A: Empathize

Personae: Sung Deuk Young

Demographics

Age: 85

Occupation: Retired

Location: Busan, South Korea



Profile

- Was diagnosed with Parkinson's disease a few years ago.
- Experiences hand tremors, weak grip strength, and reduced fine motor control
- Uses standard Korean stainless-steel chopsticks for meals because they are commonly available in Korean homes and restaurants.
- Mainly eats Korean food, which requires chopsticks for diverse side dishes (banchan)
- Eats at home and at a care center regularly, and occasionally eats at restaurants with family and relatives, about once per week.

Goals:

- Maintain better control of food
- Eat independently with minimal assistance from his caregiver
- Continue using chopsticks for Korean meals

Pain Points:

- Struggles to precisely control chopsticks and manipulate food
- Frequently slips or drops food, particularly small or slippery foods
- Finds Korean standard steel chopsticks difficult to pick up from the table.
- Requires more time than other family members to complete meals.
- Feels pressured and less independent when caregiver assistance is needed

Preferences:

- Prefers using chopsticks rather than switching to a fork.
- Prefers thicker chopsticks that are easier to pick up and hold.
- Prefers wooden chopsticks over slippery metal ones.
- Dislikes bright colors that make the chopsticks stand out.

Primary Research: Interview

Key Quotes from the User Interview
"Beans, noodles, and seafood are the most difficult foods for me to eat with chopsticks."
"[Standard Korean stainless-steel chopsticks] are too thin, and they are difficult for me to pick up from the table."
"I prefer thicker chopsticks because they are easier to pick up and hold."
"I prefer wooden chopsticks because they are less slippery than metal chopsticks."
"I don't like bright colors. I want the chopsticks to look more like regular chopsticks."

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Key Quotes from the Caregiver Interview

"When he uses chopsticks to pick up slippery foods such as joen or seafood, the food sometimes falls, and because his hands shake, it takes him a long time to pick up the food. He usually drops or slips food around 5-10 times during a meal"

"If I keep helping him with everything, I think it could become harder for him to do things independently. The hospital also encouraged him to do it himself. Even if it takes longer and he drops food, I encourage him to do it on his own."

"It takes him more than twice as long as an average adult… and he feels sorry to relatives or me eating with him. Because of that, he tends to avoid meals with relatives. He usually says that he would rather eat at home."

"Wooden chopsticks have a much rougher texture than metal ones, so food does not slide off as easily… the square shape also seems easier for him to hold."

"When someone has to help him, I think he feels that he is inconveniencing them, so he becomes self-conscious. He is also conscious of other people watching him… if the shape looked unusual, I think he might hesitate to use it."

"When there are many banchan dishes, he does not eat the ones that are farther away because it is difficult for him to reach them."

Primary Research: Anthropometric data

Justification/Relevance: The hand length and width measurements help determine the overall size of the grip area and ensure that the chopsticks fit the user's hand comfortably.



Length: 18.7cm
Hand length: measured from the wrist crease to the tip of the middle finger



Width: 8.6cm
Hand width: Measured horizontally across the widest section of the palm excluding the thumb

Justification/Relevance: The right-hand grip strength is measured to determine how much force the user can apply when holding and controlling the chopsticks.



Grip strength: 14.3kg
According to Park et al. (2022), the user's hand grip strength falls between the 5th and 10th percentiles (7.8th percentile) among South Korean men aged 85 and above. This indicates that the user has relatively low grip strength compared with men in the same age group. Therefore, the chopsticks should require minimal grip force to accommodate the needs of the extreme user.

Justification/Relevance: The user uses the thumb, index finger, and middle finger when holding the chopsticks. Therefore, their length and width are measured to determine the dimensions of the grip, to ensure that the chopsticks accommodate the user's finger size and provide a stable and comfortable grip.

Thumb





Length: 6cm Width: 2.6cm

Index finger

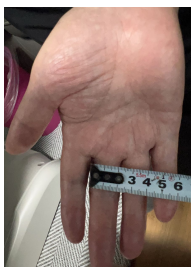




Length: 6.7cm Width: 2.3cm

Middle finger





Length: 7.7cm Width: 2.2cm

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Secondary Research #1 https://www.uwo.ca/fhs/csd/smdl/docs/Diagnosis-and-tx-of-PD-review-2020-1.pdf

Parkinson's symptom	Relevance to chopstick use/Design implication
Bradykinesia: Slower finger and hand movements, with progressively smaller movements during repeated tasks	Repeated opening and closing of the chopsticks may become slower and reduced in range, making food manipulation more difficult. The design should reduce the precise finger movement required.
Tremor: 4-6 Hz tremor Shaking of the hand	Tremor can reduce stability when holding and controlling chopsticks, making food manipulation difficult. The design should improve stability during chopstick use.
Rigidity: Reduced flexibility and increased stiffness in the fingers	Increased finger stiffness can make small grip movements and adjustments to finger positions when using chopsticks more difficult. The design should reduce the precise finger movement required.

