



# Remembering Reusable Bags

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SD-7620-10-S23 The Practice of Sustainable Design

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# The Task

design a product, material, service, process, or system that facilitates or precipitates a  
change in behavior and is more sustainable than the status quo

# Background



The circular economy will be essential for a net zero future<sup>1</sup>

“Americans use 100 billion plastic bags a year, which require 12 million barrels of oil to manufacture”<sup>2</sup>

“Plastic grocery bags contribute to the death of one million birds, 100,000 turtles, and other sea animals that ingest plastic each year”<sup>3</sup>

Despite good intentions, 40% of shoppers forget their reusable bags<sup>4</sup>

# Observations

Portland, OR | February 2023

## Grocery Store Observations

- No one used reusable produce bags
- Some people put produce straight in their basket without any bag

### **NEW SEASONS** MARKET

- At the local upscale grocery store, most people in checkout lines brought their own reusable grocery bags
- There are reusable bag reminder signs in the parking lot + stickers on the door
- One individual who had just left their car, turned around to retrieve bags from their car

### Fred Meyer

- At the big chain grocery store, about a third of the people in checkout lines brought their own reusable grocery bags
- There was also bag reminder sign in the parking lot

## At Home Observations

- Alec always remembers grocery bags when heading to the store, but almost never the produce bags
- He says that he doesn't like having to think about how many or what size of produce bags to bring, and doesn't want to carry around too many
- He does not keep reusable bags in his car, and will come home with a paper bag if he spontaneously stopped at the store while already out and about
- Both types of reusable bags are kept in the same drawer in the kitchen along with other reusable containers

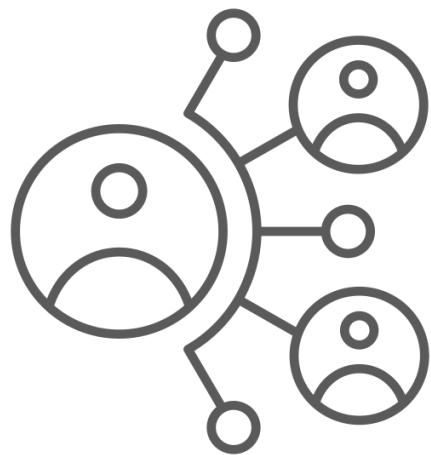
## Interviews

5 people were interviewed and while there was diversity among gender, age (28-60), and race, it is worth noting that all fell into middle to upper middle economic statuses

- 4 people said they reliably bring grocery bags from home when they know they're going shopping, but don't if it's an unplanned stop
- 3 people will carry out a few items in their hands for quick trips when they forgot a bag
- 3 people tried keeping them in their car, but rarely remember to bring them back out to the car post grocery trip
- One person always keeps a small collapsible bag in her purse
- One person prefers to bring a backpack rather than a tote bag
- No one interviewed owns reusable produce bags and 2 people have no interest in owning reusable produce bags

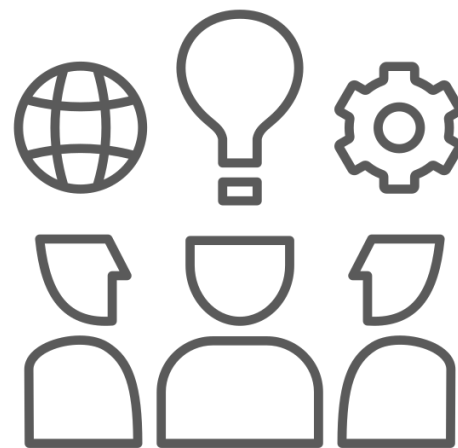
# Research

Based on patterns identified through observations, local news articles from cities adopting single-use bag bans, blog posts, national publications, and scientific studies, the following themes have emerged to guide further work:



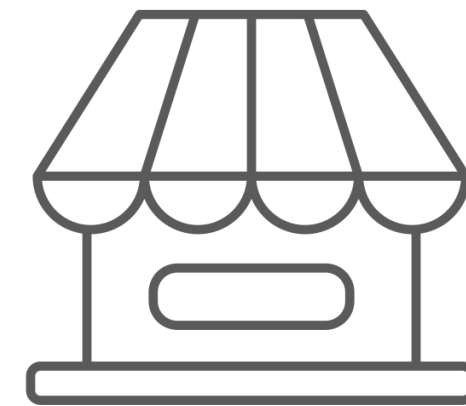
## Stakeholders

- People who own reusable grocery bags
- Grocery store owners
- Farmers market vendors
- People in general
- Animals endangered by plastic
- The biosphere



## Attitudes/Beliefs

- It's important to contribute to sustainable efforts at an individual level
- Buying more reusable bags to keep in more places might help to remember them (although it's not working)
- Convenience is important
- Not interested in reminder stickers



## Behaviors/Actions

- Forget reusable bags at home (grocery and produce bags)
- Remember grocery, but not produce bags
- Forget reusable bags in the car
- Don't bring enough reusable bags
- Want to remember

# SWOT Analysis

## Bringing Reusable Bags to the Grocery Store | Current Landscape

### Strengths

- People want to adopt more sustainable behaviors
- Many people already own reusable grocery bags (most people have at least six<sup>5</sup>)
- Reusable bags can serve more functions than just for groceries
- Some states already have policies in place to push for the transitions to only using reusable bags

### Weaknesses

- “A cotton bag should be used at least 7,100 times to make it a truly environmentally friendly alternative to a conventional plastic bag.”<sup>6</sup>
- Reusable bags are supposed to be washed after every use to prevent germs, mold, and cross contamination<sup>7</sup> (haven’t met anyone who washes them that frequently)
- To prevent bacteria growth, bags aren’t supposed to be stored in car trunks, but that is one of the top recommendations for remembering to bring bags<sup>7</sup>

### Opportunities

- Integrating reusable produce bags into grocery bags
- More convenient sanitary options
- More successful way to remember bags, especially for spontaneous trips
- Beautiful, visually appealing reminders

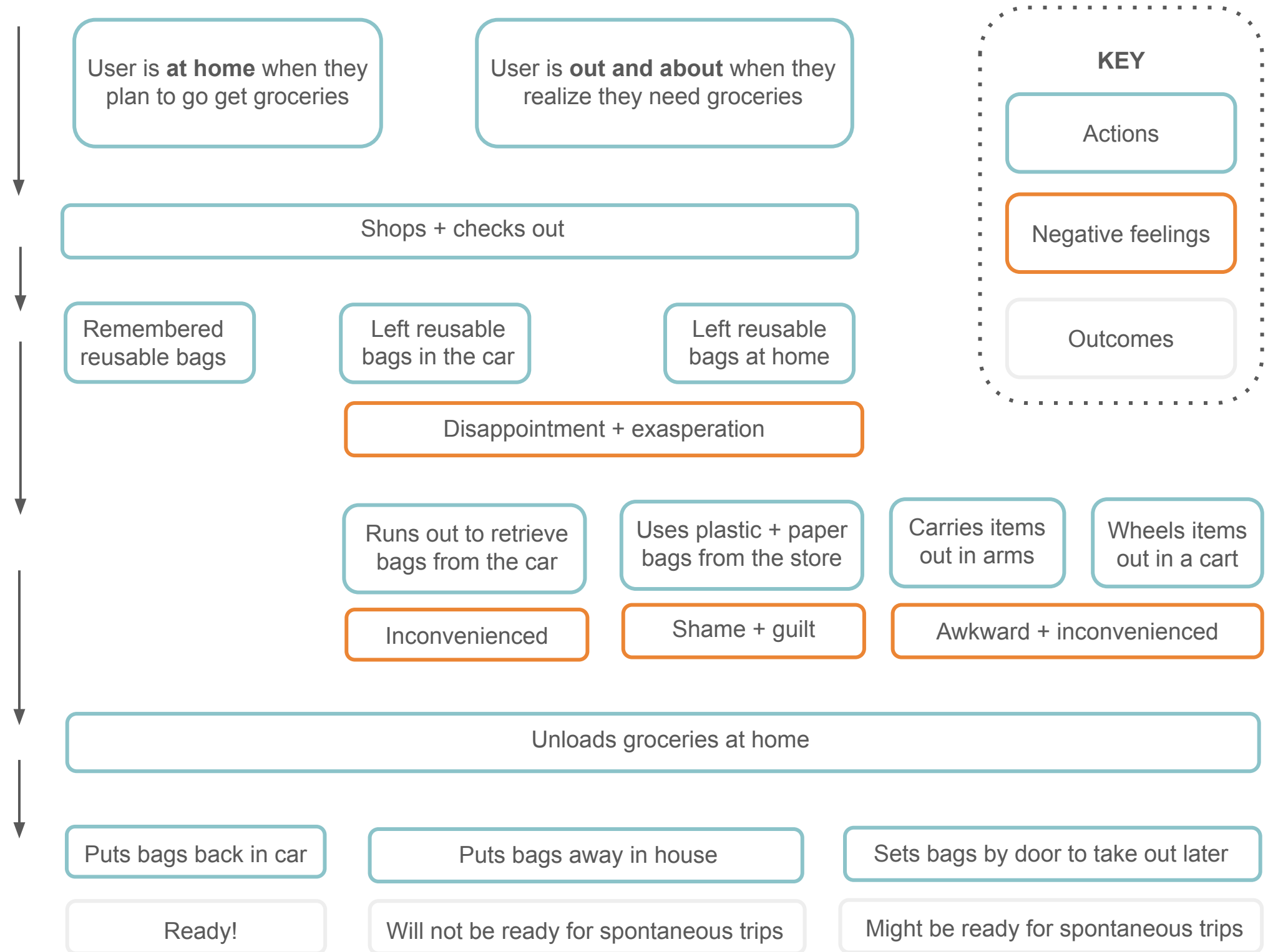
### Threats

- Bag-bans + fees are the only options that have made a notable difference, but are illegal in some states (Florida, Michigan, Wisconsin)<sup>5</sup> → hopefully not a growing threat!
- Americans dedication to convenience
- Disconnect between values and actions



# Potential Scenarios

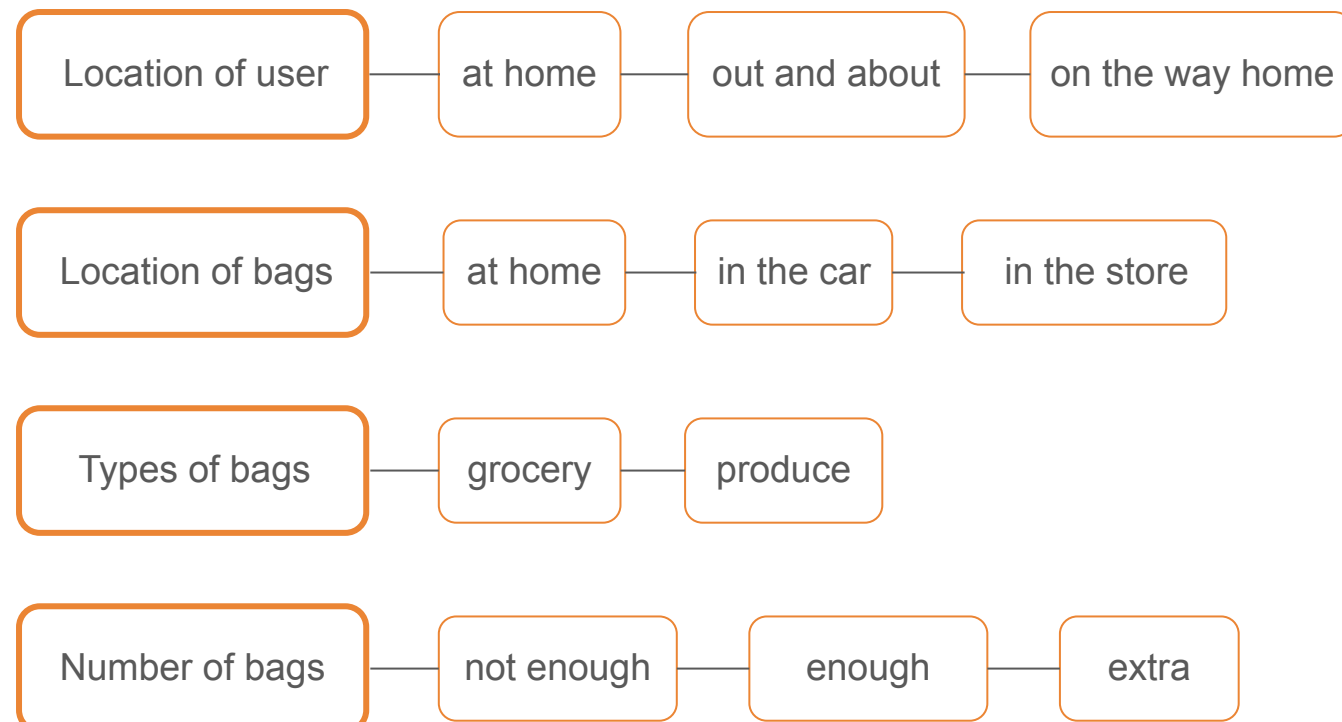
Exploring the user experience of trying to bring reusable bags to the store in order to gain perspective on possible points of intervention to increase success in executing this sustainable behavior.



# Why is This So Hard?

There are constantly changing circumstances around grocery shopping, which make it particularly challenging to establish new habits. There are also many factors that must align to make completing the sustainable behavior successful.

## Factors to Consider



“Knowledge and values alone are not sufficient to get people to change their behavior”<sup>8</sup>

“Research in neuroscience estimates that as much as 95% of our behaviours depend on deliberative and automatic thinking”<sup>9</sup>

“Such behaviours ingrained in everyday life tend to be in competition with the rational aspect of behaviour”<sup>9</sup>

“As defined by Orbell and Verplanken (2010), habits are built on three pillars: repetition, automaticity and a stable context.”<sup>9</sup>





# Problem Statement

Billions of single-use plastic bags are produced every year, which have harmful impacts on people, animals, and the environment at every stage of the product's lifecycle. While well-intentioned people buy reusable bags to eliminate the need for disposable bags at the grocery store, many forget to bring them and therefore contribute to plastic production and waste of both single-use and reusable plastic bags.



