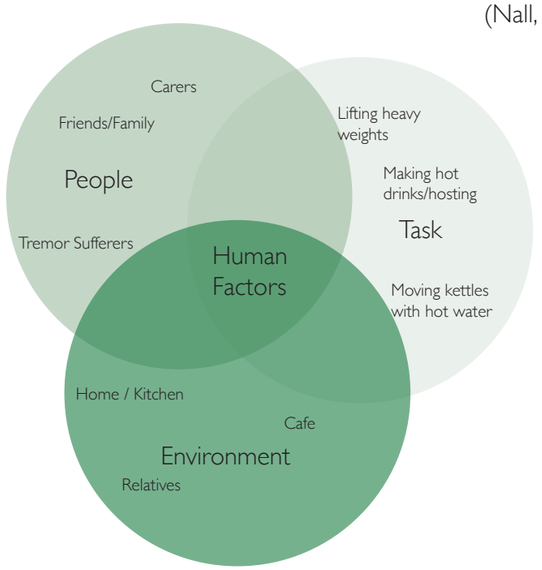
The difficulty the elderly have with making hot drinks. Particularly those with Tremors / Parkinsons

“ **145,000** Suffer from Parkinsons in the UK”

(UK, 2021)

“ **50%** Likelihood to inherit Parkinsons from parents that suffer from the diseases”

(Nall, 2021)



Effects of Parkinsons

Parkinsons is a progressive neurological condition. This means that it causes problems in the brain and gets worse over time. It’s the fastest growing neurological condition in the world. It can cause several muscle disorders like tremors, impaired posture and slurred speech. (Parkinsons disease, 2021)


Tremors


Impaired Posture


Slurred Speech

Analysing the problem

How the elderly, sufferers of Parkinsons and tremors are less likely to make a hot drink.


Spilling the contents


Burning the hand from boiling water


Afraid of asking for help

Tremors of peoples limbs are an ever growing problem due to the rapid increase in people that suffer from the disease. The largest percentage of the suffers have tremors as a side effect of Parkinsons. Parkinsons itself is a degenerative disease that is hereditary. People with Parkinsons suffer from the neurological condition due to a lack of the chemical dopamine in the brain. This is caused because some nerve cells within the brain have died. (Brain Basics: The Life and Death of a Neuron | National Institute of Neurological Disorders and Stroke, 2021) (Staff, 2021)

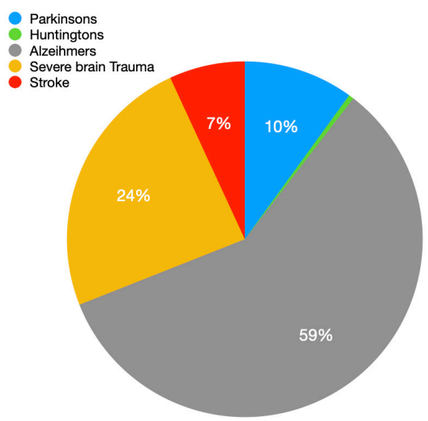
The 5 largest causes of the death of the neurons / nerve cells in the brain are:

- Parkinsons
- Huntingtons
- Alzheimers
- Brain Trauma
- Stroke

These 5 diseases account for:

Parkinsons: 145,000
Huntingtons: 6,700 (Fisher and Semaka, 2021)
Alzheimers: 850,000 (Society, 2021)
Brain Trauma: 350,000 per year (Statistics, 2021)
Stroke: 100,000 per year (Bouverie, 2021)

All the people that suffer from 1 of these 5 conditions are likely to get and suffer from tremors for the rest of their life. Why should we ask them to spend hundreds of pounds on devices that attempt to give them independence and the freedom they once had?



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User Testing

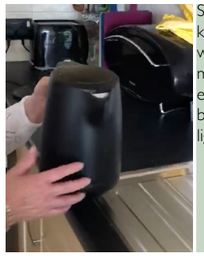
Annie (Claire)

Shaun

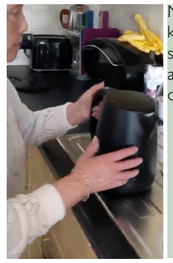
Gordon

June

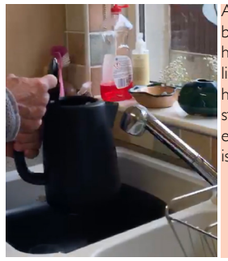
User testing was performed to understand exactly what the users were struggling with during the process of making a hot drink. My four user testers all had their way of making a hot drink refined. They weren't limited to the type of hot drink but all carried out a similar process and method. The users were asked to comment on what they may have found difficult or challenging during the process. The videos were also analysed for habits they may have not mentioned.



Struggles to keep steady whenever moving kettle empty due to being empty and lightweight.



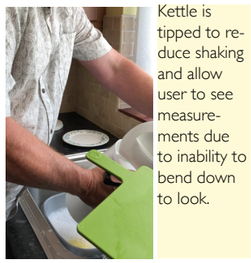
Needs to place kettle down to steady kettle and allow her to open the lid.



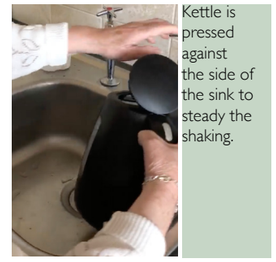
After pressing button on handle to open lid the second hand is used to steady the kettle even before tap is turned on.

The kettle is pressed against the tap to reduce the shaking and make sure the tap is fully surrounded by the gap in the kettle.