Secondary Research #2 https://www.youtube.com/watch?v=5EdFFffGdD8

Thinner vs. Thicker Objects

- Insights: Thicker objects are easier to hold than thin or small objects. Thin objects require more precise fingertip control and adjustment of grip force. In contrast, thicker objects allow users to use more of the hand and rely less on fine finger movements.
    - **Design Implication:** The chopsticks should have a thicker grip to reduce the need for precise fingertip control. This makes them easier to use for users with reduced dexterity and hand tremors.

Social implications

- Insights: Difficulty using chopsticks impacts the social well-being of people with Parkinson's disease. For example, one man stopped attending reunions because he could no longer use chopsticks. Because he felt excluded at social events when using a different utensil from others, he began to avoid social situations.
    - **Design Implication:** The chopsticks should have the appearance of conventional chopsticks to help users feel socially included.

Use of Fork

- Insights: One older man who had difficulty using chopsticks said that he was not comfortable using a fork because of familiarity and social stigma. This shows that using a fork does not fully solve the user's problem, although a fork provides the same functionality as chopsticks.
    - **Design Implication:** The product should not force users to learn how to use different utensils. The product should provide a familiar and socially comfortable experience.

Secondary Research #3 https://journals.sagepub.com/doi/pdf/10.1177/2057158516642386

The study investigates how Parkinson's disease affects eating and mealtime-related activities based on semi-structured interviews with 19 people with Parkinson's disease aged 55-84. The study's result analysis is divided into categories.

1. **Compromised physical control:** Tremors and involuntary movements make it difficult for participants to use cutlery properly. Additionally, they often knock over cups and glasses or spill food and drinks.
    - **Design Implications:** The design should accommodate users with reduced physical control and involuntary hand movements.
2. **Difficulties eating together with others:** Because mealtimes take longer, participants feel uncomfortable making others wait. Additionally, the physical symptoms of Parkinson's disease can cause patients to feel stress and shame when eating in front of other people. Some patients declined invitations and chose to eat alone because they did not want others to watch them struggle.
    - **Design Implications:** The design should allow users to feel psychologically comfortable during meals with others.
3. **Strategies to maintain conventional norms and independence:** Some patients with Parkinson's disease felt a sense of accomplishment and independence when they participated in meal-related activities by themselves without any assistance.
    - **Design Implications:** The design should allow users to feel a sense of independence and accomplishment and reduce the need for caregiver assistance.

Key Quotes

- "Eating difficulties affected their self-esteem, enjoyment, family dynamics, and social life."
- "Maintaining independence and being able to eat independently were strongly associated with well-being and increased self-efficacy."
- "Environmental factors, such as the attitudes of strangers and the inability to meet expected norms of conduct at the dinner table, led to feelings of shame and avoidance behaviors."

A: Empathize

Secondary Research #4 https://pmc.ncbi.nlm.nih.gov/articles/PMC7411180/

Among 105 patients with Parkinson's disease, 85% reported experiencing embarrassment, while 26% reported experiencing shame. Only 15% reported experiencing neither embarrassment nor shame.

The sources of embarrassment and shame

- Visible symptoms of Parkinson's disease
- Increasing physical dependence and the need for help from others

Negative impacts of higher levels of shame and embarrassment:

- Poorer health-related quality of life
- Higher levels of anxiety and depression

Design Implications: The design should allow the user to eat more independently and confidently, helping to reduce shame and embarrassment and prevent further negative impacts on health and well-being.

Empathy Map

Think and Feel

- Feels pressured when receiving assistance
- Wants to maintain his independence during meals.
- Feels self-conscious when food drops from his chopsticks and draws attention from others
- Worries that eating slowly may inconvenience others during meals

Hear

- Hears family members offer help when they notice him struggling to pick up/manipulate food.
- Hears restaurant workers ask whether he would like a fork



Say and Do

- Says Korean standard steel chopsticks are too thin and that thicker chopsticks are easier to pick up from the table
- Says beans and noodles are particularly difficult to pick up.
- Continues using chopsticks rather than switching to alternative utensils such as fork.