## Key Design Drivers

- Beautiful visual cues
- Integration of features/multifunctional (grocery + produce bags)
- Space conscious
- Sanitary/easy to care for
- Breakeven impact in less than 5 uses

## Key Design Objectives & Strategies

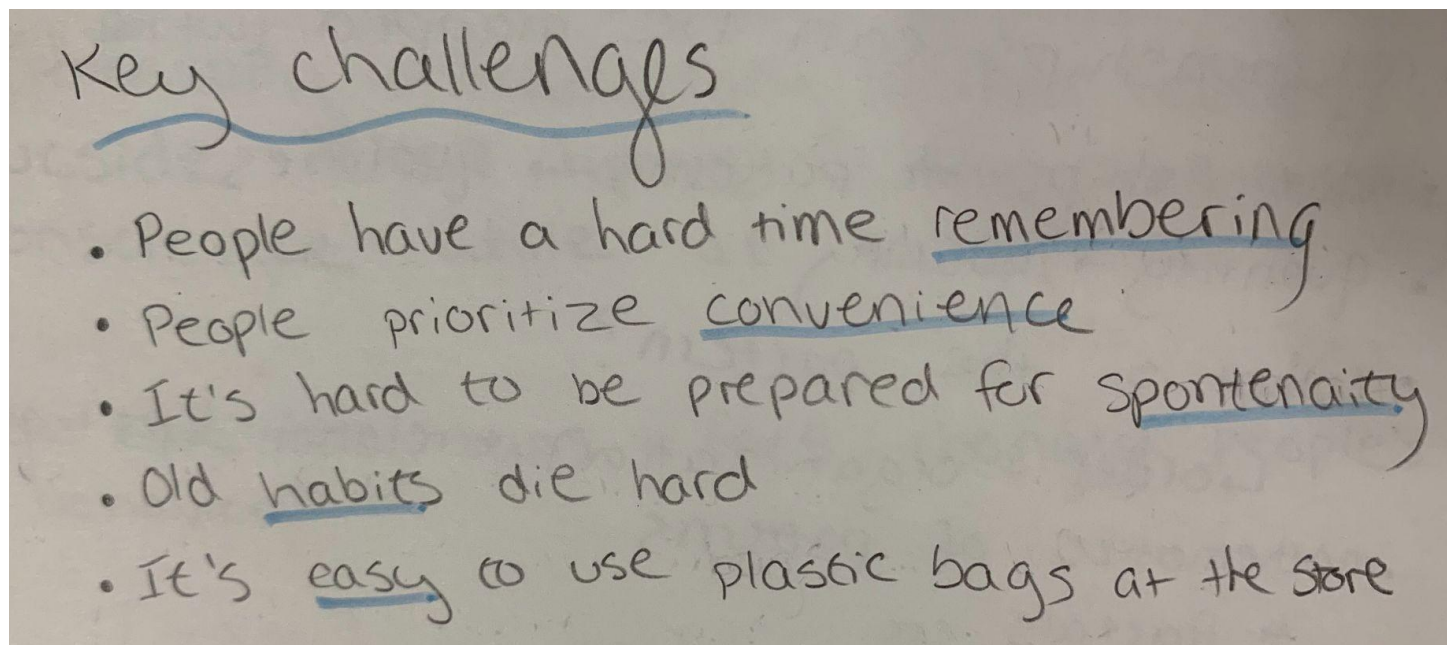
- Cause no harm, create no new problems
  - Apply the Precautionary Principle
- Maintain the earth's ability to provide "services"
  - Maintain healthy habitats
- Meet human cultural needs
  - Design beautiful, accessible, functional things
- Reduce carbon dioxide equivalent footprint
- Design to encourage low consumption behavior
  - Greater control (over memory?) to empower user

## Key Issues

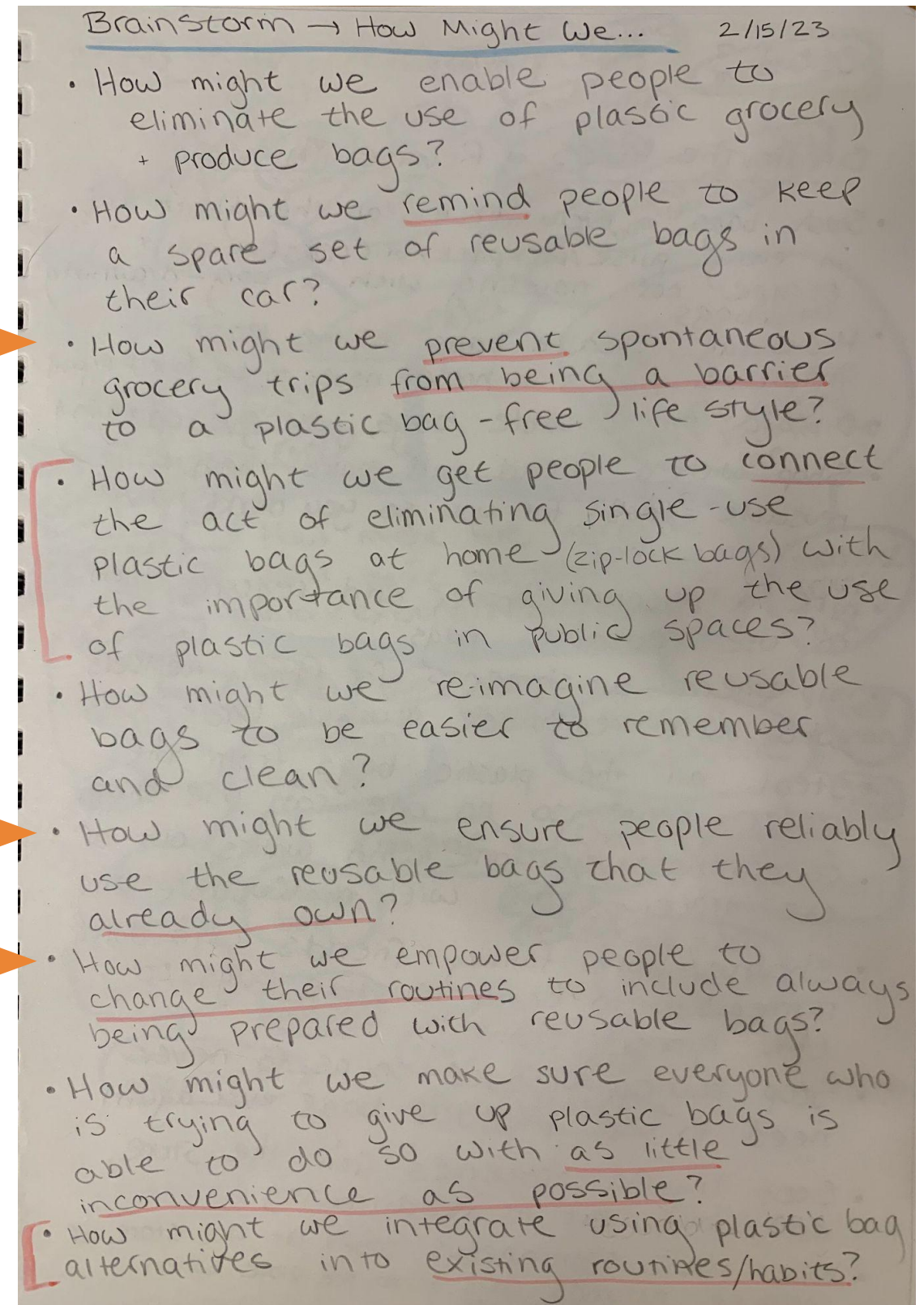
- Fallible human memory
- Value of convenience
- Accounting for spontaneity
- Eliminate possibility of habitat destruction from plastic bag use
- Conscious material selection and manufacturing methods to achieve breakeven impact after minimal use

# How Might We...

After identifying key challenges, “How Might We...” statements were developed by connecting the user + need + insight, and used as seeds for ideation to help focus the brainstorming process.



How might we enable people who intend to bring their reusable bags to the grocery store to successfully develop this sustainable behavior into a new habit with maximum ease and minimal relapse?



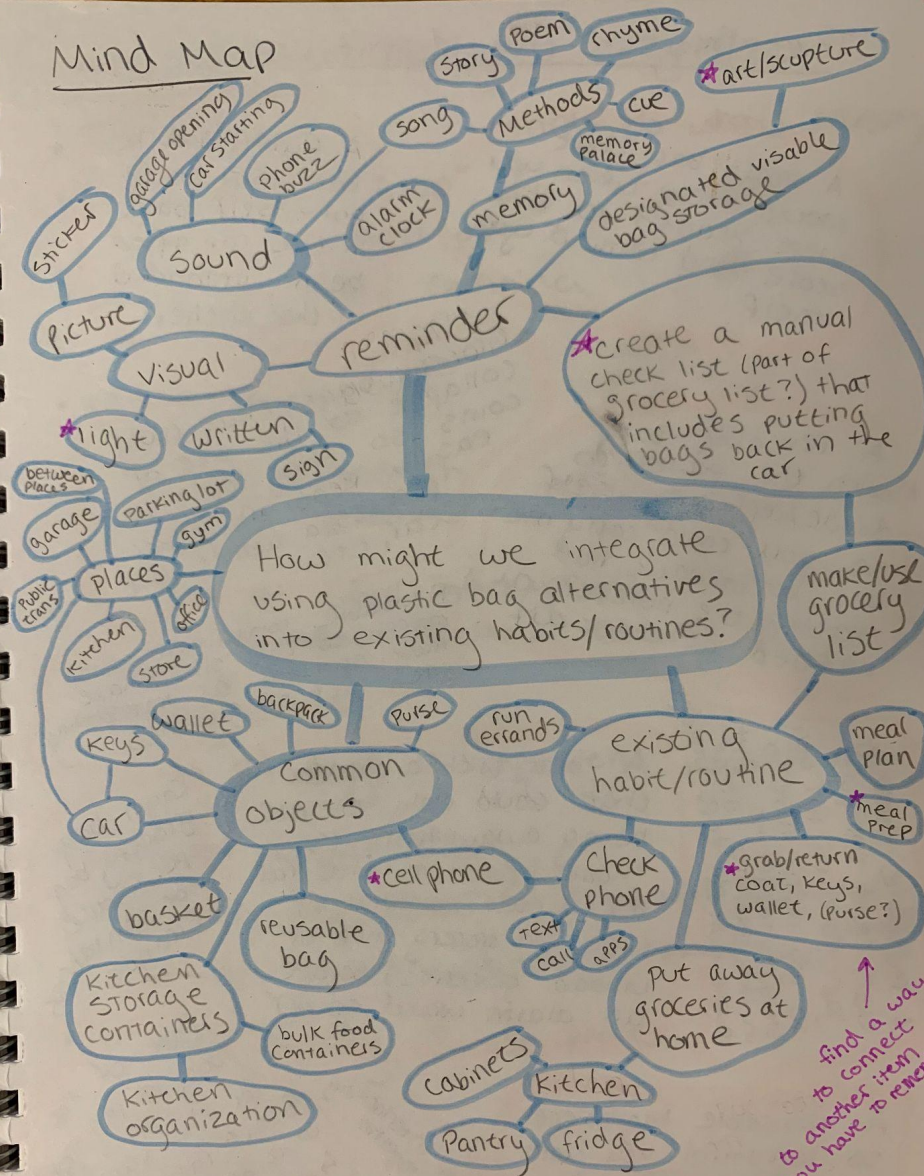
# Early Brainstorming

## Step 3 Brainstorming

### Break The Rules of Reverse Thinking

- Stash bags in every drawer, all throughout car, in every purse/backpack/briefcase - can't escape not traveling with a bag - drawing in bags
- Hide all reusable bags in the least intuitive places in house - never to be found again
- Discard all reusable bags, just give up trying
- Shop with a friend and make them bring reusable bags for you so you don't have to remember → accountability (recruit a friend?)
- hire a personal shopper and require them to use reusable bags
- implement punishments for family members who don't remember reusable bags  
"tip jar" "sweat jar" "plastic bag jar"
- steal all the plastic bags from the grocery store so no one can use them
- congratulate everyone who walks out of the grocery store with a reusable bag  
motivation through celebration?
- Shame/shun family + friends who don't remember to bring reusable bags to the grocery store
- Stop buying produce, so as to never need to use produce bags ever again
- Stop buying groceries from the store, and only eat at restaurants
- Never make spontaneous stops at the store or combine errands, only go to the store when planned in advance