Two hands are required to steady the kettle whilst filling.

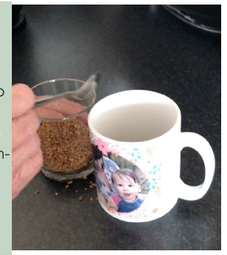


Kettle is tipped to reduce shaking and allow user to see measurements due to inability to bend down to look.



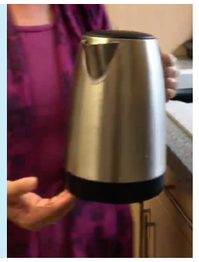
Kettle is pressed against the side of the sink to steady the shaking.

Coffee is often spilt from the spoon while moving from the container to the mug so it is moved close to the mug for minimum spillage.

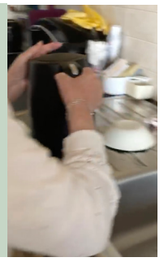


Two hands are required to steady the kettle before placing it in a very unique position due to the specific kettle.

Two hands are used to steady the kettle due to its heavier weight of being full.

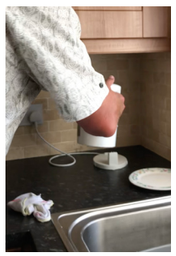


The second hand is used to cover the spout as water was falling out.



Kettle was heavy and gripping was painful due to large amount of weight on pinky finger.

Both hands are needed to steady the kettle to fit onto the stand.



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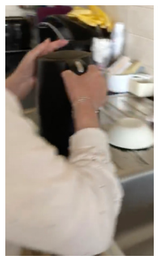
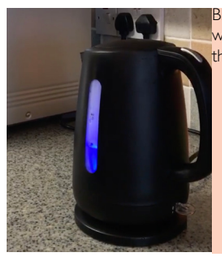
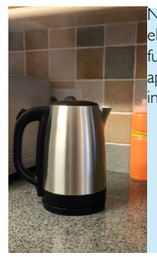


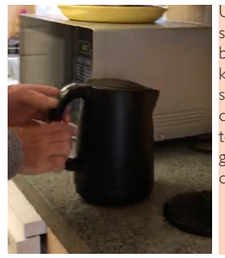
Blue light shows water level in the kettle.



No visual element of how full the kettle is apart from looking in the lid.



User had to switch hands by putting the kettle down and switching hands due to inability to get a stable grip on kettle due to tremors.

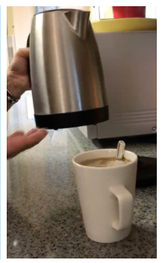


User lifted kettle with right hand but is a left handed person.

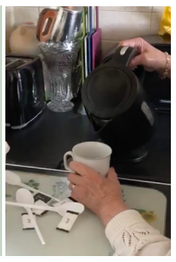
Light turns off as a visual aid to show when kettle has boiled.

Kettle rested on worktop while being poured due to more violent tremors and weight issues.

Kettle needed to be held due to less weight and more violent tremors were visible.

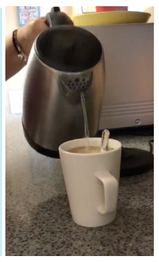


Poured the kettle while it was resting on the table top. This could slip and cause major harm and spillage over the kitchen floor.

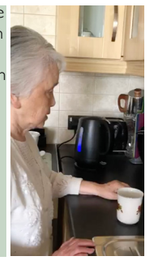


Poured within a very close proximity of the cup so that as little spillage would occur as possible.

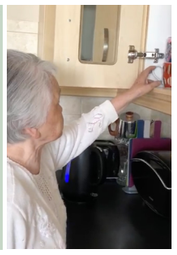
Was difficult to hold due to weight but couldn't be touched with second hand due to body being made of metal and conducting internal heat.



Forgot the kettle had been put on and that a mug had already been lifted out.



Struggled to grip mug.



Reaching up high the users tremors did depreciate but struggled to get a grip of handle without a few failed attempts.

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Ethnographic Testing

For the purposes of the test all items including the spoon were gripped as strongly as possible. Only one device was used to cause tremors in one hand. A typical tremor sufferer will experience the tremors through both hands. Having two devices wasn't feasible for the purpose of the test.

Holding a spoon was easy but often found it would knock off the wall of the vessel it was put inside of. Often it would be hard to hold due to the limited concentration that could be applied to controlling of movement of the spoon.

It was impossible to hold the spoon steady so that a sufficient amount of coffee could stay on the spoon. It took 10 attempts to lift out a few granules per time to have enough for one coffee. It became very frustrating very fast and could easily have put me off trying to make a coffee.

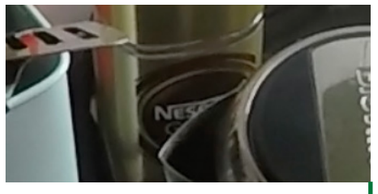
Focusing where I wanted to grab and hold objects was difficult. This wasn't only because I couldn't aim correctly and often found myself hitting my hand off of other objects, I couldn't continually hold a light weight object as it would fall out of the hand.

Pouring water into the kettle was violent and I found that approximately 20-30% of the original water intended to be put inside the kettle was lost to spillages. The glass, due to its wet outside from water being put into the glass, presented a challenge to grip the glass without it slipping. It was difficult to press the kettle on/off switch.

Trying to aim into the mug where I wanted the coffee to go was difficult and very annoying as it would often fall outside of the mug.