See

- Family members eating independently
- Sees thin Korean stainless-steel chopsticks used at home and in restaurants.
- Sees a variety of banchan with different sizes, shapes, and textures, including beans, noodles, or seafood

Pains

- Tremors, weak grip, and reduced fine motor control make precise food manipulation difficult.
- Small, round, thin, or slippery foods such as beans, noodles, seafood, and soft foods are difficult to manipulate.
- Difficulty using chopsticks increases his dependence on his caregiver.
- Existing alternatives, such as forks, are not suitable for all Korean foods

Gains

- Eat independently with less caregiver assistance
- Control chopsticks with less precise finger movement and less physical effort.
- Eat difficult foods with fewer errors (drops).
- Continue using chopsticks that resemble conventional chopsticks to avoid social stigma.

Environment Analysis







- Korean meals often include banchan with diverse textures and forms, such as slippery, small, round, or thin foods including noodles, beans, and seasoned vegetables. This requires different levels of precision and grip. Additionally, banchan are often shared dishes, requiring the user to reach toward different dishes while maintaining accurate positioning and control of the chopsticks.
- The chopsticks are used at home, at the care center, and in restaurants. Therefore, the design should remain portable and usable across different dining environments. Moreover, when the product is used outside the home, the chopsticks require hygienic storage before and after meals.

Stainless-steel chopsticks Analysis

Secondary resource #5
https://www.koreajoongangdaily.com/kjd-special/flat-frustrating-and-now-famous-the-history-of-koreas-metal-chopsticks/12031557

Insight: In the Korean dining context, metal chopsticks are more suitable than wooden or plastic chopsticks, which wear down or deform more easily, because metal chopsticks are durable and capable of precise handling.

Secondary resource #6
https://www.korea.net/NewsFocus/HonoraryReporters/view?articleId=193912

Insight: Thinner and more slippery chopsticks require greater muscle control.





Two Independent chopsticks
(+) Each chopstick moves independently for flexible food manipulation.
(+) Adapts to foods of different shapes and sizes.
(-) Requires precise coordination of both chopsticks simultaneously.
(-) Difficult for users with reduced fine motor control.

Thin, rectangular chopsticks
(+) Resists rolling on the table.
(-) Provides small contact area between fingers and chopsticks.
(-) Requires greater finger control, increasing difficulty for Parkinson's users
(-) Small table clearance requires precise fingertip pinching for pickup.

Narrow tips
(+) Concentrate contact for precise gripping of small foods.
(-) Requires greater accuracy and fine motor control
(-) Small contact area increases slipping of slippery foods

Stainless steel
(+) Durable and resistant to wear.
(+) Low reactivity and hygroscopy support hygienic, safe food use.
(-) Smooth surfaces provide less friction between fingers and chopsticks.
(-) Increases difficulty for users with weak grip and dexterity.







Chopstick Length	20.4cm
Chopstick Width	0.7cm
Chopstick Thickness	0.25 cm

A1 Insight Summary: Primary research shows that the user experiences reduced efficiency and satisfaction when using standard Korean stainless-steel chopsticks. His grip strength is 14.3 kg (7.8th percentile among South Korean men aged 85+), alongside tremors and reduced fine motor control caused by Parkinson's disease.

- Usability Insight (Efficiency, Errors & Satisfaction): Thin, slippery chopsticks require precise finger coordination and control. This ultimately increases food slips/drops and dependence on caregiver assistance.
- Design Implication for Criterion B: The redesign should reduce required grip force and precise finger movement to improve grip stability and independent food manipulation.

A: Empathize

Task Analysis of the User Eating a Meal with Chopsticks

1. Picking up the chopsticks



Physical:
- Reaches for and picks up the chopsticks (set up by his family members) from the table
- **Efficiency:** Has difficulty lifting the thin chopsticks from the table

Cognitive:
- Determines how to position his fingers to lift the chopsticks.

2. Establishing a stable grip



Physical:
- **Efficiency:** Repeatedly adjusts the chopsticks between his thumb, index, and middle fingers to establish a stable grip.

Cognitive:
- Checks whether the chopsticks feel stable before reaching for food

3. Reaching and grasping food



Physical:
- Reaches toward the food using the chopsticks
- Opens and closes the tips of the chopsticks to grip the food.
- Receives caregiver assistance to cut a large piece into a smaller size

Cognitive:
- Checks the plate location and food size.
- **Satisfaction:** Feels dependent on caregiver assistance

4. Transferring and dropping food



Physical:
- Transfers the food from the plate toward his mouth.
- **Errors:** Food slips from the chopsticks.