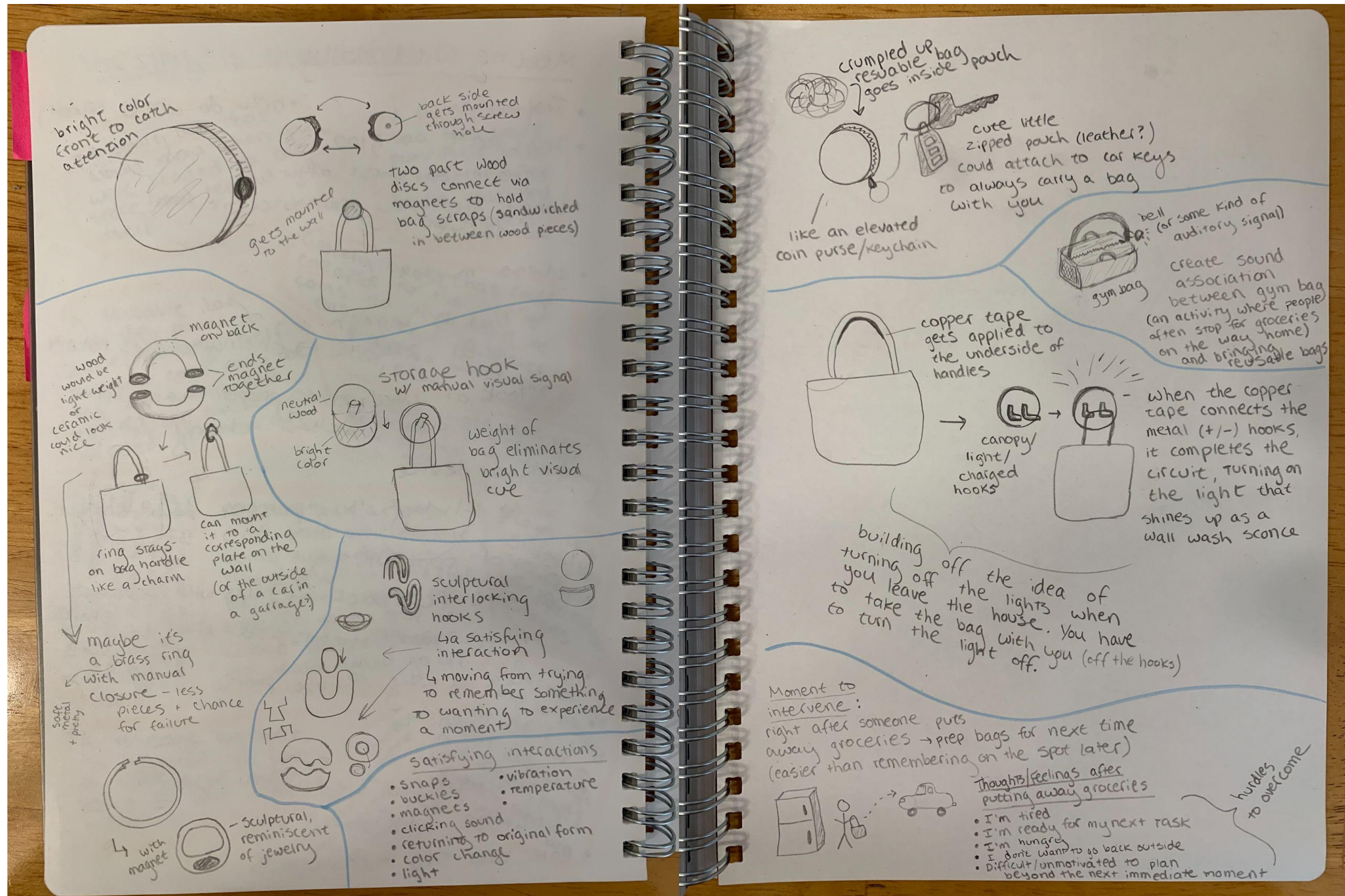
### Mind Map



### The Sky is the Limit

- \* A smart bag that would know when you were headed to the store and remind you itself
- A flying/mobile bag that would put itself back in the car after being unloaded in the kitchen
- Grocery bags that could collapse to the size of coins so they could be easily kept in jacket pockets, a wallet, the car, etc.
- Reusable containers that morph to the size/shape most optimal for transporting each set of groceries
- A reusable bag with the power to divide/replicate itself so you could carry one exactly the number you needed at check out
- A reusable container that could transport your groceries for you so you didn't have to struggle to get keys out in the parking lot, or make multiple trips inside
- A bag with a sensor that could only tolerate being away from its "home base" in the car for a set amount of time (to grocery shop or unload groceries) before an alarm would go off
- \* Gym bag grocery bag specifically for spontaneous errands
- Part of the bag is required for the car to store (attach keys to a grocery bag?) → physically can't leave without a bag
- \* A reusable bag/object so beautiful, you want to show it off and use it for more than groceries
- Food is sold in interlocking containers that fit together and carries → don't need bags
- find a way to connect them you have to remember

# Sketches



# Early Concept Ideation



Testing the “elevated coin purse/keychain” concept from the sketches by playing around with grocery/produce bags to see how small they could become.

While the canvas bag didn’t fit in the little pouch, it was feasible for the nylon grocery bag and produce bag.

This would only solve for conveniently bringing one bag at a time, but even that could potentially be helpful in a pinch (and add up over time).

# Concept Evolution

From the beginning, this project has explored how to encourage/enable/promote/ease the use of reusable grocery and produce bags.

In considering a solution, the aim at this stage is not to create a “better” bag, but to have people use the bags they already own. While the problem was first approached by thinking about how to help people *remember* their reusable bags, most recent considerations involve how to make people *excited* about a moment/object/interaction so they *look forward to* bringing their reusable bags.

This shift in perspective has led to ideation around physical material-based solutions (as seen in the previous sketches) that are small, simple, and beautiful.



# Material Exploration

What might a physical solution be made of...



## Magnets

- Satisfying interaction
- Effortless closure system
- Small
- Durable
- Easy to reuse
- Make sure to specify ones without rare earth metals

## Maple

- Beautiful
- Durable
- Ages nicely
- Compostable
- Could use small scrap pieces opposed to sourcing virgin wood

## Brass

- Beautiful
- Durable
- Ages nicely
- Recyclable
- Make sure to specify lead-free for this project

# Lifecycle Inventory and Analysis

Focusing on a wall hook concept, further evaluation of all three material options was completed using Lifecycle Form spreadsheets, the Okala Impact Factors, and the Sustainable Minds software. The insights gained from this process narrowed the material selection down to reclaimed wood (maple wasn't available in the Sustainable Minds database so the scorecard says walnut).

Mining raw materials (iron, copper, and zinc) for the magnets and brass options proved to be overly resource and labor intensive. While they did still produce significantly improved performance scores compared to a single use plastic bag – probably due to their durability – they still fell short of the wood option.

Plywood, virgin wood, and reclaimed wood were all compared as well, and unsurprisingly reclaimed wood performed the best.

See Appendix A-C for Lifecycle Form spreadsheets

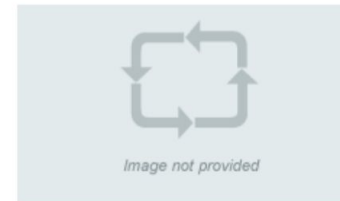


Project: Assignment 10.2 - Assign Lifecycle Inventory  
 Concept: Reclaimed Walnut  
 Methodology: SM 2013

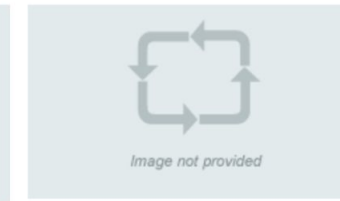
## Scorecard

### Reference

Reference material - Plastic Grocery Bag



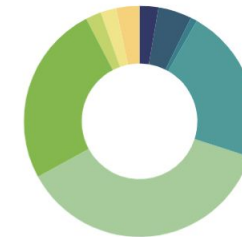
Reclaimed Walnut



100% performance improvement

Impacts per functional unit	<b>0.36</b> mPts per 1 year of use	<b>9.0x10<sup>-4</sup></b> mPts per 1 year of use
Total amount of service delivered	0.003 x 1 year of use	20 x 1 year of use
Impacts of total service delivered	1.1x10 <sup>-3</sup> mPts	0.018 mPts
Assessment level	Estimate	Estimate
<b>Greatest impacts</b>		
SBOM input	Polyethylene, HDPE, granulate	Reclaimed wood, walnut
Impact category	Fossil fuel depletion	Carcinogenics
Life cycle stage	Manufacturing	Manufacturing

### Total impacts by impact category



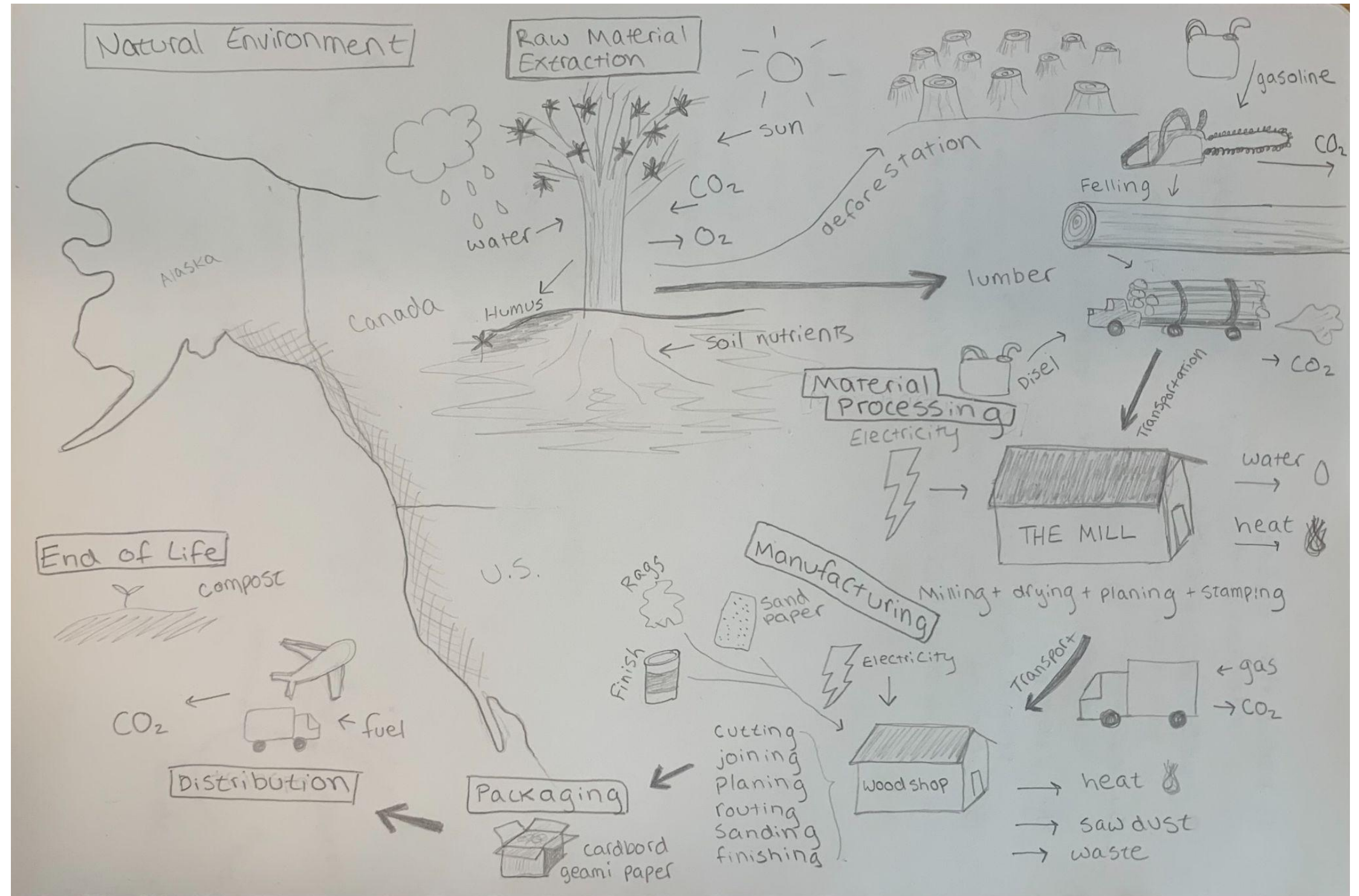
Impact category	%	Impact category	%
<b>Ecological damage</b>		<b>Ecological damage</b>	
<a href="#">Acidification</a>	2.62	<a href="#">Acidification</a>	3.57
<a href="#">Ecotoxicity</a>	4.72	<a href="#">Ecotoxicity</a>	5.75
<a href="#">Eutrophication</a>	0.9	<a href="#">Eutrophication</a>	1.21
<a href="#">Global warming</a>	21.73	<a href="#">Global warming</a>	17.08
<a href="#">Ozone depletion</a>	0.01	<a href="#">Ozone depletion</a>	0.01
<b>Resource depletion</b>		<b>Resource depletion</b>	
<a href="#">Fossil fuel depletion</a>	37.05	<a href="#">Fossil fuel depletion</a>	7.48
<b>Human health damage</b>		<b>Human health damage</b>	
<a href="#">Carcinogenics</a>	25.34	<a href="#">Carcinogenics</a>	41.1
<a href="#">Non carcinogenics</a>	2.18	<a href="#">Non carcinogenics</a>	14.63
<a href="#">Respiratory effects</a>	2.2	<a href="#">Respiratory effects</a>	4.71
<a href="#">Smog</a>	3.26	<a href="#">Smog</a>	4.46



# Lifecycle Diagram

This diagram maps the stages of a maple wood wall hook from extraction in its natural environment through to its end of life and many of the inputs/outputs along the way.

This visual helps illustrate that even for a small simple object, there is a large complex network of resources and labor involved in every stage of its lifecycle.



# Material vs Digital

The intent of this brainstorming session was to explore two directions for a final outcome and choose one to proceed with.

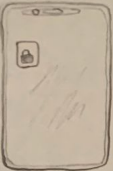
While the project began with a material solution focus, it would be ideal not to introduce a new physical product into the world if the same problem could be solved with less resources and labor.

Through this process, the lists not only revealed that both directions were equally promising in enabling sustainable behavior change, but also brought up the question of evaluating these options against a purely behavioral solution as well.

The image shows a handwritten page from a spiral notebook, divided into two columns by a vertical wavy line. The left column is titled 'Material Solution' and the right column is titled 'Digital Solution'. Each column has two sub-sections: 'PROS' and 'CONS'. The handwriting is in black ink on a light-colored paper.

Material Solution		Digital Solution	
<p><u>PROS</u></p> <ul style="list-style-type: none"><li>• would be designed to spark joy</li><li>• would be durable and could be passed along to a new person once the behavior change is established in the first user</li><li>• Tactile interaction could be more helpful in establishing a behavior change</li><li>• simple design could remain the same for years (if proven effective)</li><li>• opportunity for beautiful branding + educational sustainable packaging</li></ul>	<p><u>CONS</u></p> <ul style="list-style-type: none"><li>• depending on if the solution works + how long the product is in use, it may create more harm than good</li><li>• don't want to create more waste</li><li>• ideally the same person would graduate from needing to use this object, but then there's no guarantee that they pass it along properly (not thrown away)</li><li>• could be exclusive because of high price point for quality materials</li></ul>	<p><u>PROS</u></p> <ul style="list-style-type: none"><li>• no physical materials, manufacturing, transportation, or disposal to worry about</li><li>• most people already have phones → don't need to buy anything new</li><li>• maybe app could be free (sponsored by sustainable brands?)</li><li>• more accessible</li><li>• more customizable (set times, habits, etc.)</li><li>• could compete, encourage, interact, etc. with others on the app - create community of accountability</li></ul>	<p><u>CONS</u></p> <ul style="list-style-type: none"><li>• could just end up being annoying and getting silenced/deleted</li><li>• potentially easy to miss reminders</li><li>• could create more of a reliance on phone than truly changing pattern of remembering bags</li><li>• not everyone is open to trying new apps</li><li>• could be more difficult for older generations</li><li>• would need to continually develop to roll out updates</li></ul>

# Digital Concepting Notes


 an app that could program reminders for the user to bring their bags.