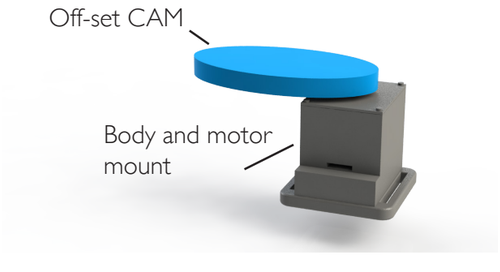
Stirring is difficult to focus to where you want the spoon to go and to get a consistent stirring pattern was impossible however the liquids and coffee mixed well but with a lot of extra noise from the spoon hitting off the inside wall of the mug.

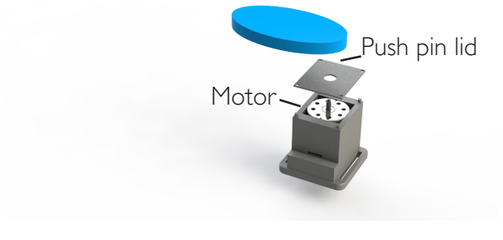
Similar to the coffee lid, the focus required to lift the milk lid and get it in the correct position for being screwed onto the bottle was difficult and required a lot of attention.

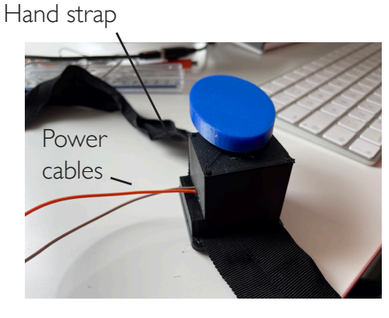


The biggest fear, as described by a a lot of tremor sufferers, was that the kettle which contains boiling water inside was scary to lift due to the fact the water could spill over the table and onto body parts like feet or hands.

Lifting and holding the jug steady for prolonged periods of times was difficult due to its weight and the concentration required to focus on getting the hand within a small gap provided for a handle. Pain was felt whenever the jug was tipped and trying to hold it steady.







Conclusions

Desk Research

A large and growing population of Parkinsons sufferers and people with tremors have been left with minimal options to be able to help them to make hot drinks. The whole process from simply getting the elements into the vessel that brews the drink all the way through to the drinking of the drink, there are problems that tremors bring. Claire, Gordon and June all stated in conversations that they would love their to be an affordable option to the expensive stabilisers that are on the market as they cannot afford the more expensive ones and don't think there is a need for it to be as expensive.

User testing

From the user testing it was clear that there were two main friction points and definite areas of opportunity. The two opportunities were:

The user being able to tip the kettle. It was stated by several users that there was a fear that tipping the kettle may result in it falling and boiling water be spilt onto a body part, thus causing severe burns.

Using a spoon was difficult due to the loose items on the spoon falling off due to the tremors causing the spoon to become unstable and the contents spilling onto the counter top / floor.

After looking at and comparing the existing products that are available on the market, a key area for a product is a low cost resolution for the spillage of items that are on a spoon. On the market there are stabiliser spoons which counters the shaking with a motor and gyroscope but comes with a cost of £100+ which all users tested stated that this would be too expensive and out of what they could afford.

Empathetic Testing

Discovering the opportunity in the market for an alternative for a spoon that was low cost and intuitive lead to empathetic testing where it was discovered that:

Lighter / Heavier objects

Aiming the hand onto handles

The fear of spilling hot water

After simulating what tremors are like and being able to emphasise with the people that suffer this problem on a daily basis, it was clear a resolution needed to be found to help the users use a spoon and move the parts of a hot drink without the fear of spilling it over the worktop / floor as well as their independence on not needing to rely on others for their hot drinks.

Opportunity

Give the elderly the low cost tools to give them their freedom / independence back

Insight	Existing Products	Opportunity
Shaking Lifting a lightweight object such as a spoon or lid is a lot more difficult to control than a heavy object like a kettle.	 Gyeno £269.00  Easi-Grip £17.99	●●●●● This was a problem found by all users and during the ethnographic testing. A low cost resolution to this problem doesn't exist.
Spillage Pouring boiling water from heavy kettle can be scary as the user is fearful of the boiling water spilling on their skin. Spilling contents of spoon was a hassle to clean up.	 Uccello Kettle £49.98  ECO Tipper £24.94	●●●●○ The spilling of water was addressed by 2 users that both had severe tremors but was addressed by all using the spoon as well as being a major discovery through ethnographic testing. A lot of products help this issue currently.
Focus Focused targeting of shaking hand to be able to grasp for small objects or get the hand within a handle on a mug.	 Readi-Steadi £59.99	●●○○○ This was only addressed by 1 user test but was noted during the ethnographic testing. Not seen as a major issue.
Weight Lifting heavy objects are easier to control than lighter objects but the consequences of dropping heavier objects due to their weight are greater.		●●●●○ Discovered souly through ethnographic testing. This could be because the older generation are weaker and may not have addressed the large difference as they don't often lift full kettles.

Product/User Requirements

User Requirements

Claire (89)

Diagnosed with Alzheimers 8 years ago.
Tremors caused from Dystonic / Essential source. Often sees a physiotherapist to calm tremors.

- Independence
- Not have to worry about spilling contents when making a hot drink
- Hosting friends and family round and being able to offer hot drink

Strength

Stability

Agility

Frances (63)

Claires' friend that helps take care of Claire in a voluntary capacity

- Help Claire to feel more comfortable at home whenever Frances is around to help
- Help Claire to gain independence back and the confidence to make hot drinks for herself
- Not have to help Claire clean up if she attempts to make hot drinks

Natalia (25)

Claires carer who will visit 2 times a day to make sure she is eating and drinking sufficiently as well as taking her medication. She would often make a hot drink for Claire when visiting.