Cognitive:
- Focuses on maintaining a secure grip on the food.

5. Responding to food drop



Physical:
- Pauses eating after some of the food drops.
- Looks down at the fallen food.

Cognitive:
- **Satisfaction:** Feels self-conscious when the dropped food draws attention from his caregiver and family members.

6. Pausing the meal



Physical:
- Places the chopsticks down on the table.

Cognitive:
- Decides to pause eating

7. Cleaning hands



Physical:
- Picks up a wet tissue from the table

Cognitive:
- Wants to clean his hands

8. Receiving the cup



Physical:
- Receives and holds the cup from a family member.

Cognitive:
- Responds to the offer.

9. Resuming chopstick use



Physical:
- Puts the cup down and resumes eating
- Repeats the chopstick movements until the meal is finished

Cognitive:
- Feels full after finishing the meal

Comparative Task Analysis

The comparative task analysis was conducted to identify differences in chopstick performance between the user and the comparison participant under the same task conditions.

The primary user completing the task



- Takes 20 seconds to complete the task, from picking up the chopsticks to putting them back on the table.
- Takes 8 seconds to grip a piece of banana.
- Drops/slips the banana twice

The comparison participant completing the task



- Takes 6 seconds to complete the task, from picking up the chopsticks to putting them back on the table.
- Takes 2 seconds to grip a piece of banana.
- Does not drop or slip the banana.

Compared with the comparison participant, the user took 14 seconds longer to complete the task and 6 seconds longer to grip the banana. The user experienced two slips/drops, while the comparison participant did not slip or drop the banana. This comparison shows the user's difficulty controlling standard Korean stainless-steel chopsticks.

Task Analysis Mimicking the User's Restricted Finger Movement

The task analysis was conducted to better empathize with the user by experiencing restricted finger movement and reduced dexterity while using standard Korean stainless-steel chopsticks. Although the gloves do not accurately simulate Parkinson's disease symptoms, they were used to mimic constraints that restrict precise finger movements and make food manipulation more difficult.

1. Picking up the chopsticks



Physical
- **Efficiency:** Requires larger finger movements (extending and opening the hand) to pick up the chopsticks because the gloves restrict finger movement.

Cognitive
- **Efficiency:** Requires greater mental effort to pick up the chopsticks.

2. Positioning the chopsticks



Physical
- **Efficiency:** Takes longer than usual to position the chopsticks between the fingers.
- Holds the chopsticks in an awkward position. Requires further adjustment.

Cognitive
- **Efficiency:** Repeatedly checks the position of the chopsticks to establish a stable grip.

3. Picking up food



Physical
- **Efficiency:** Uses larger hand movements to pick up food with the chopsticks.

Cognitive
- **Efficiency:** Requires greater mental effort to control the chopsticks

4. Dropping food



Physical
- **Errors:** Small pieces of food slip from the chopsticks.

Cognitive
- **Efficiency:** Requires greater mental effort to hold the food securely.

5. Recovering from an error



Physical
- **Recovery:** Picks up the slipped food and attempts to transfer it toward the mouth again.

Cognitive
- **Satisfaction:** Becomes frustrated after the food slips.

6. Pausing the meal



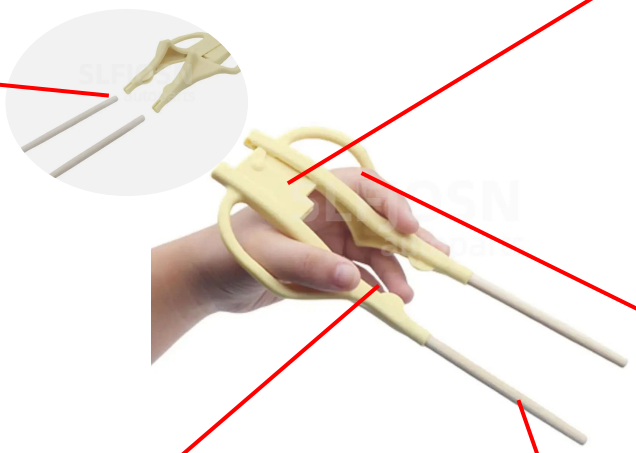
Physical
- **Efficiency:** Requires larger finger movements to place the chopsticks on the table.

Cognitive
- **Satisfaction:** Feels uncomfortable with restricted finger movements.

Task analysis shows that the user has difficulty establishing a stable grip and manipulating food, and experiences food slips during transfer. In Step 3, caregiver assistance increases dependence, while in Step 5, food drops (Errors) increase self-consciousness (Satisfaction). In the comparative banana task, the user took 20 seconds, compared with 6 seconds for the comparison participant, and experienced two slips/drops (Efficiency & Errors). The redesign should reduce precise finger coordination and improve grip stability to support more efficient, independent, and satisfying meal experiences.