Prompted by:

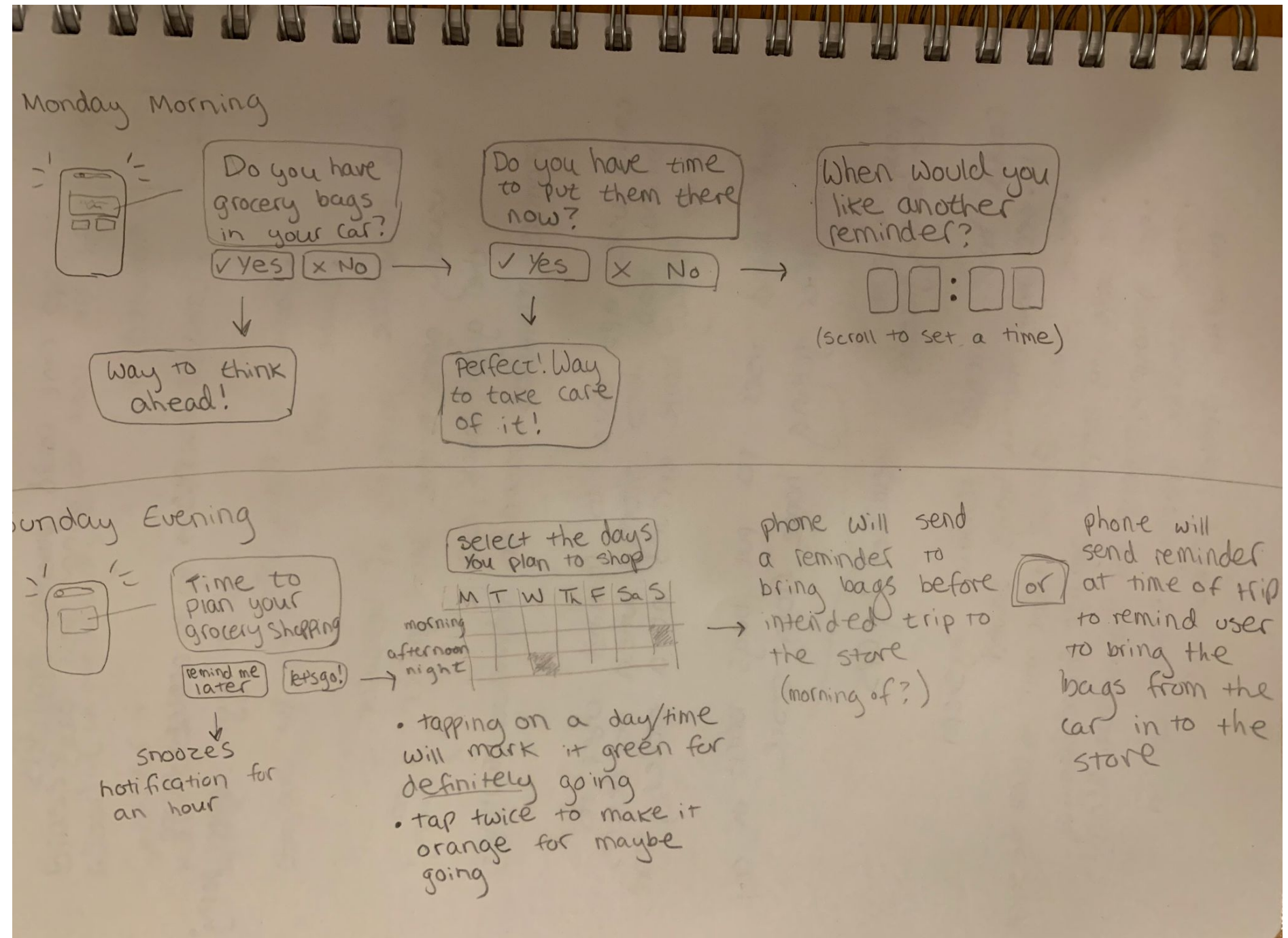
- calendar events → "go to grocery store" "go to gym" "dinner party"
- Same day every week
- Same time

could recognize patterns of behavior  
 ↳ usually goes to the store after the gym, work, etc. } too creepy?  
 Prompts reminders based on individual routines

could use gps data to remind user to bring bag into store when it detects that they have arrived at a grocery store

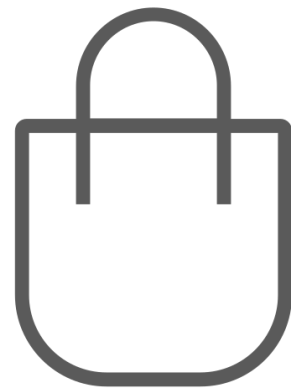
could remind user to put bags back in car 10min after getting home from store  
 ↳ enough time to put away groceries tracked by GPS

could have virtual reward system  
 ↳ see how many bags saved  
 • have streak feature → don't want to break the streak  
 • be able to compete against friends/family  
 • get discounts/coupons for sustainable brands  
 • have specific grocery stores opt in to offer special promotions



# Final Concepts

Three different sustainable design solutions were tested to compare the strengths and weaknesses of each strategy.



## Material

This solution involved prototyping a design for an interactive wall hook whose simple form is made from reclaimed wood. Due to the limited nature of this object, it was only tested in one home.



## Digital & Behavioral

These two solutions were compared head to head in a small experiment consisting of 12 participants – six testing each strategy. The digital group tested a simulated app (digital product), while the behavioral group practiced a new prescribed routine coupled with a verbal mantra to remember their reusable bags.

# Behavior Design Strategies

“According to Prochaska et al.'s (1992) transtheoretical model (TIM), the **creation of durable behaviour is assumed to go through five stages**: precontemplation, contemplation, preparation, action, and maintenance. The TIM distinguishes between people who have not yet decided to change their behaviour, those who intend to, and those who are already changing and sustaining the behaviour”<sup>9</sup>

“The **Design for Positive Habit Model** suggests that the relative stages of habitual formation dictate the individual's motivational readiness for change and receptiveness to interventions. It **provides a framework for the design of interventions based on individual differences in environmental intentions and readiness to adopt new behaviours**, as well as strategies to facilitate change.”<sup>9</sup>

**This project** aims to address the people who **intend to change their behavior** around remembering reusable bags, as well as those who are **already in the process of changing** and sustaining the behavior, therefore, **three appropriate interventions have been identified**.

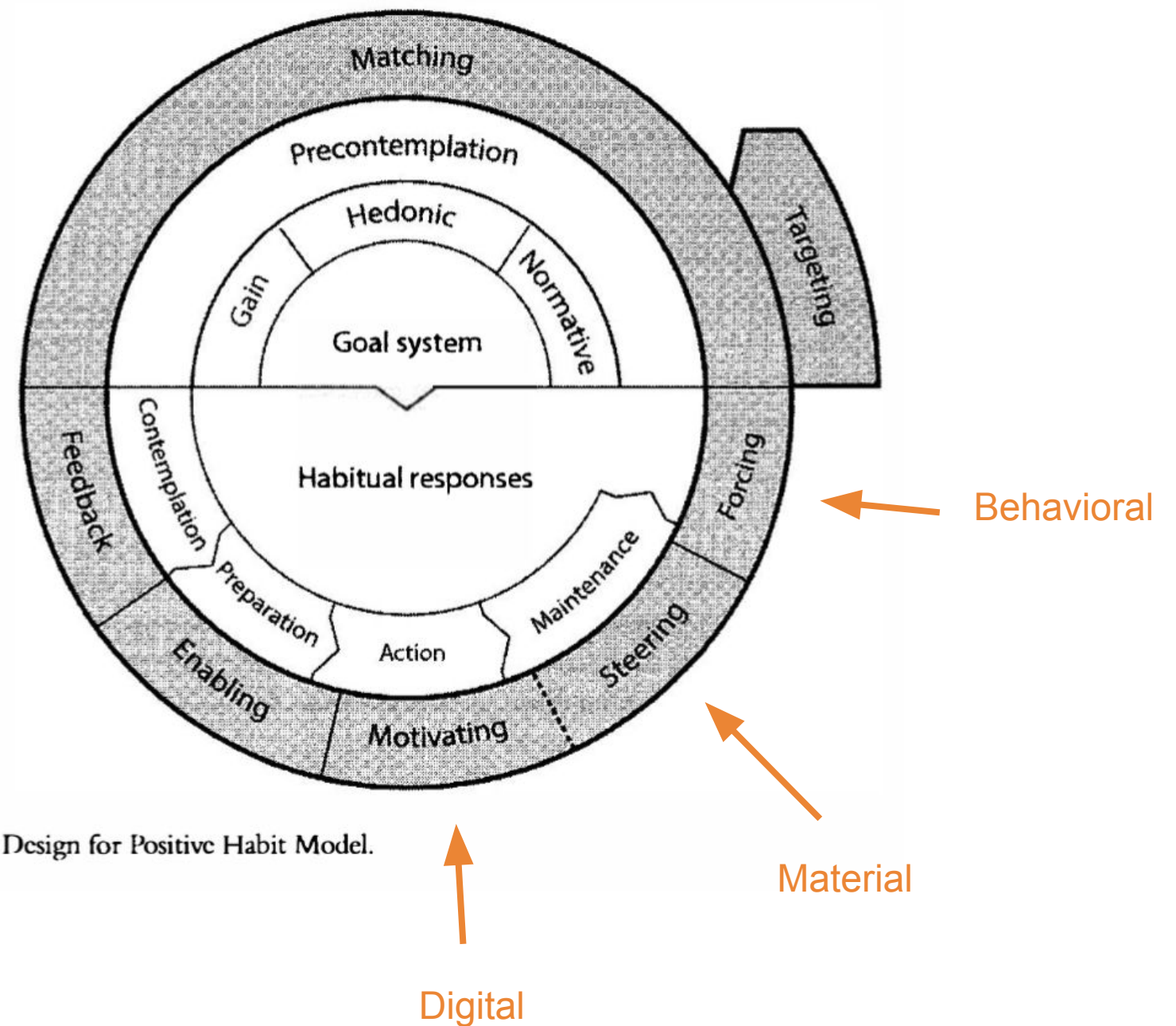


Figure 24.4 Design for Positive Habit Model.

# Behavior Design Strategies

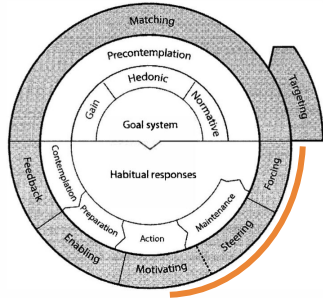


Figure 24.4 Design for Positive Habit Model.

## Digital



### Motivating

**Aim:** to inspire people to explore more sustainable usages through providing rewards to “prompt” good behaviour

**How it works:**

Interventions show people the consequences of actions through a variable (financial, emotional, social, physical) reward

**Example:**

Flower Lamp “blooms” as a reward – changing its shape when power consumption has been low for some time. To make the lamp more beautiful, a change in behaviour is needed (Interactive Institute, 2004).

The digital solution offers positive encouragement through celebratory notifications when people remember their reusable bags, incentivising people to keep up the desired behavior through praise.

## Material



### Steering

**Aim:** to facilitate users to adopt pro-environmental habits through the prescriptions and/or constraints of use embedded in the design

**How it works:**

Interventions contain affordances and constraints which encourage people to adopt sustainable habits or reform existing unsustainable habits.

**Example:**

The AWARE Puzzle Switch is an on/off button that encourages people to switch off the light by playing with people’s built-in desire for order (The AWARE project, 2007).

The material solution affords storing a reusable bag when not in use, and takes advantage of the constraint of gravity to automatically show a “reminder” by way of a bright color.