- Help Claire to feel more comfortable at home whenever Natalia is around to help
- Help Claire to gain independence back and the confidence to make hot drinks for herself
- Not have to help Claire clean up if she attempts to make hot drinks

Product Requirements

Effectiveness

- Gives the user independence to make their own hot drinks.
- Helps increase the intake of liquids of the user to stay hydrated.
- Allow them to feel comfortable to make hot drinks when hosting their friends.

Efficiency

- Easy to collect elements of hot drink (sugar, coffee).
- Easy to use to stir hot drink and make a coherent drink.
- Easy to clean and be dishwasher safe.

Safety

- Drop proof. Won't shatter or deform if likely dropped by the user.
- Heat proof. Won't melt when exposed to boiling water and small particles wont mix into drink.
- Lightweight so if dropped it wont damage other items.
- Food safe material with no sharp edges that could cut the mouth.

Utility

- Easily fit inside a cutlery drawer.
- Easily fit inside a dishwasher cutlery holder.
- Appropriately sized for users of all ages and hand sizes.

Learnability

- Self intuitive where no instructions are required.
- No assembly required.
- Easily washed and cleaned by hand if desired.

Ergonomics

- The size of the product should be approximately the same size as a regular spoon to help it be as intuitive as possible. It should fit comfortably in the hand and be able to fit into any vessel to scoop out the contents.
- The product should be easily lifted by any user but have a slightly heavier weight behind it so the user can have as much control over the product as discovered in the ethnographic testing.
- The product must be comfortable to hold. This will be tested using the users.

User Journey

Frances comes to visit Claire for the first time since lockdown to catch up and have a drink together.

They socialise by having a hot drink and some biscuits.

Claire offers to make a hot drink for both which typically is a struggle due to the mess created by the elements of the hot drinks being spilt.

She tops up her kettle which in itself is a struggle but finds holding larger and heavier objects easier than light weight and small objects.

Claire then adds the coffee granules into the mug. She does this with ease and found the perfect amount that she likes for her and Frances' drink.

She uses her new spoon that due to its unique design allows her to safely and quietly lift out the coffee granules which all are concealed within the spoon.

She uses her kettle to pour out the boiling water for each mug which she can manage.

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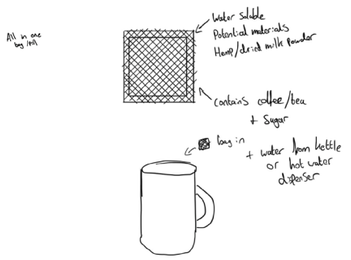
Concept Generation

Concept Propositions

All in one

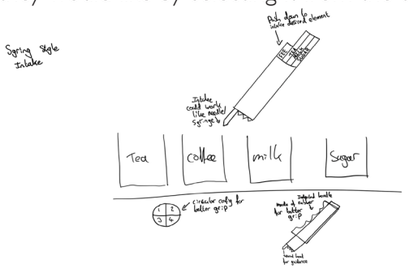
The concept came from a tea bag. We already have a system where you can have your tea in a bag to save having to brew tea leaves and then remove them using a brewing spoon.



+ Remove the possibility of spillage as it is all encased in one bag / pill
+ Can be eco friendly by making the product all from materials that can be consumed
+ Servings can be customised by ordering bags with a larger quantity of one element
+ Small storage capacity and a longer shelf life due to dried materials
- Could easily tear
- Complexities manufacturing difficult materials
- Limits customisation by customer

Injection / 4-way click pen

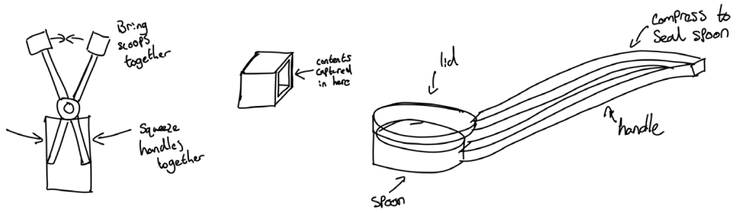
Similar to coffee pod design, the user can have many evenly weighed portions of one element they would like by selecting it from the top.



+ Allows user to take advantage of increased grip
+ Pods can be topped up for simplicity
+ Very little storage space required
+ Ability for anyone to use the product
- Could easily get pods mixed up between compartments
- Not obvious as to what the product is or how it works
- Could easily drop
- Difficult to clean tip with product inside

Bucket Mechanism

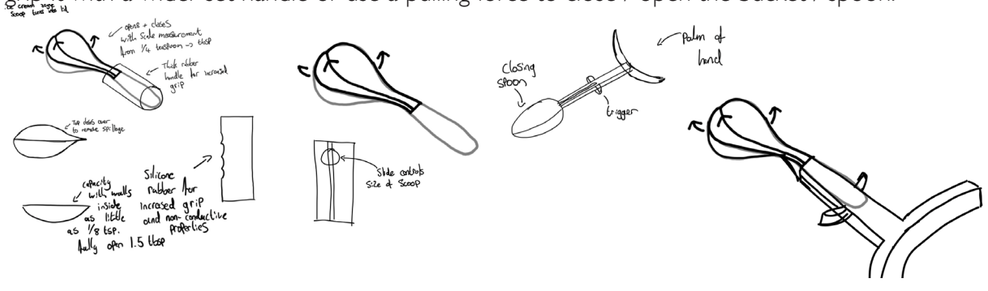
Capitalising on a users increased grip due to tremors, a bucket design would allow a user to steady the device whenever near the product but gripping tight once they have the product.