A: Empathize

Product Analysis #1: https://www.ebay.com/itm/236515814367



Modular Removable heads
Modularity: Allow food-contact parts to be removed and replaced.
(+) Efficiency: Makes food-contact areas easier to clean.
(-) Errors: Detachable parts can be incorrectly reattached or lost.

Hinge
Maintains alignment between both chopsticks
(+) Efficiency: Reduces coordination needed to control two independent chopsticks.
(+) Efficiency: Reduces repeated grip adjustments (identified in Task Analysis Step 2)
(-) Limits movement to manipulate various Korean foods

Ring
Guides fingers into consistent positions
(+) Learnability: Clearly indicates where the fingers should be positioned
(+) Efficiency: Supports easier opening and closing of the chopsticks.
(+) Efficiency: Reduces repeated finger repositioning when establishing a grip.
(-) Restrict natural finger movement
(-) Satisfaction: assistive appearance can draw unwanted social attention

Contoured finger support
Provides shaped surfaces that conform to finger placement
(+) Increase contact area between fingers and chopsticks
(+) Improves grip stability with less force.
(-) May not fit different users' hands.

Natural bamboo
Provide a higher-friction food-contact surface.
(+) Errors: Greater friction requires less precise control and reduces food slipping.
(+) Satisfaction: Matches the user's preference for wooden texture.

Chopstick Length	22.5 cm
Chopstick Width	5.5 cm
Chopstick Weight	43g

Product Analysis #2: https://spoon-tamago.com/a-japanese-craftsmans-chopsticks-for-the-physically-challenged/

Magnet
Repelling magnets assist the automatic opening of the chopsticks.
(+) Efficiency: Reduces the physical effort required to open the chopsticks.
(+) Accommodates users with reduced finger strength.

Adjustable Resistance
The number of magnets adjusts the opening resistance.
(+) Allows the resistance to match the user's hand strength.
(-) Learnability: Requires users to understand how to adjust the resistance.





Curved Form
Conforms to the user's hand and natural grip position.
(+) Satisfaction: Supports a more comfortable hand position.
(+) Efficiency: Reduces the effort required to maintain a stable grip.
(-) May not fit different users' hands.

	Size M	Size S
material	Cherry wood, magnet	Cherry wood, magnet
coating	Natural oil	Natural oil
size	210 x 26 x 30 (mm)	175 x 31 x 25 (mm)
weight	Approximately 35g	Approximately 30g
price	12,300 yen (excluding tax)	11,300 yen (excluding tax)

Size Variation
Accommodates different hand dimensions.
(+) improves fit for different hand sizes.

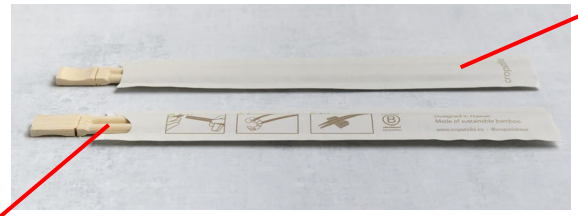
Finger Grooves
(+) Learnability: Clearly indicates where fingers should be positioned.
(+) Efficiency: Reduces repeated finger repositioning.

Wide Finger-Contact Surface
Increases the contact area for easier control.
(+) Reduces pressure concentrated on the fingers.
(-) Increases the size and requires more storage space.

A: Empathize

Product Analysis #3: https://cropsticks.co/pages/our-impact

Disposable Design
Designed for short-term use.
(+) Efficiency: Avoids cleaning after use.
(-) Not suitable for long-term use due to limited durability.



Compact Packaging
Uses wrapper around the chopstick
(+) Efficiency: Lightweight and compact for transport.
(+) Requires little storage space
(-) Efficiency: Opening the narrow wrapper requires precise finger movements.
(-) Paper packaging can be damaged by moisture.