## Behavioral



### Forcing

**Aim:** to make it harder or impossible for people to act on undesired behaviours by introducing friction to existing context or removing cue of the habit so as to prevent relapse in the change

**How it works:**

Interventions add friction to undesired automated responses or removing cue of the habit

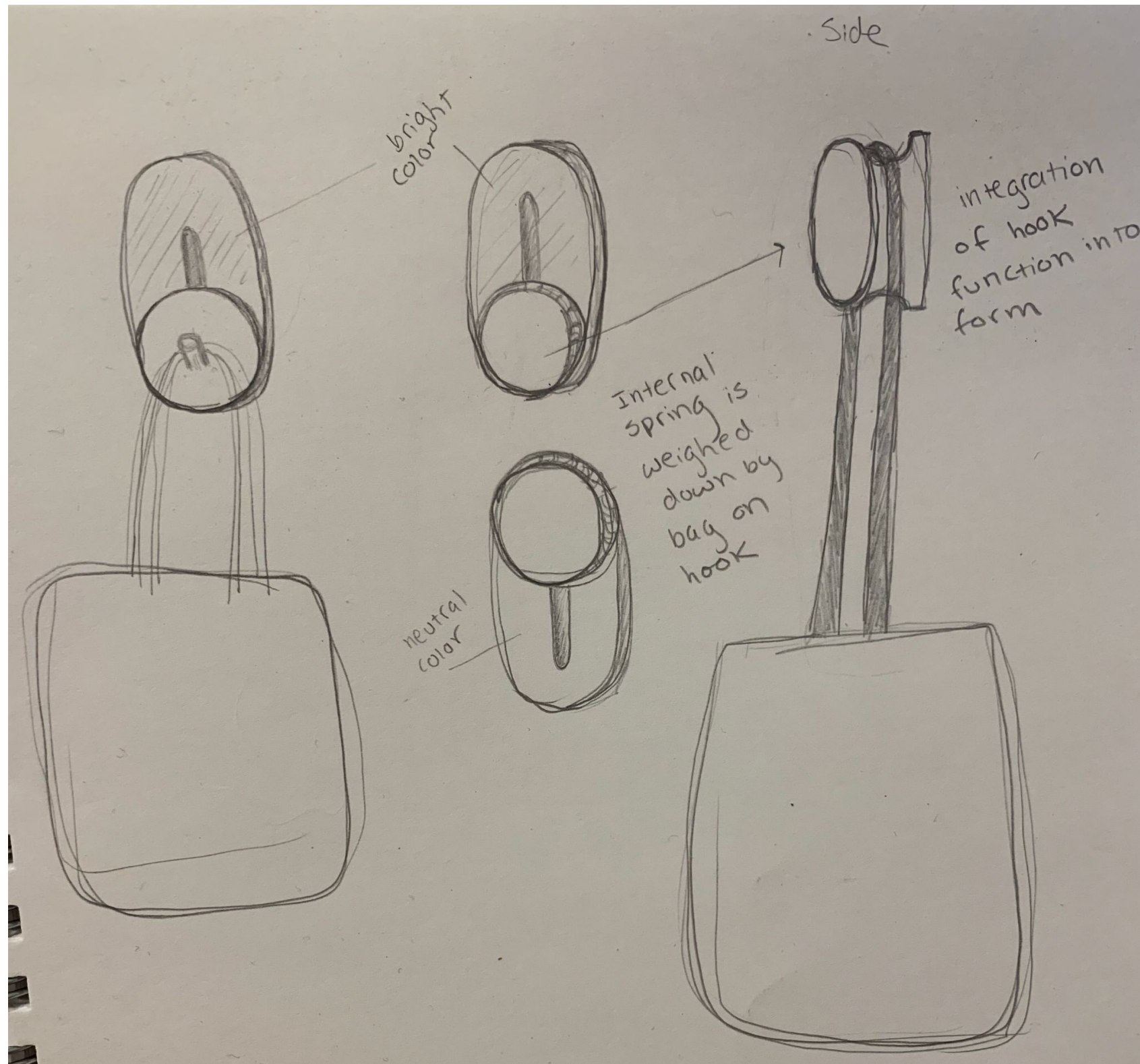
**Example:**

A speed bump forces the people to drive slowly.

The behavioral solution adds friction to the user’s typical routine by adding a new step of placing bags in front of the door after unloading groceries, creating a physical barrier as a reminder.

# Material Solution

## Maple Wall Hook with Gravity Enabled Reminder



- One material prototype was constructed and tested over the course of a week
- Takes advantage of a brightly colored backplate to catch the user's attention when a bag is hanging on the hook
- When bag is removed, spring loaded hook is released from the weight and moves up to cover the bright surface creating a neutral object in the home while the bag is in use
- Simple and modern to fit in most homes
- Intended to be hung by front door or garage door to be in the line of sight upon departure
- Despite short trial, solution resulted in 100% success rate in remembering reusable bags

# Material Solution





# Digital & Behavioral Solutions

This experiment took place over the course of two weeks.

In order to conduct the digital and behavioral solutions experiment, 12 individuals were presented with the opportunity to participate, and all opted in. These people ranged from 28-60 years old, represented three races (although predominantly white), all were middle/upper middle class economic statuses, and lived across five different states.

An introductory email was sent out to all participants to learn more about the project and featured a link to the initial survey to collect information about participants' current grocery shopping practices. Initial and final surveys were designed and distributed through Google Forms.

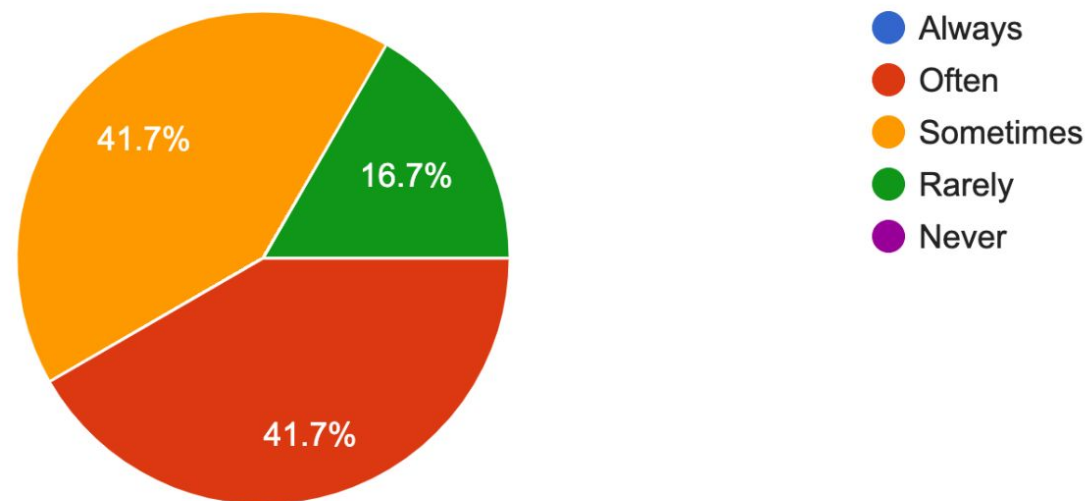
[See Appendix D-J for all participant communications and survey materials](#)



# Initial Survey Results

How often do you use reusable grocery bags when shopping?

12 responses

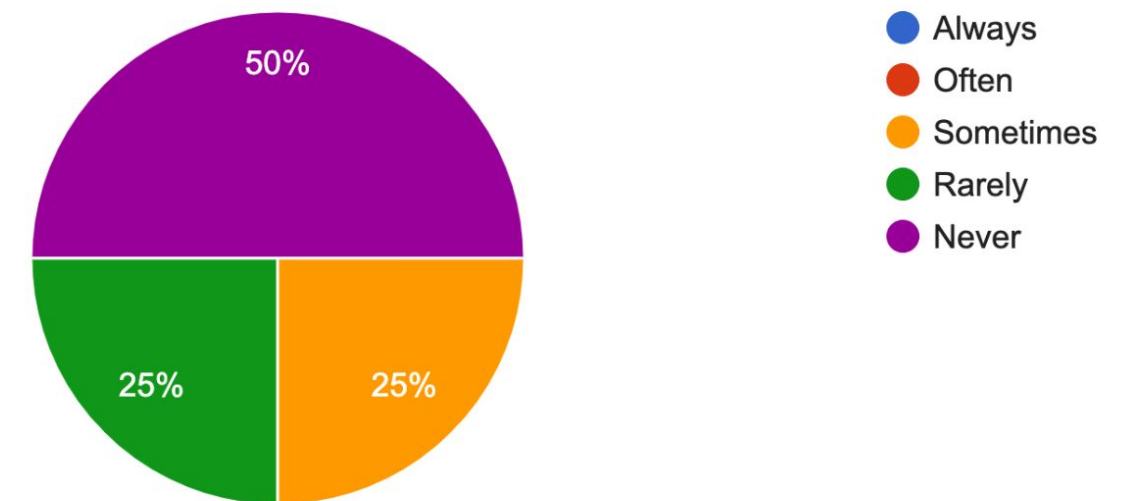


No one *always* remembers their reusable bags

And a fair amount *rarely* use them

How often do you use reusable produce bags when shopping?

12 responses

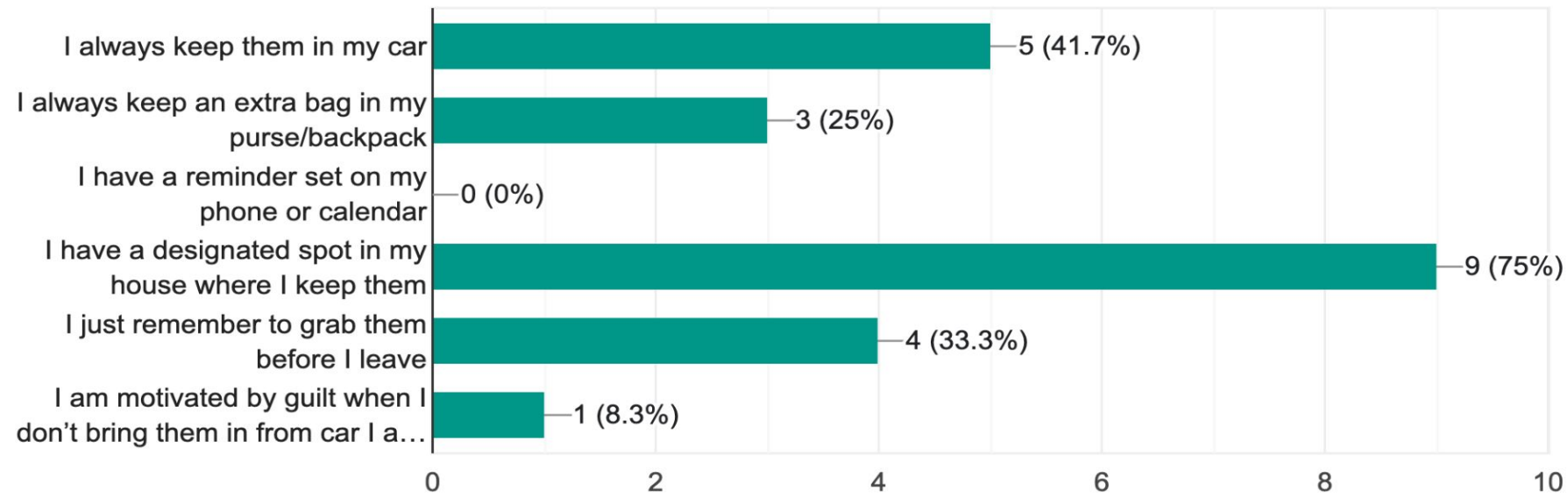


Half of participants *never* use reusable produce bags.

# Initial Survey Results

How do you remember to bring your reusable bags to the grocery store? (select all that apply)

12 responses

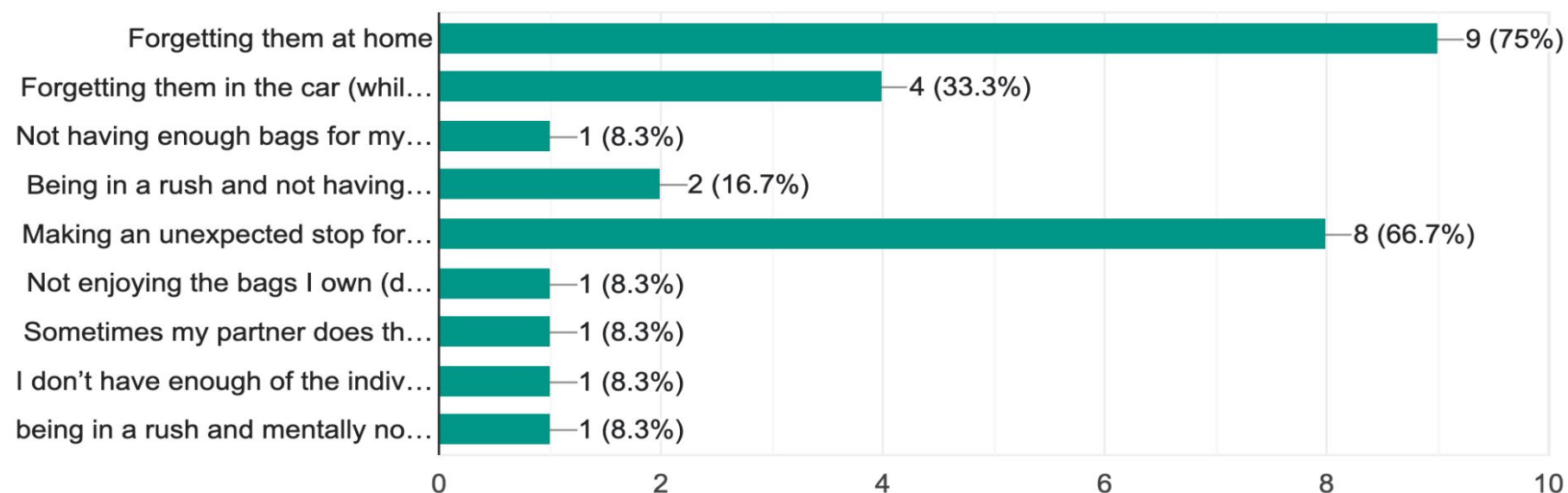


## Top ways to remember bags...

1. Designated spot in house
2. Always keep them in the car
3. "Just remember to grab them"

What obstacles have you faced that prevent you from bringing your reusable bags to the grocery store? (select all that apply)

12 responses



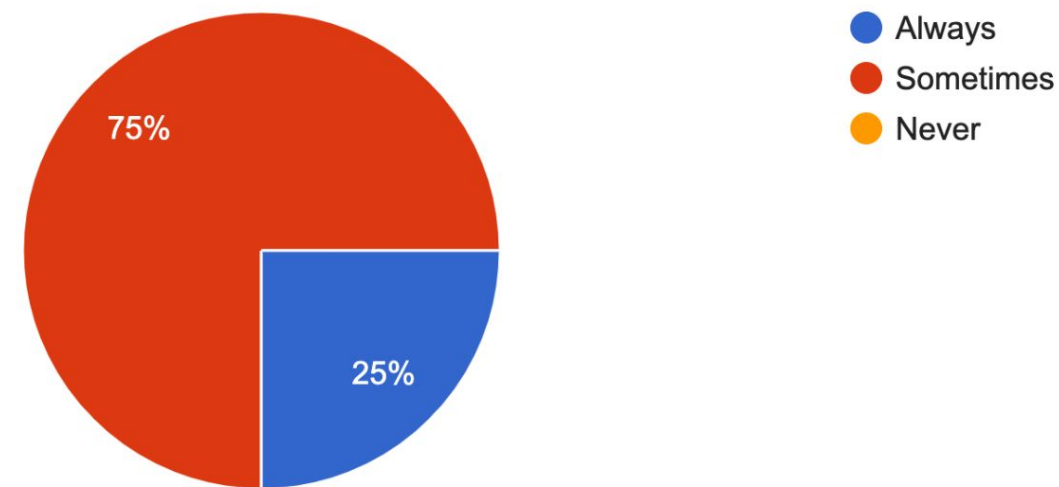
## Biggest obstacles are...