+ Allows user to take advantage of increased grip
+ Intuitive
+ Easy to clean
+ Ergonomic due to increased handle size
- Difficult to control before increased grip
- Buckets could easily stick if wet with product
- Limited sizes available due to small gap of vessels containing elements
- Not aesthetically pleasing

Closing lid spoon

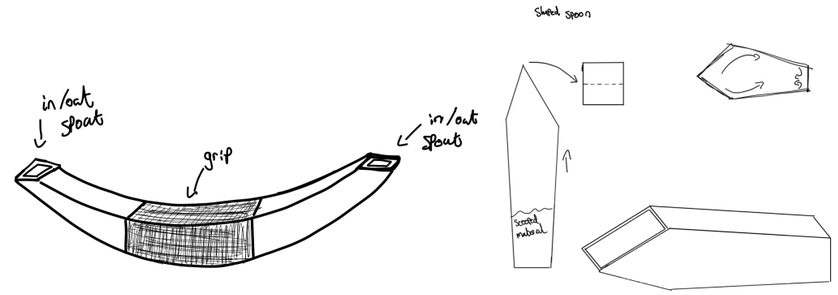
Allowing a user to close over a lid that could be part of the spoon. This allows the user to grip it with a wider set handle or use a pulling force to close / open the bucket / spoon.



+ Allows user to take advantage of increased grip
+ Controls over measuring size
+ Palm rest of increased stability
+ Retains similar form to normal spoon
- Poor grip opportunities
- Difficult to aim
- Difficult to clean mechanisms
- Clogged by slightly larger items e.g. nuts

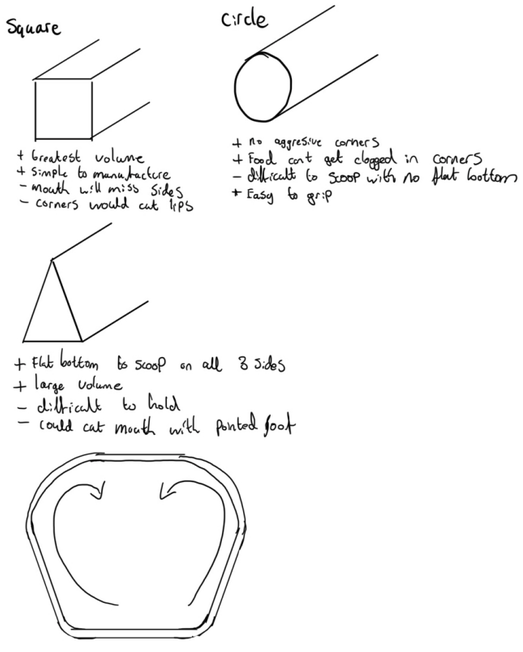
Chosen Concept

Enclosed Spoon



+ Aesthetically pleasing minimal design
+ Can be made from one part reducing waste (eco Friendly)
+ Enclosed roof stops contents from spilling out the top
+ Similar function as a spoon so easy to understand and intuitive
- 2-sided option may not be comfortable to steady
- Pointed edges could make it quite dangerous if being shaken
- Too large to fit inside of a vessel holding contents for hot drink
- Corners and edges on inside will collect residue making cleaning quite difficult

Sketch Development



An original bucket style with a tilted opening was sketched but research was carried out to understand what benefit and drawbacks each shape had whenever designing the spoon.

Human Factors

“50+

Average age people start developing symptoms

Anthropometric data is the data that surrounds a human and their measurements and abilities. It considers their physical characteristics and their abilities and limitations.

Designing, using anthropometric data is completely different to designing for the average person. Anthropometric data allows us to gain a normal distribution of people that we are designing for. A normal distribution allows us to see what variability exists among a group. Due to limited access, data based off of the Dutch population has been able to be obtained from 1D database which is maintained by DINED.

The data below shows the anthropometric data from a subject group of between 20 and 60+ year old Dutch civilians. Due to COVID restrictions this was the only data available to use at the time.

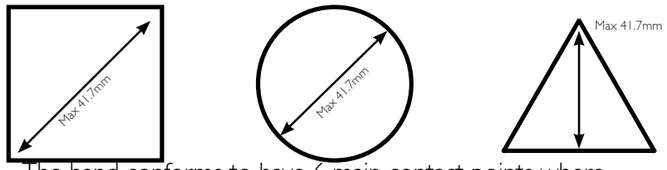
populations	Dutch adults 20–30, mixed		Dutch adults 31–60, mixed		Dutch adults 60+, mixed	
measures	mean	sd	mean	sd	mean	sd
Forefinger breadth (mm)	16	2	18	2	18	2
Hand width (without thumb) (mm)	84	8	86	7	85	6
Hand width (with thumb) (mm)	97	9	103	9	103	8
Hand thickness (mm)	24	6	26	6	28	6
Thumb breadth (mm)	21	2	23	2	23	2
Hand length (mm)	186	14	186	12	184	12
Grip circumference (mm)	129	13	130	13	131	13
Torque with two hands (Nm)	7	2	7	2	7	2
Maximum gripping force (N)	432	122	385	97	345	83

(DINED, 2021)