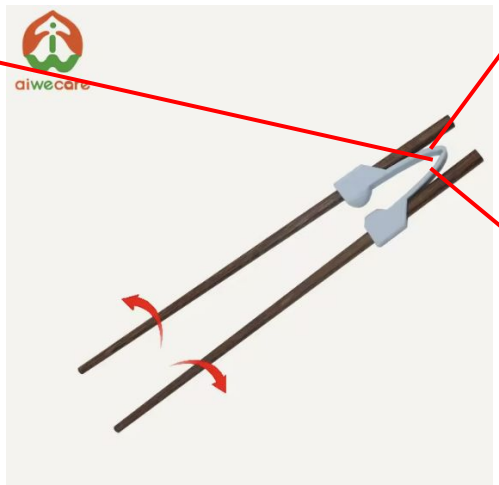


Connected Chopsticks
Keeps the two chopsticks positioned together inside the package.
(+) Prevents the two chopsticks from separating during storage.
(-) Requires force to separate the two chopsticks.

Built-in Chopstick rest
Elevates the chopsticks from the table.
(+) Efficiency: Makes the chopsticks easier to pick up due to increased clearance.
(+) Prevents the food-contacting tips from touching the table.
(-) Requires force to detach the chopstick rest.
(-) Difficult for users with tremors and reduced fine motor control.

Product Analysis #4:
https://www.alibaba.com/product-detail/Aiwecare-Reusable-Wooden-Anti-Slip-Learning_1601342094853.html

Resistance and opening
Controls the resistance and opening between the chopsticks.
(+) Efficiency: assists opening and closing of the chopsticks
(-) Satisfaction: Resistance may not match the user's grip strength.
(-) Efficiency: Limited opening range restricts manipulation of different sized foods.



Connector
Keeps the two chopsticks aligned during use.
(+) Efficiency: Reduces the finger coordination required to position both chopsticks.
(+) Supports users with tremors and reduced fine motor control.
(-) Efficiency: Restricts flexible movement of chopstick
(-) Efficiency & Satisfaction: Setup requires precise finger movements and increase caregiver dependence.

Minimal design
Uses small, separate connectors.
(+) Satisfaction: Maintains a more conventional chopstick appearance
(+) Satisfaction: Reduces unwanted attention during social meals.
(-) Errors: Small separate parts can be easily lost.

Chopstick Length	25cm
Chopstick width	5.2cm
Chopstick weight	15 g
Connector width	4 cm
Connector length	5.8cm

The product analysis shows that assistive mechanisms can reduce the coordination and grip control required to manipulate chopsticks.

- Usability Insight (Efficiency, Errors & Satisfaction): Fixed resistance, limited opening range, and rigid finger supports can increase physical effort and restrict flexible finger movement during food manipulation. Additionally, a visibly assistive appearance may draw unwanted social attention.
- Design Implication for Criterion B: The redesign should provide a stable grip with low-effort control while maintaining sufficient movement for food manipulation. Additionally, it should retain the appearance of conventional chopsticks to reduce social stigma and improve user satisfaction.

B: Define the project

1. Current situation



- Deuk Young is an 85-year-old retired Korean man who was diagnosed with Parkinson's disease, experiencing hand tremors, weak grip strength, and reduced fine motor control. He faces challenges when eating meals with chopsticks in a Korean dining environment, where chopsticks are used to eat various side dishes. The product under investigation is a standard pair of Korean stainless steel chopsticks commonly found in Korean homes and restaurants.

2. The Current Problem & Criterion A Link

- Primary user observations documented in Criterion A reveal the user's pain points when eating with conventional Korean chopsticks.

- **Errors:** The user struggles to precisely control two separate chopsticks and manipulate food due to hand tremors, weak grip strength (14.3 kg, 7.8th percentile among Korean males aged 85+), and reduced fine motor control. According to the caregiver interview, he slips or drops food 5-10 times per meal, which was also identified in Task Analysis Step 4. According to the product analysis, standard Korean stainless-steel chopsticks are thin and provide a small finger-contact area. This demonstrates a mismatch between the physical demands of conventional chopsticks and the user's physical capabilities.
- **Efficiency:** The user requires more time and physical effort to establish a stable grip and manipulate food. In particular, the user has difficulty lifting thin chopsticks from the table because the task requires precise fingertip control (Task Analysis Step 1). In the comparative banana task, the user required 20 seconds to complete the task, compared with 6 seconds for the comparison participant. This was due to difficulty picking up the chopsticks, adjusting finger positions to establish a stable chopstick grip, and recovering from errors.
- **Satisfaction:** According to the caregiver interview, the user feels less independent and self-conscious when caregiver assistance is required. He feels that he is inconveniencing others when someone has to help him, and he is also conscious of other people watching him when he drops food or takes longer to eat. These experiences reduce his social comfort and confidence during meals.