1. Forgetting bags at home
2. Making an unexpected stop for groceries (without bags in the car)
3. Forgetting bags in the car

# Initial Survey Results

Do you make a grocery list prior to going to the store?

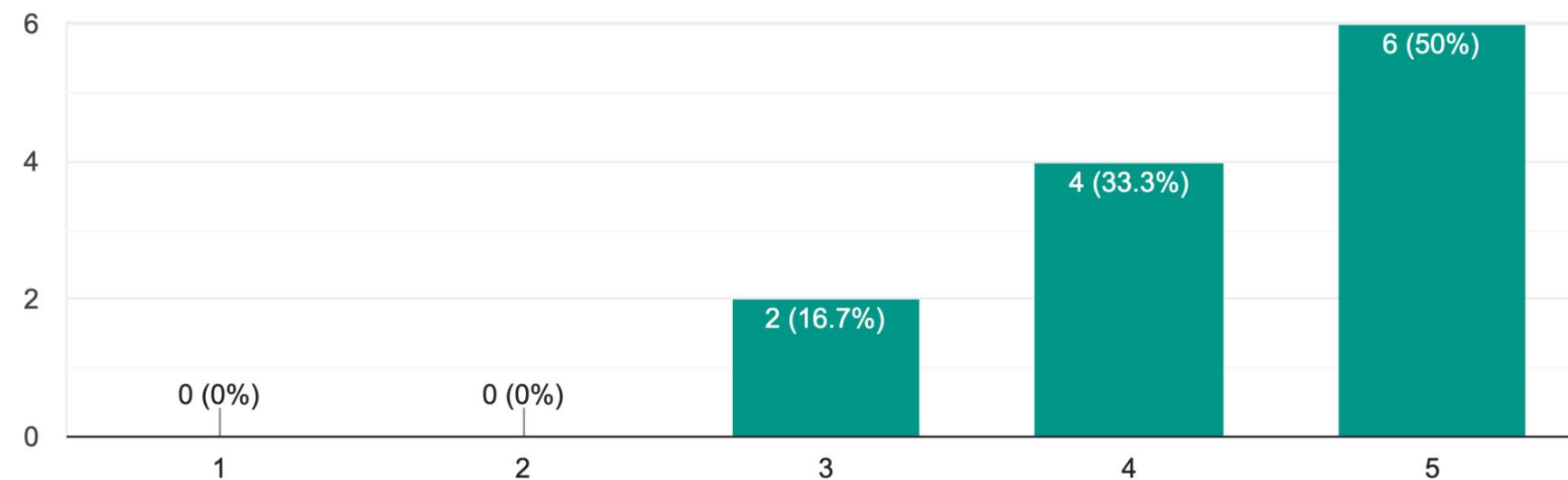
12 responses



Not many people consistently make grocery lists

How important is it to strive to eliminate your use of disposable bags at the grocery store?

12 responses



People are motivated to develop this sustainable behavior change!

# Initial Survey Insights

Insights that informed the next steps of the experiment including the division of the groups and the instructions they were given...

Most people don't have a predictable grocery shopping schedule

No one uses a reminder set on their phone or calendar to bring reusable bags

Most people use grocery lists occasionally, but not very consistently

Sarah was going to text participants in the digital group to simulate notifications from an app based on their shopping schedules. Since schedules were unpredictable, participants were instructed to set location-based reminders so they would receive a reliable notification every time they left their house and arrived at the store.

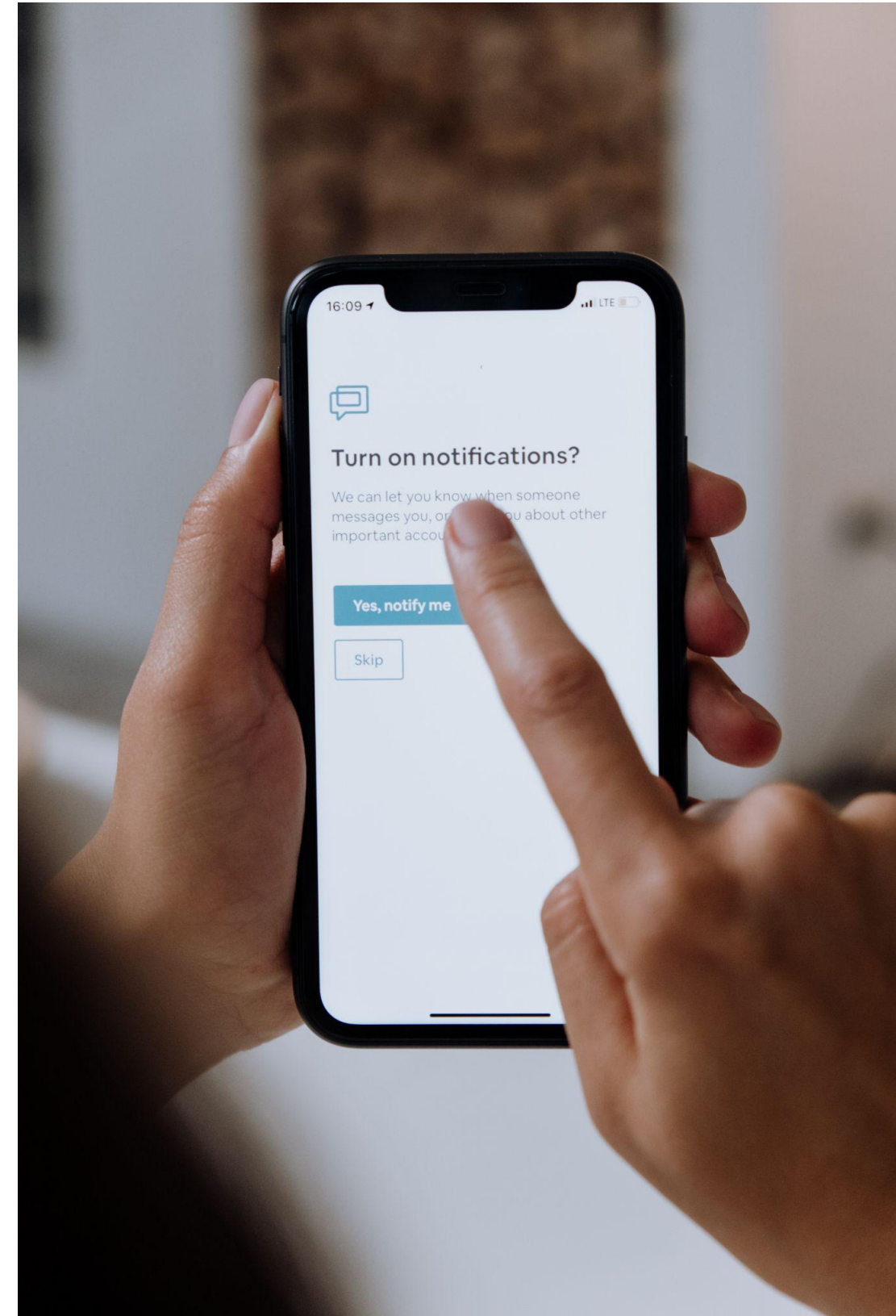
Originally the behavior group was going to be based on who consistently made grocery shopping lists, so that the final item on the list would be to put bags back in the car. In this scenario, the sustainable behavior change could be tied to an existing routine to ease adoption. Since this survey revealed that not many people reliably use grocery lists, the behavior idea pivoted to a universally applicable method.

# Experiment Setup

## Digital Group

- This method simulated notifications from a new app concept
- This whole group had iPhones
- Participants first set location-based reminders through the built-in Reminds app
- Notification #1: bring reusable bags whenever they leave their house
- Notification #2: Text Sarah how many reusable bags they were about to use whenever they arrived at their designated store
- Once contacted, Sarah sent celebratory texts for remembering
- Sarah also helped each person keep track of how many disposable plastic bags that they saved so they got updated feedback on their progress
- Participants were also alerted to their progress compared to other participants

See Appendix G for full instructions sent to participants



# Experiment Setup

## Behavioral Group

- This method didn't require the creation of a new product
- This whole group had cars
- All participants began with bags in their car
- Once they unloaded their groceries at home, they were instructed to immediately consolidate bags into their favorite bag, and place it directly in front of their door
- This placement cued them to bring the bags out to their car the next time they left home, or they had the option to take them out right away
- Periodic reminders were sent to keep the project top of mind that just said "Plastic waste just won't do, remember your bags, it's up to you!"
- Participants were invited to use this mantra for motivation when they initially may have forgotten their bags, but were still in a position where they could go back and grab them

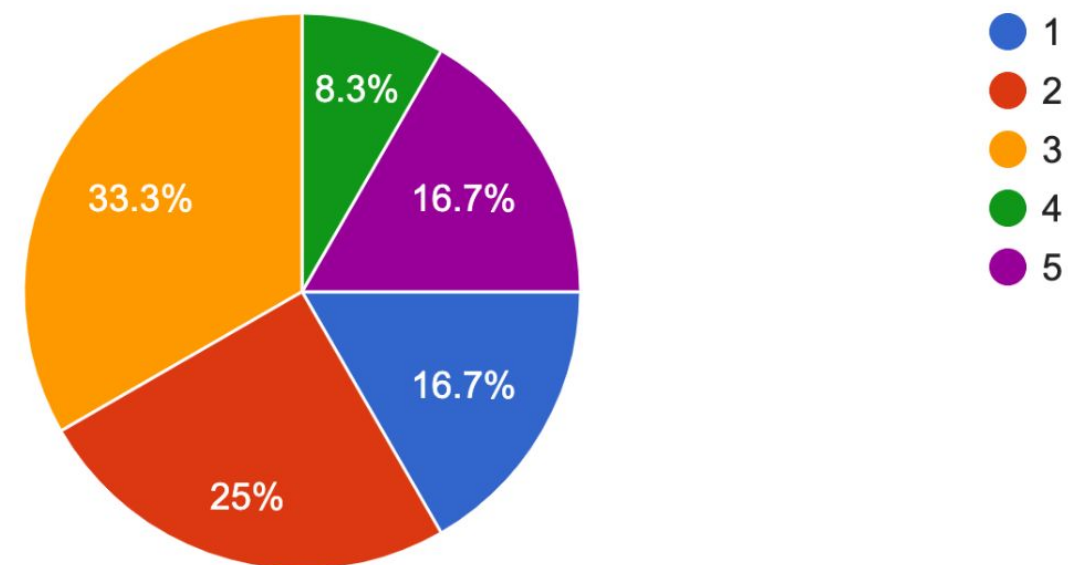
See Appendix H for full instructions sent to participants



# Final Survey Results

How many times did you go grocery shopping since agreeing to participate in this experiment?

12 responses



The digital group shopped **12** times

In total, participants went to the store **35** times during the experiment

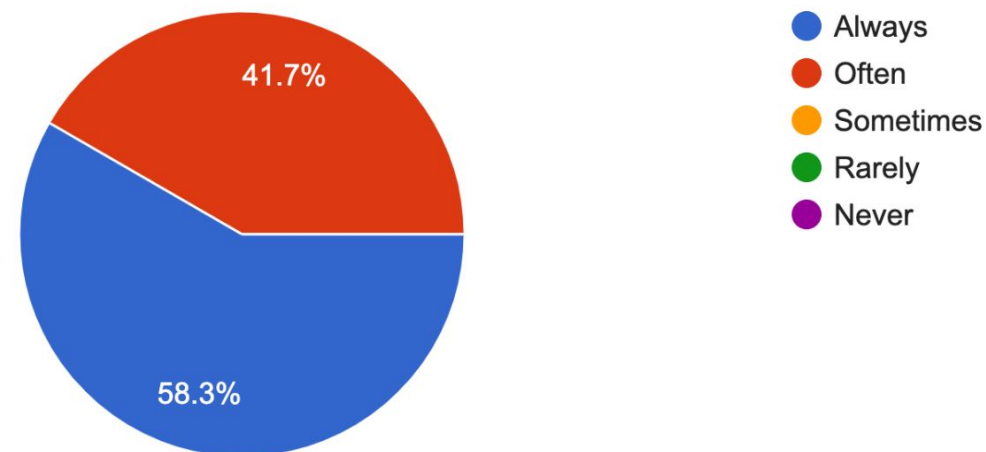
The behavioral group shopped **22** times



# Final Survey Results

How often did you use reusable grocery bags when shopping?