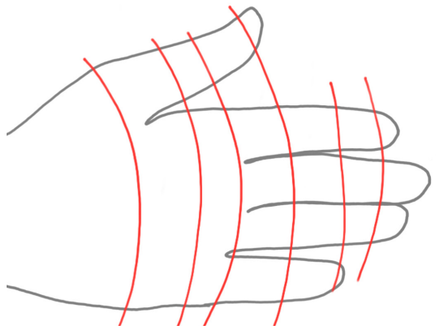
From the data above this would imply that the handle for the user should be no larger than 41.7mm wide. This was calculated by:

Mean Grip Circumference = 131mm (half a cylinder)
= 262mm (full cylinder)
262 / 3.14 / 2 = 41.7mm

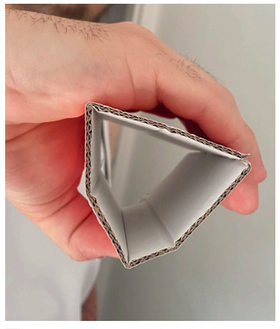
Shape Dimensioning



The hand conforms to have 6 main contact points where it will interact with an object when gripping. This however only applies to objects with edges of 60 degrees or more.



Cardboard Prototype Testing



The shapes with sharp angles like the square and triangle above don’t conform to the natural shape of the hand well.

A more natural flowing curve will fit the hand better. A circle is easiest due to the hand hugging the edges but t the comfort of the grip can easily be disrupted by the thumb overlapping the fingers.

Printed Prototype Testing

Comfortable but too small a circumference.

Fingers were close at the back and wasn’t a normal position a spoon would be held in.

When gripping tight, it was sore on the inside of knuckles.

Visible gaps around the spoon providing very little surface contact.

Handle was too short to fit width of hand on comfortably.

Comfortable but too small a circumference.

Material Surface

Surfaces are very intrinsic to the amount of grip that you have on a handle. Depending on the application grooves are required to provide more grip. Some examples even require a change of material like:

Groove in handle for thumb

Large base to fit in palm of hand

Rubber material

Indents for individual fingers

The change in material often adds grip but can take away from the aesthetics giving it a more industrial and more ergonomic driven design than aesthetics. The addition of groves into a handle often adds more discomfort than comfort due to the spacing stretching peoples fingers that might be smaller or cramping together fingers of people with bigger hands. The changing of shape often ruins the conformity of the product. Making features obvious has its benefits like intuition by the user but it can ruin the aesthetics and if not done right, can ruin the experience for the user.

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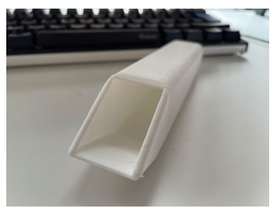
Prototyping

Exploration of the shapes and styles that were sketched during the concept exploration have been explored physically through making prototypes with cardboard. After exploring the sizes possible with the cardboard, they were 3D printed to gain invaluable feedback from users.

Square

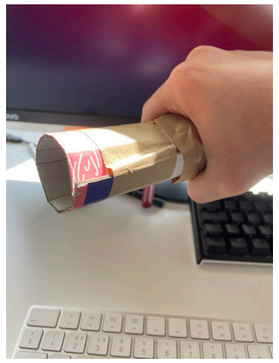
Having a square would be best for the largest volume to be collected using the spoon. 50mm was tested first but found to be too big. A 10mm drop was made which was a comfortable size in the hand yet still was large enough for the scoop.

This however was found the be uncomfortable so two paths emerged. Filleted edges were explored as well as a completely circular design.



Circle

The circular design was tested for the purpose of comfort. The feedback from the square design was that it wouldn't fit comfortably in the hand and that it was hard to distinguish orientation.



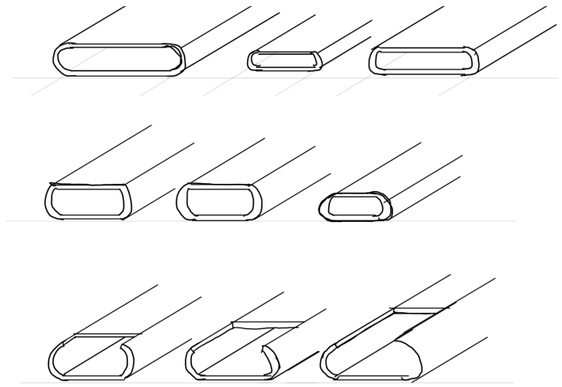
The circular design did not fix the problem of orientation however it demonstrated that it conformed better to a users hand and was found to be more comfortable.

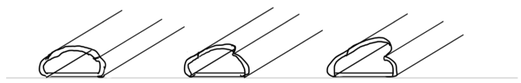
Combination

From user feedback regarding the comfort of the handle and scooping capabilities, the flat bottom scoop with the circular handle was designed. It allowed material to fall back into the scoop whenever shaking occurred with the comfortable handle.

Shape Exploration

From user feedback and exploration another shape with a flat bottom and flat edges was explored.





The slot design proved to not only appeal to the users regarding comfort but allowed the product to have its flat base thus improving the functionality of lifting material. The cut out on top proved to aid the users in defining and seeing the quantity they lifted. The slot design also meant the product would naturally fall in the correct orientation. This however has changed with it falling on its base only in the final design.

Testing

The square opening at an angle facing upwards proved to be the most useful from the user testing feedback however the handle was very uncomfortable.