3. Research data summary

Parameter	Analysis
Food slips/drops	According to the caregiver interview, the user slips or drops food 5-10 times per meal. Furthermore, in the comparative task, the user slipped the banana twice, while the comparison participant experienced no slips.
Time transfer banana	In the comparative task, the user required 20 seconds to complete the task, compared with 6 seconds for the comparison participant.
Grip Strength	14.3 kg, 7.8th percentile for Korean men 85+
Hand dimensions	18.7 cm length × 8.6 cm width

4. Opportunities for redesign

The task analysis shows that the user struggles to use conventional chopsticks because they do not accommodate the needs of people with Parkinson's disease who experience tremors, reduced grip strength, and reduced fine motor control.

a. Grip Stability & Ergonomics: Redesign the chopsticks to improve grip stability and reduce the physical effort required to control them. Accommodate the user's hand dimensions (18.7 cm hand length and 8.6 cm hand width) and grip strength (14.3 kg).
b. Food Control: Redesign the chopsticks to reduce the fine motor coordination required for control and allow the user to manipulate foods of different sizes and textures in Korean dining environments.
c. Aesthetics, Portability & Hygiene: Redesign the product to support independent and socially comfortable use across home and restaurants. Maintain a familiar chopstick experience while allowing hygienic transport and storage.

B: Define the project

Category	Specification	Justification	Testing
Attributes	The chopsticks should support socio-pleasure by helping the user feel confident and socially comfortable when using them.	According to the caregiver interview, the user is conscious of other people watching him when he drops food or takes longer to eat. He sometimes avoids meals with distant relatives because he feels that he inconveniences others. Additionally, Secondary Research #3 indicates that patients with Parkinson's disease experience shame when eating in front of others and may avoid social meals. Therefore, the product should support socially comfortable and confident chopstick use.	Ask the user to use the prototype during a meal with family members. Ask the user to rate their confidence and social comfort on a scale of 1-5.
Functions: Intended operations or actions of the solution	The chopsticks should reduce slips and drops during food manipulation compared with the stainless-steel chopsticks.	According to the caregiver interview, the user slips or drops food 5-10 times per meal due to tremors, weak grip strength, and reduced fine motor control. The task analysis (Step 4) also shows that the user drops food or experiences food slipping from the chopsticks. Therefore, the product should reduce the user's pain points related to food slipping and dropping.	Conduct a food transfer task using conventional Korean chopsticks and the prototype, keeping the food size and plate position the same. Record the number of slips and drops for each product and compare the results.
	The chopsticks should allow the user to pick up and control foods of different sizes, shapes, and textures.	According to the user interview, the user struggles to manipulate beans, noodles, and seafood. The environment analysis shows that Korean meals contain multiple banchan with different sizes, shapes, and textures. Therefore, the chopsticks should allow the user to effectively manipulate a wide range of foods.	Select foods that represent different characteristics such as a bean (small/round), noodles (thin/slippery), and a piece of seafood or banana (soft/slippery). Record the number of successful pickups, slips, and drops, and whether caregiver assistance is required.
User Needs: Specific functionality, usability, ergonomics, and performance requirements	The chopsticks should provide a stable and comfortable grip while requiring less precise fine motor control than conventional Korean stainless-steel chopsticks.	According to the persona, the user experiences tremors, weak grip strength, and reduced fine motor control due to Parkinson's disease. Secondary Research #1 identifies tremor, bradykinesia, and rigidity as symptoms of Parkinson's disease that reduce stability and make precise finger movements more difficult. Therefore, the product should reduce the need for precise fine motor control and improve grip stability to address the user's physiological difficulties.	Ask the user to complete a food transfer task using the prototype, then rate grip stability, comfort, and ease of picking up food on a scale of 1-5.
	The chopsticks should be easy for the user to pick up from the table without requiring fine fingertip control.	During the user interview, the user stated that standard Korean stainless-steel chopsticks are "too thin" and "difficult for me to pick up from the table." This was also observed in Task Analysis Step 1, where the user had difficulty lifting the thin chopsticks from the table. Therefore, the product should allow the user to easily pick up the chopsticks from the table.	Place the prototype on the table and ask the user to pick it up 5 times. Measure the time taken to pick it up and the number of failed attempts and ask the user to rate the ease of picking it up on a scale of 1-5.