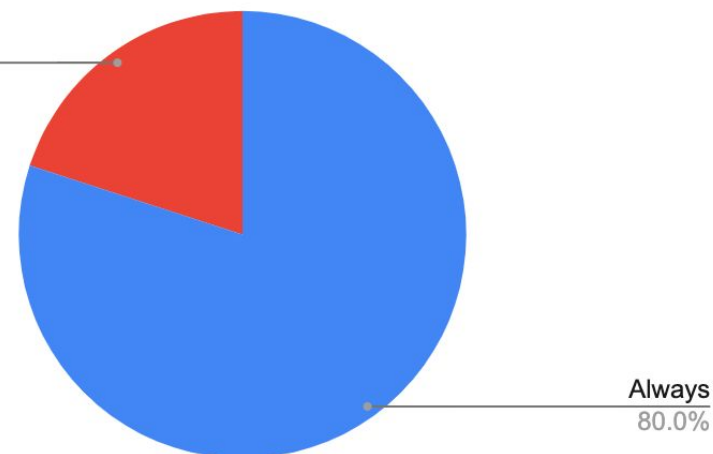
12 responses



**11** out of 12 people **improved** the frequency that they used reusable grocery bags since the initial survey

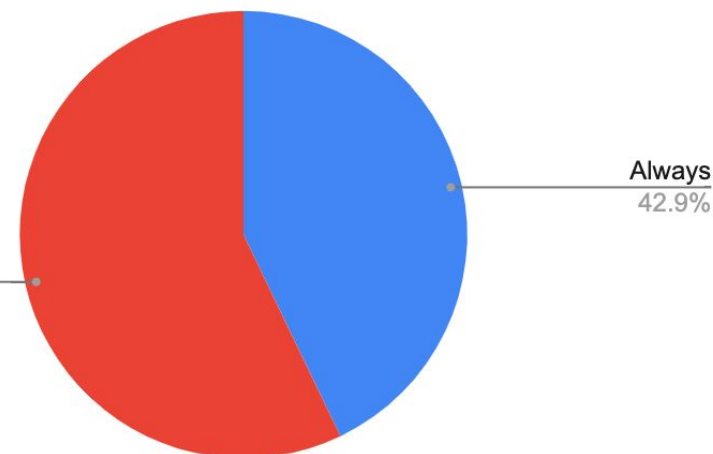
How often did you use reusable grocery bags when shopping? (Digital Group)

Often  
20.0%



How often did you use reusable grocery bags when shopping? (Behavioral Group)

Often  
57.1%

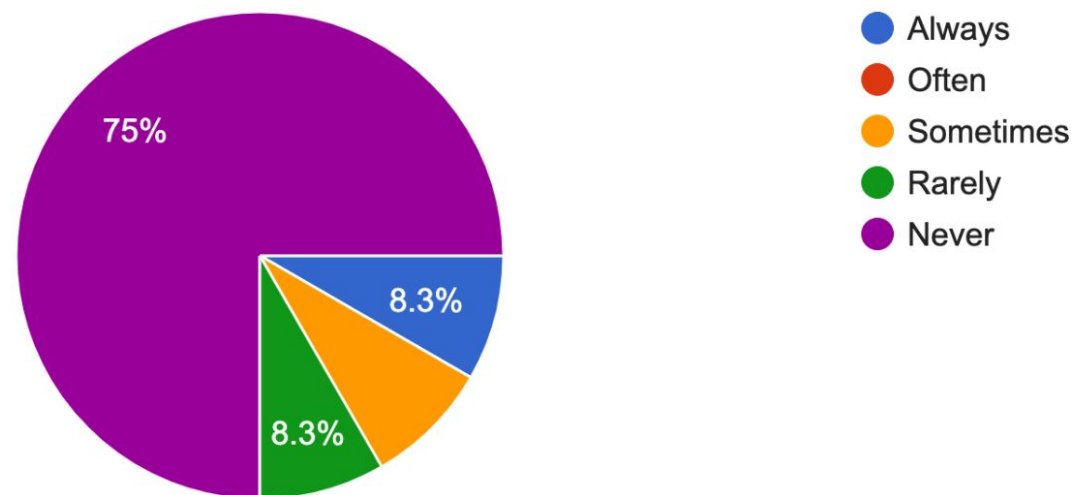


The **digital** group more consistently brought reusable grocery bags to the store, but also made fewer trips to the store

# Final Survey Results

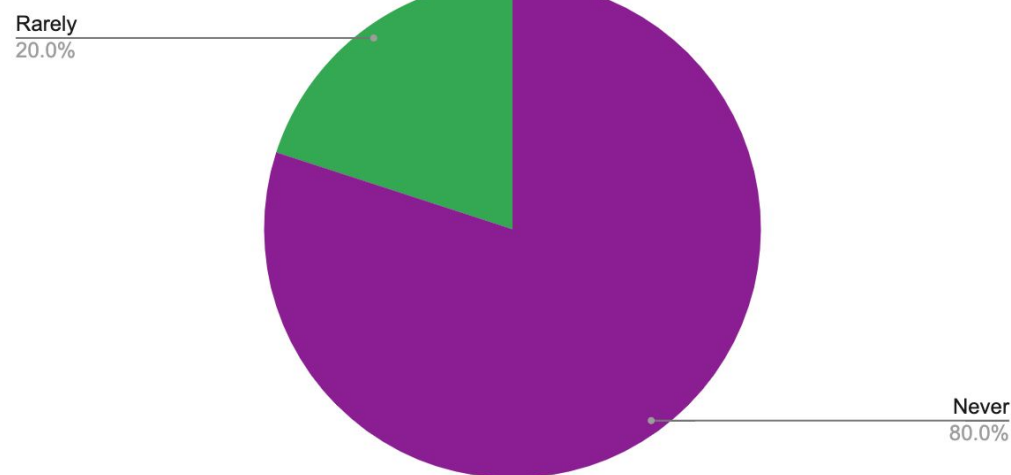
How often did you use reusable produce bags when shopping?

12 responses

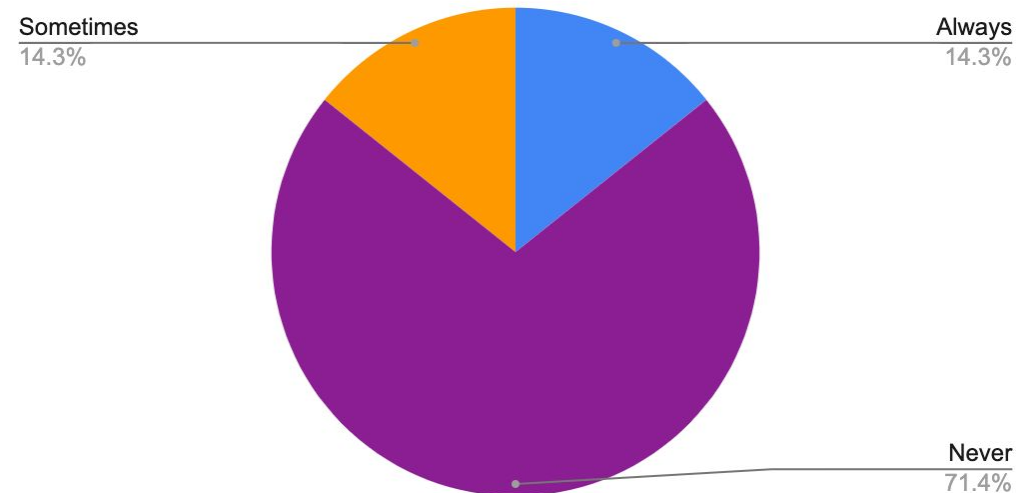


**Less** people brought reusable produce bags to the store since the initial survey, although many noted they **didn't use disposable** produce bags either

How often did you use reusable produce bags when shopping? (Digital Group)



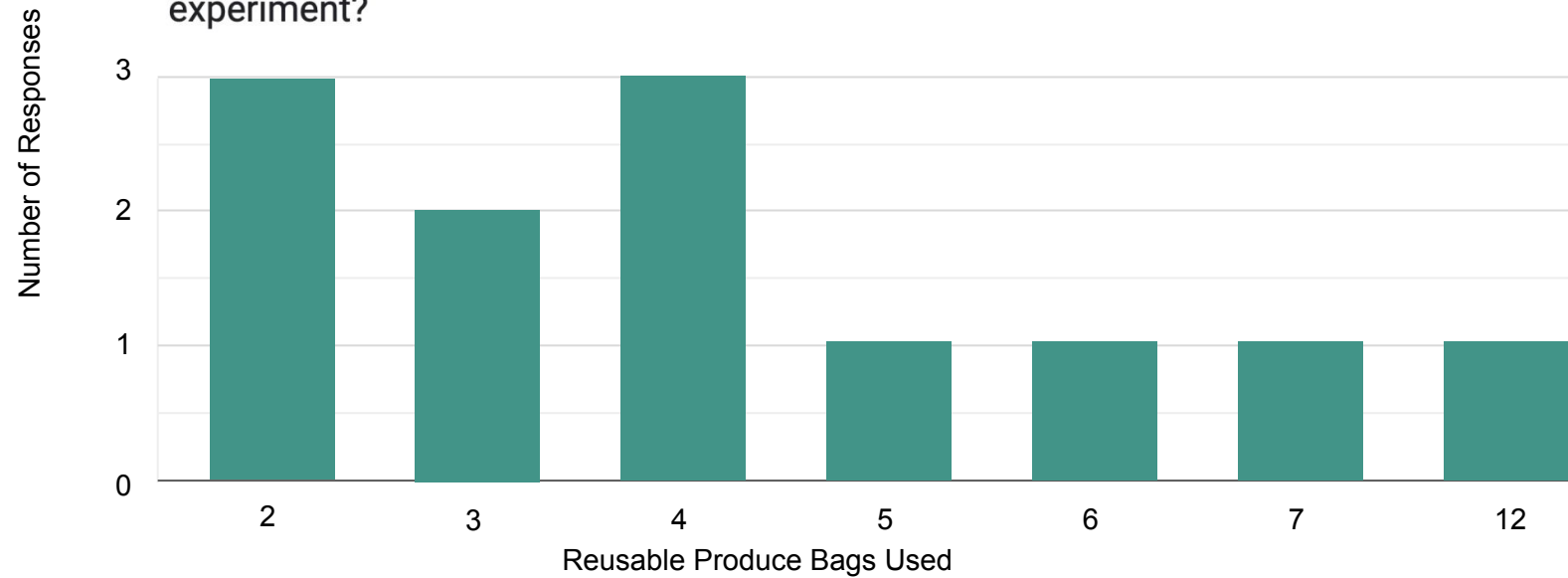
How often did you use reusable produce bags when shopping? (Behavioral Group)



The **behavioral** group more consistently brought reusable produce bags to the store, and made more trips to the store

# Final Survey Results

If you were to estimate, how many reusable grocery bags did you use over the course of the experiment?

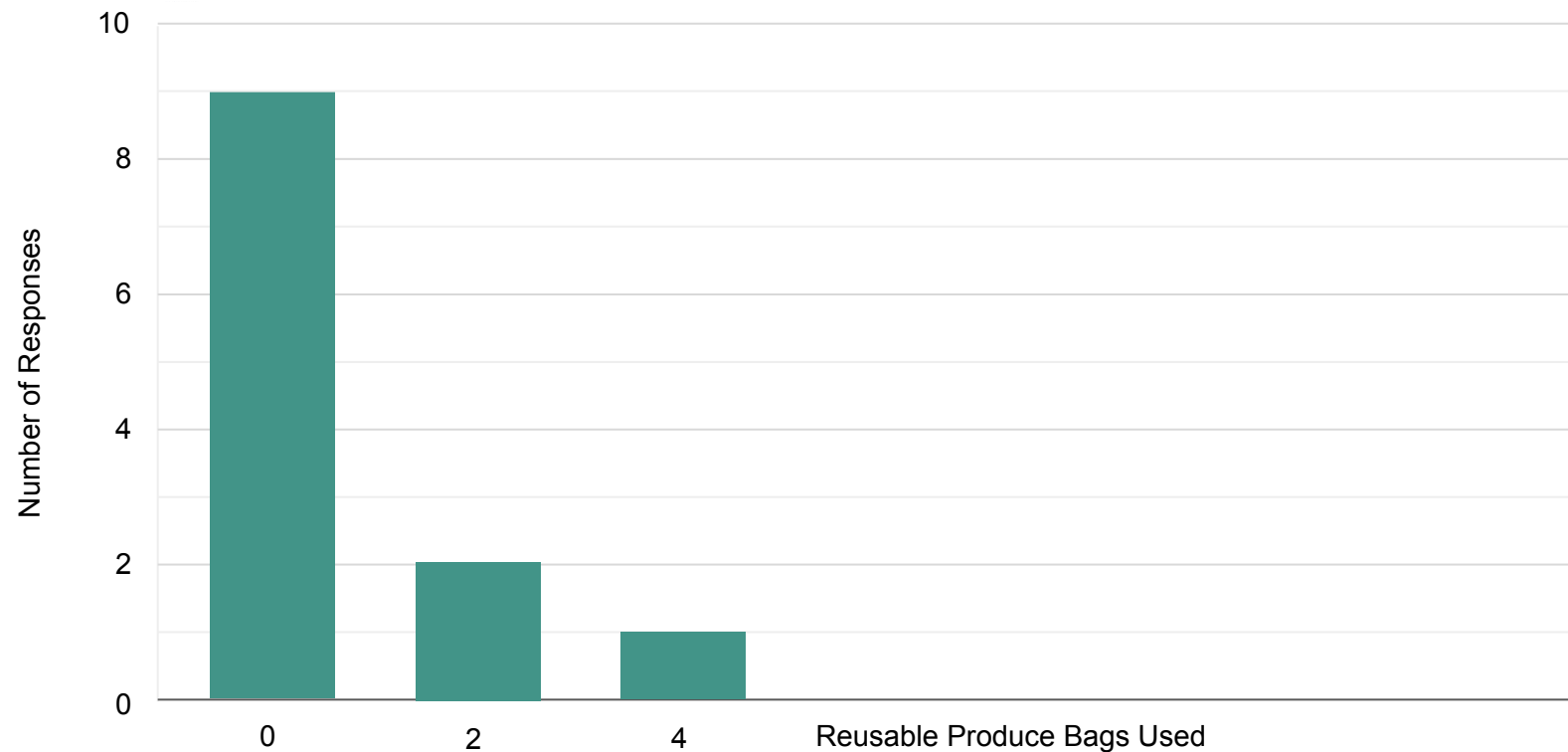


Digital group: **16** reusable grocery bags

Behavioral group: **38** reusable grocery bags

Total: **54** reusable grocery bags

If you were to estimate, how many reusable produce bags did you use over the course of the experiment?



Digital group: **0** reusable produce bags

Behavioral group: **6** reusable produce bags

Total: **6** reusable produce bags

# Final Survey Results



“I knew I needed to tell Sarah how many I used when I went so I made sure to bring one when I did and that gave me some accountability.”

“Knowing that I would be accountable to these survey results made me much more attentive to remembering my bags before I left the house!”

“It made me be more intentional about my grocery trips”

“I felt personally connected because of the project. The relationship was important and motivating”

“I didn't want to disappoint Sarah so I was extra good at bringing my bags”

“Taking the survey ahead of time and the text reminders really helped me remember to take bags wherever I went (grocery shopping and clothes shopping)”

“It was really rewarding when I remembered that I'd receive the text reminder. Very helpful and helped me stay accountable.”

“I remembered to put my bags in the car more regularly!”