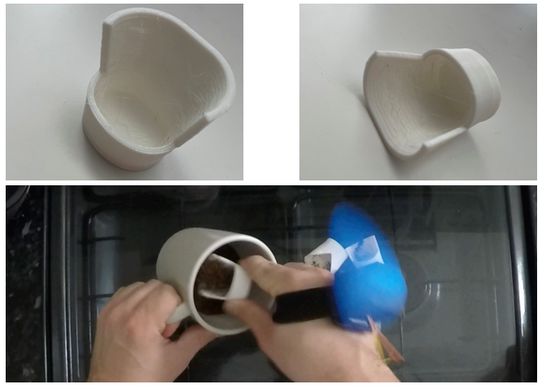
It was discovered however that the circular body was not great at lifting product due to the minimal contact point. Users stated it was difficult to see what product was lifted and what was not.

Users stated the handle was comfortable but the larger scoop, though it lifted a lot, was too large around the top to comfortably fit inside a jar.

Prototyping

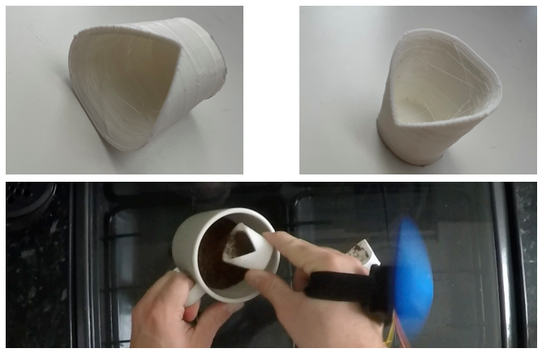
Roof shape exploration

A squared off top was explored as it gave a complete cross section of exactly what the spoon had lifted. The user could see from one side to another.



The curved back was explored to see if it provided any visual benefit. Due to the curve starting where the squared off part started it removed visibility.

The curved edges in this design keep the product within the spoon when shaken and but doesn't give as much viewing of the product once inside the spoon.



Roof shape testing
User

Claire stated she found the cut out in a square shape good for seeing what exactly has been lifted but far too easily let out the product.

Claire stated she found the cut out with a retracted curved roof allowed her to see less but was better at stopping product to fall out.

Claire stated she found the cut out with the pointed roof allowed her to see a little less than the square one but more than the circular one while stopping product from falling out

Ethnographic

From the ethnographic testing of the shapes it was clear the designs with higher edges retained more product but made it slightly more difficult to see what had been lifted. A mix between the triangular cut out and the arc cut out would be ideal.

Material Surface Testing

Due to all prototypes being printed from PLA it would not give an accurate representation of how the final product would react however a sample product was sent to myself.

PP plastic (No cover)

Whenever wet the material did not slip far without being able to regain control.

PP plastic ribbed

Whenever wet the material did not slip at all. This was however more uncomfortable which ruined the experience. Whenever explaining the rib material the user stated that the skin on their hands is typically more delicate and could tear easily from a coarse surface.

Rubber

Using the rubber material gave a minimal advantage due to having more grip whenever the handle was dry however wet it didn't perform any better than either of the previous plastic materials with or without ribs. The rubber took away from the smooth profile and aesthetic of the spoon.

Ribbed rubber

Using the rubber material gave a large advantage due to having more grip whenever the handle was dry and wet. The rubber took away from the smooth profile and aesthetic of the spoon and the ribs were uncomfortable. Whenever explaining the rib material the user stated that the skin on their hands is typically more delicate and could tear easily from a coarse surface.

Final Shape Design

Regarding the ergonomics and aesthetics of the handle, this design was a culmination of the feedback from users regarding the handle and how its curved edges are more comfortable to hold as well as allowing a user to naturally find the correct orientation of the spoon. A user can easily tell which orientation the spoon should be and naturally the spoon is self-intuitive.

Regarding the scoop part of the spoon it has been designed from a point of understanding how best to collect the product whilst allowing the user to see what they have collected. An added benefit is the ability to lift a certain amount with each spoon and it be consistent every time.

Final Design

Aesthetics

A consistent and symmetrical finish with a minimal and simplistic style that caters to the user but remains invisible to an unsuspecting observer. This gives the user the confidence of using the spoon at home with friends or allows them to bring it to a restaurant to eat in public.

Ergonomics

The handle has been specifically designed for the purpose of maintaining a consistent shape throughout that scoops efficiently yet the handle fits the form of the hand, and from feedback from Claire it fits comfortably in the hand and easily lifts what is required.

Packaging

The packaging is made from the same material as the spoon. As well as being used for transportation it can be used whenever the spoon has been cleaned to dry the spoon. Both can be washed in a dishwasher if desired for a deep clean.

Components

The two spoons have been designed to represent the current option with spoons regarding size. A teaspoon and a tablespoon. These are so that users can use the spoons for other purposes like baking so they have more accurate measurement utensils.

Testing

Feedback from Claire of the final design was that: "It feels comfortable in my hand. Especially if I knock it against the cup, I feel like I am in control. I don't have any fear about spilling anything because I can see it doesn't. It gives me confidence."

Material Choice

The sample shown below is one sent from the company that manufacture the material. The material is called PP-H50-500-14 which is a new experimental material by JELUPLAST that can make products with similar mechanical and thermal properties as 40% talc filled polypropylene. It also can be manufactured in the exact same way through injection moulding. It, however, is far more sustainable and completely circular. It is based off wheat straw which is the stem that holds wheat up. This is usually disregarded but now can be capitalised on.