	The chopsticks should accommodate the user's hand dimensions of 18.7 cm in length and 8.6 cm in width, and a grip strength of 14.3 kg, to allow for a comfortable use.	From the primary anthropometric research, the user's hand dimensions were measured as 18.7 cm in length and 8.6 cm in width. Furthermore, the user's grip strength of 14.3 kg falls between the 5th and 10th percentiles (approximately the 7.8th percentile) among South Korean men aged 85 and above. This indicates that the user has relatively low grip strength compared with men in the same age group. Therefore, the chopsticks should accommodate the user's hand dimensions and require minimal grip strength during use.	Ask the user to transfer food using the prototype. Record the number of grip adjustments, slips, and successful transfers. Ask the user to rate the comfort of using the chopsticks on a scale of 1-5.
Safety	The chopsticks should be smooth and free from sharp edges.	The chopsticks come into contact with the user's fingers, face, and mouth when the user moves them toward his mouth to transfer food. Therefore, sharp or rough surfaces should be avoided to prevent injury.	Conduct a product observation to identify any sharp edges.
	The chopsticks should be non-toxic and food-safe.	The environmental analysis shows that the chopsticks come into contact with food and the user's mouth during meals. Therefore, the chopsticks should be non-toxic and food-safe to prevent harmful substances from being ingested.	Conduct secondary research to verify the non-toxicity and food safety of the materials used according to South Korean food safety standards.
Aesthetics: Visual appeal, colour, shape, texture, and style	The chopsticks should have a familiar appearance similar to that of conventional Korean stainless-steel chopsticks to avoid standing out.	According to the interview, the user stated, "I don't like bright colors. I want them to look more like regular chopsticks." The caregiver also highlighted that the user is conscious of other people watching him in restaurants and may hesitate to use chopsticks that look unusual. Secondary Research #2 further identified that alternative utensils can create discomfort due to concerns about familiarity and social stigma. Therefore, the chopsticks should have a familiar appearance to support the user's confidence and comfort during social meals.	Present prototypes with different appearances to the user. Ask the user to rate each prototype on a scale of 1-5 for familiarity and willingness to use chopsticks in public (restaurants).
Constraints	The chopsticks should be usable without caregiver assistance to promote the user's independence.	In the interview, the caregiver said, "If I keep helping him with everything, I think it could become harder for him to do things independently. The hospital also encouraged him to do it himself. These days, even if it takes longer and he drops food, I encourage him to do it on his own." The task analysis also shows that the user currently receives caregiver assistance during food manipulation and becomes self-conscious when this assistance draws attention from others. Secondary Research #3 found that people with Parkinson's disease value maintaining independence and a sense of accomplishment during meals. Therefore, the product should be usable without caregiver assistance and allow the user to use the chopsticks independently.	Conduct a task analysis during a meal and record whether caregiver assistance is required when using the chopsticks.
Environment	The chopsticks should be suitable for Korean meals that involve multiple side dishes (banchan) positioned at different distances.	The environment analysis shows that Korean meals include multiple side dishes (banchan) positioned around the table. This means that the user needs to reach toward different dishes while maintaining precise control of the chopsticks. According to the caregiver interview, the user does not eat banchan that is far away because it is difficult for him to reach it with chopsticks. Therefore, the chopsticks should allow movement to manipulate banchan positioned at different distances.	Place banchan at different distances from the user. Ask the user to reach for and transfer food from each plate using the prototype. Record the number of successful transfers and food slips or drops.

	The chopsticks should be portable and allow hygienic storage when transported between the home, care center, and restaurants.	The persona and environment analysis show that the user eats at home, at the elderly center, and in restaurants with family. This highlights that, since the chopsticks are used outside the home, they require hygienic storage for transportation. Therefore, the chopsticks should be portable for use in various dining environments and allow for hygienic storage.	Ask the user to transport the chopsticks between different environments and to remove and store them before and after meals. Record whether the chopsticks remain protected during transportation and storage.
Manufacture requirements: Material selection	Physical Properties: The chopsticks should have low thermal conductivity (the ability to conduct heat)	The environment analysis shows that the chopsticks come into contact with both hot and cold foods during Korean meals. Heat transfer through the material increases discomfort in the grip area and the risk of burn injuries. Therefore, the chopsticks should be made from a material with low thermal conductivity to minimize heat transfer to the user's hand.	Conduct secondary research to verify the thermal conductivity of the selected material.
	Chemical Properties: The chopsticks should have low reactivity to avoid reactivity with the food or moisture and hygroscopy to prevent the absorption of moisture from the surrounding environment.	The analysis of stainless-steel chopsticks highlights low reactivity and low hygroscopicity as material properties that support hygienic and safe use with food. The environment analysis shows that the chopsticks are used with different types of food. Therefore, the materials should have low reactivity and low hygroscopicity to maintain performance and ensure food safety.	Conduct secondary research to verify the reactivity and hygroscopicity of the selected material and verify the non-toxicity and food safety of the materials used according to South Korean food safety standards.

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