Above you can see an example part that had been sent. It is a whistle that has been completely injection moulded. The material is food safe, which means it can store food, be used to transport food and is also safe to make products that are usually put inside or around the mouth. It is simultaneously tasteless and doesn't have an odour. It is also low cost. Emails from the company estimate that my product could be made for as little as £2 per pair of spoons.

Marketability

145,000 people in the UK suffer from tremors caused through a range of diseases. The final product would be one sold globally through various channels. Exact figures aren't available for global tremor sufferers but if we calculate a linear correlation between population and percentage of sufferers we can see that:

UK = 145,000 of 66,000,000 (0.22%)
Globally = 17,600,000 of 8,000,000,000 (0.22%)

An estimated 17.6 million people suffer from tremors globally. If 10% of these people invested in the spoon it would mean a manufacturing of 1.76 million pairs of spoons.

Self - Review

During this project I have found I have made many accomplishments but I have also come across a lot of challenges that I find have brought me to lean on the generosity of others to help me during COVID-19. The first and biggest challenge was to find users that I could help during the pandemic. I leaned towards knowing somebody through my grandmother that suffered from Parkinsons and tremors to use as a focus group and user that I could help.

The next biggest challenge I came across was being able to summarise the data I had got from desk, empathetic and testing. There was a lot of feedback that I needed to evaluate and find the friction points from this research, and felt that being able to summarise a lot of useful data was a challenge to split between the 10 page summary and keep in the design journal.

Throughout this project I feel I have grasped a far better understanding of what it means to be a product designer. A lot of work is focused on making sure you can understand who the user is. With projects like these, I found it difficult to define my target user at the beginning but found through the research that I naturally found a group that struggled with the process of making hot drinks which fitted well within my original project title.

I have found that skills I have been able to practice and improve on, but not fully grasped, are my aesthetic layout and the communication of the design process. I know I have the relevant data and am able to interpret in the correct way but have always struggled to show my thought process. Previously using timelines was what I thought was a poor method but the natural progression of feedback, design, test, feedback, design, test has proven to me that the story will often enough explain itself throughout the 10 page summary.

Next Steps

By no means would I call the project complete.

Firstly, I would improve on the tremor simulator I created. If time and budget were larger I would record the muscle movements of someone that lives with tremors with electrodes placed around the arms and wrists. I would then use electrical impulse machines to move my own muscles in the same pattern and try to perform tasks. This would not only give me more accurate movements of tremors but the physical feeling of the movements of my muscles.

I believe many more iterations of this product would need to be designed and tested to prove feasibility. If I were to continue this process I would love to meet the user in person. I don't believe I truly got a feel for how the user experienced the different prototypes. The journey I chose to explore, spoon shapes and the benefits, could be greatly expanded on. Firstly looking at orientation and explore a more mathematical driven design to look more specifically at quantities that were lifted by each spoon. I would do further research into the relationship between not only the user and the spoon, but the object in which the spoon has interactions with like the vessels that hold the contents that is being moved.

Another area of analysis would be how to configure the spoon. Would it be possible to have a double ended spoon? What options would there be for design of other utensils like a fork or a knife?

Appendix

References

- Bouverie, J., 2021. NICE impact Stroke. 1st ed. [ebook] Manchester: NICE, p.All. Available at: <https://www.nice.org.uk/Media/Default/About/what-we-do/Into-practice/measuring-uptake/NICE-Impact-stroke.pdf> [Accessed 30 July 2021].

- Dined.io.tudelft.nl. 2021. DINED. [online] Available at: <https://dined.io.tudelft.nl/en/database/tool> [Accessed 30 July 2021].

- Fisher, E. and Semaka, A., 2021. How Many People Have Huntington Disease? – HD Insights. [online] Huntingtonstudygroup.org. Available at: <https://huntingtonstudygroup.org/hd-insights/how-many-people-have-huntington-disease/> [Accessed 30 July 2021].

- Headway.org.uk. 2021. Statistics. [online] Available at: <https://www.headway.org.uk/about-brain-injury/further-information/statistics/> [Accessed 30 July 2021].

- Nall, R., 2021. Is Parkinsons disease hereditary? Genetics and causes. [online] Medicalnewstoday.com. Available at: <https://www.medicalnewstoday.com/articles/320560> [Accessed 30 July 2021].

- nhs.uk. 2021. Parkinsons disease. [online] Available at: <https://www.nhs.uk/conditions/parkinsons-disease/> [Accessed 30 July 2021].

- Ninds.nih.gov. 2021. Brain Basics: The Life and Death of a Neuron | National Institute of Neurological Disorders and Stroke. [online] Available at: <https://www.ninds.nih.gov/Disorders/Patient-Caregiver-Education/Life-and-Death-Neuron> [Accessed 30 July 2021].

- Society, A., 2021. Alzheimer's Society's view on demography. [online] Alzheimer's Society. Available at: <https://www.alzheimers.org.uk/about-us/policy-and-influencing/what-we-think/demography> [Accessed 30 July 2021].

- Staff, M., 2021. Parkinsons disease - Symptoms and causes. [online] Mayo Clinic. Available at: <https://www.mayoclinic.org/diseases-conditions/parkinsons-disease/symptoms-causes/syc-20376055> [Accessed 30 July 2021].

- UK, P., 2021. Reporting on Parkinsons: information for journalists. [online] Parkinsons UK. Available at: <https://www.Parkinsons.org.uk/about-us/reporting-parkinsons-information-journalists> [Accessed 30 July 2021].