# Final Survey Results

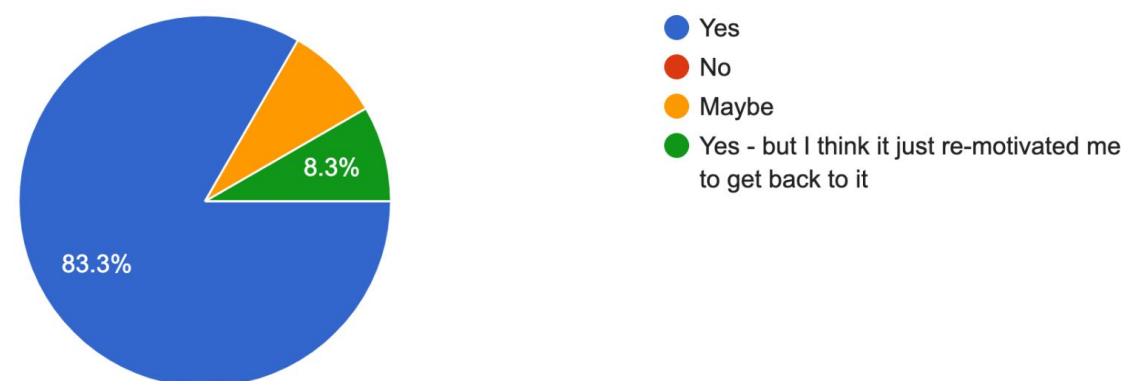
What could have made the experiment more successful in initiating a sustainability-focused behavior change?



**More time** was the most selected factor that could have made the experiment more successful

Do you feel more motivated now after the experiment to continue building the habit of remembering to bring reusable bags to the grocery store?

12 responses



**11** out of 12 people responded **yes** they did feel **more motivated to continue** building this habit

# Final Survey Insights

- The digital group wasn't very consistent about texting Sarah how many bags they were about to bring into the store
- The lack of incremental bag counts made it difficult to share comparative updates with participants to show how well they were doing in relation to other participants
- There was positive feedback on the encouraging messages when people did let Sarah know they remembered to use their bags
- People also wanted rewards in addition to praise
- One of the major motivators for both groups was personal accountability
- A couple people asked about the impacts of repurposing plastic produce bags (e.g. small trash can bags, dog waste bags, etc.), which could be something to look into for a future project
- Ideally the experiment would have lasted more than two weeks to gather more data
- Future iterations would have also ensured all participants had reusable produce bags



# Concept Conclusions

All three different sustainable design solutions had strengths and weaknesses, but any definitive winner could not be determined without more time and more people to test each option.

	<u>Material</u>	<u>Digital</u>	<u>Behavioral</u>
<u>Strength</u>	<ul style="list-style-type: none"> <li>● Convenient</li> <li>● Beautiful</li> <li>● Object could be passed along once habit is established</li> </ul>	<ul style="list-style-type: none"> <li>● Convenient</li> <li>● Integrated into normal routines</li> <li>● Positive encouragement</li> <li>● Accountability is helpful</li> </ul>	<ul style="list-style-type: none"> <li>● Visual and haptic practice quickly builds the new habit</li> <li>● Brings joy and intention through focusing on favorite bag</li> </ul>
<u>Weakness</u>	<ul style="list-style-type: none"> <li>● Requires physical materials and manufacturing</li> <li>● Might not fit all home styles</li> </ul>	<ul style="list-style-type: none"> <li>● Unable to test comparative feature to establish cultural norms within the experiment</li> <li>● Hard to get partners/roommates to participate</li> </ul>	<ul style="list-style-type: none"> <li>● Inconvenient</li> <li>● Assumes people have cars</li> <li>● Not as helpful for bringing bag from car to store</li> <li>● Hard to get partners/roommates to participate</li> </ul>

# Impacts



## From the Experiment

- 12 people seriously considered their reusable bags habits
- **62 disposable bags were not used** because people remembered their reusable bags
- 6 people now have reminders programmed into their phones to continually remember their reusable bags
- 4 people were **inspired to get reusable produce bags**
- **11 people said they are more motivated** than before to continue building up this sustainability-driven habit



## Potential Impacts

- If all Americans exclusively used reusable bags, it would **save 100 billion plastic bags a year**, which require 12 million barrels of oil to manufacture<sup>2</sup>
  - That's the equivalent to over **18 Olympic sized swimming pools filled with oil!**
- Eliminating 100 billion plastic bags a year would also result in the **reduction of 158 billion kg CO<sub>2</sub>e**<sup>10</sup>
  - That's the equivalent to emissions from **42.3 coal-fired power plants** in one year<sup>11</sup>
- Choosing reusable means protecting millions of birds, turtles, and other animals from plastic caused deaths<sup>3</sup>



# Impacts



**12.5** By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse



**13.3** Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning



**14.1** By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution



**15.5** Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species

Eliminating the need for single use plastic bags would address the unsustainable patterns of consumption and production and help reduce climate change, biodiversity loss, and pollution.

Plastic bags are petroleum-based products, the creation of which emits large amounts of greenhouse gases that accelerate climate change. Choose reusable bags instead!

Plastic waste (including bags) poses many threats to marine life including polluting delicate ecosystems and being fatally mistaken as food. Reusable bags cut down on harmful waste.

Similarly to marine life, land animals are also suffering from plastic pollution and must be protected or face the possibility of extinction. Reusable bags can reduce the loss of biodiversity.

# Remember your reusable bags!

there's more at stake than feeling shame and guilt at checkout

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26. Photo by Kindel Media: <https://www.pexels.com/photo/point-of-view-of-a-person-on-a-springboard-8688134/>
27. UN SDG Icons from <https://sdgs.un.org/goals>

# Appendix A

## Magnet (iron) Lifecycle Form

Component	Natural Environment	Raw Material Extraction			Material Processing			Component Manufacturing			Assembly & Packaging		
	Where does it come from?	Virgin Material	Input/Output	Detail	Process	Input/Output	Detail	Input/Output	Detail	Input/Output	Detail		
Magnet	<ul style="list-style-type: none"> <li>Igneous and metamorphic rocks</li> <li>In the U.S. – Lake Superior district, NE, Alabama, SW</li> <li>China, Russia, Sweden, Australia, Indonesia, and</li> </ul>	Iron	Input	Electricity for mining equipment (rotary drills, hydraulic shovels, water tankers, graders, pumps, etc.)	Refining iron ore	Input	Fuel for transportation from mine to refinement facility	Powder Metallurgy	Input	Powdered elements: iron, neodymium, boron	Packaging	Input	Iron plate
			Input	Fuel for mining equipment and transport (front-end loaders, rear dump trucks, bulldozers, service trucks, bulk trucks, pick-up trucks, etc.)		Input	Electricity to run the machines that crush the ore, and mills that grind it		Input	Energy to create heat, power a vacuum chamber, run the ball mill that crushes the newly formed alloy into dust, power the oven for sintering + annealing, and power the electromagnetic force used to align the groups of atoms		Input	Foam
			Input	Water for mining process ( <a href="#">US Geological Survey</a> )		Output	Dust + fine particles released into the air		Output	Dust + fine particles		Input	Wood crate
			Output	Engine fumes		Output	Water removed from the concentration process		Input	Magnetic force to align the molecules in the alloy metal dust		Input	Plastic wrap to waterproof the box
			Output	Dust + fine particles released into the air		Output	Waste solids – sand, rock, etc.		Input	Pressure from hydraulic or mechanical rams to compress the metal powder in the dies		Input	<a href="#">(China Magnets Source – Magnet Packaging)</a>
			Output	Acid mine water		Input	Potentially the use of chemical reagents (depending on type of concentration process) including collectors, frothers, anti-foamers, activators, and depressants		Input	Chemicals for a protective coating		Input	
			Output	Carbon dioxide	Agglomeration	Output	Silica removed in the floatation step		Output	Heat		Input	
			Output	Sulphur compounds		Input	Energy to create heat		Input	<a href="#">(How Products Are Made)</a> <a href="#">(Arnold Magnetic Technologies)</a>		Input	
			Output	Chlorides		Output	Heat		Input			Input	
			Output	Fluorides		Output	Potentially carbon dioxide (for the sintering method)		Input			Input	
			Output	Nitrogen dioxide		Output			Input			Input	
			Output	Health and safety impacts for miners		Input	<a href="#">(Energy &amp; Environmental Profile of the U.S. Mining Industry)</a>		Input			Input	
			Input	<a href="#">(Energy &amp; Environmental Profile of the U.S. Mining Industry)</a>		Input			Input			Input	

Transport/Distribution/Purchase			End of Life Scenarios		
	Input/Output	Detail		Input/Output	Detail
Transport	Input	Fuel for shipping	Material Recycling	Input	Magnets
	Input		Material Recycling	Output	Rare earth minerals
	Input		Disassembly	Output	Unwanted additives
	Input		Disassembly	Input	<a href="#">(Arnold Magnetic Technologies)</a>

# Appendix B

## Maple Lifecycle Form

Component	Natural Environment	Raw Material Extraction		Material Processing		Component Manufacturing		Assembly & Packaging					
	Where does it come from?	Virgin Material	Input/Output	Detail	Process	Input/Output	Detail		Input/Output	Detail			
Hook/accessory	West coast Alaska through California	Bigleaf Maple Tree	Input	Water	Felling	Input	Gasoline to run chainsaws	Cutting	Input	Electricity	Small cardboard box	Input	Cardboard
			Input	Sunlight		Input	Diesel to run tractors and trucks to transport the wood to the mill		Output	Sawdust		Input	Energy to run machines to cut the cardboard sheets into appropriate shapes for boxes
			Input	Nutrients from the soil		Output	Carbon Dioxide	Joining	Input	Electricity		Input	Kraft Paper
			Input	Carbon dioxide	Milling	Input	Electricity to power saws		Output	Sawdust		Input	
			Output	Oxygen		Output	Bark and scrap bits of wood	Planing	Input	Electricity		Input	
			Output	Humus (by way of dead/decomposing leaves, etc.)	Drying/seasoning	Input	Electricity to heat the kiln (not necessary for air drying)		Output	Sawdust		Input	
			Output	Lumber		Output	Heat	Cutting/routing/carving?	Input	Electricity		Input	
			Output	Deforestation	Planing	Input	Electricity to power planers		Output	Sawdust		Input	
			Input		Grade stamping	Input	Ink	Sanding	Input	Electricity		Input	
			Input			Output	Water? (as the ink dries?)		Input	Sandpaper		Input	
			Input		Banding	Input	Plastic		Output	Sawdust		Input	
			Input			Input			Output	Used sandpaper		Input	
Input			Input		Finishing	Input	Rubio Monocoat (0% VOC hardwax oil wood finish)		Input				

Transport/Distribution/Purchase			Maintenance/Upgrading			End of Life Scenarios		
	Input/Output	Detail		Input/Output	Detail		Input/Output	Detail
Transported by air and land	Input	Fuel for airplane and delivery truck	Refinishing (for future touchups)	Input	Rubio Monocoat	Industrial Composting	Input	Energy
	Input					Industrial Composting	Input	

# Appendix C

## Brass Lifecycle Form

Component	Natural Environment	Raw Material Extraction			Material Processing			Component Manufacturing			Assembly & Packaging			
	Where does it come from?	Virgin Material	Input/Output	Detail	Process	Input/Output	Detail	Input/Output	Detail	Input/Output	Detail			
Hook/accessory	Chile, Australia, Peru, Mexico, and the U.S.	Copper	Input	Electricity for mining, grinding, concentrating, roasting, smelting, conversion, anode casting, and electro-refining	Creating the Copper alloy Brass	Input	Copper	Sand Casting	Input	Sand	Small cardboard box	Input	Cardboard	
			Input	Water		Input	Zinc		Input	Pattern (might be made of wood, metal, plastic – gets removed before molten metal is added)		Input	Energy to run machines to cut the cardboard sheets into appropriate shapes for boxes	
			Input	Chemicals for the slurry in the concentrating stage that help the copper sulfide minerals to float in order to be skimmed off and collected		Input	Additional materials to achieve specific attributes (i.g. iron, lead, tin, arsenic, antimony, manganese, silicon, and phosphorous)		Input	Molten brass		Input	Kraft Paper	
			Output	Carbon dioxide		Input	Electricity to heat furnace to melt materials together, and to power the rolling machines		Output	Heat		Input		
			Input	Electrolyte (an aqueous solution of sulfuric acid and copper sulfate)		Output	Heat		Finishing	Input		Cutting ceramic media	Input	
			Input	Stainless steel (used in the refining stage for the copper to be temporarily plated onto)		Output	Scrap pieces from final cuts			Input		Fine plastic media	Input	
			Output	Stainless steel		Input	(Brass)			Input		Electricity to power tumbling machines	Input	
			Output	Impurities		Input				Input		Hand polishig compound	Input	
			Output	Health and safety impacts for miners		Input				Output		Brass dust	Input	
			Input	(Copper - From Beginning to End)		Input				Input			Input	
	Canada, Russia, Australia, Peru, U.S., China (top 6 of over 50 countries that mine zinc)	Zinc	Input	Electricity	Input		Input			Input				
			Output	Heat	Input		Input			Input				
			Input	Diluted sulphuric acid	Input		Input			Input				
			Output	Contaminants	Input		Input			Input				
			Output	Sulphuric gas	Input		Input		Input					
			Output	Lead	Input		Input		Input					
			Output	Carbon dioxide	Input		Input		Input					
			Output	Carbon monoxide	Input		Input		Input					
			Output	Cadmium	Input		Input		Input					
			Output	Health and safety impacts for miners	Input		Input		Input					
		Input	(Zinc Processing)	Input		Input		Input						

Transport/Distribution/Purchase			Maintenance/Upgrading			End of Life Scenarios		
	Input/Output	Detail		Input/Output	Detail		Input/Output	Detail
Transported by air and land	Input	Fuel for airplane and delivery truck	Refinishing	Input	Hand polishing compound	Material Recycling	Input	Energy to heat a furnace to melt down the brass
	Input			Input	Polishing/microfiber cloth	Material Recycling	Output	Heat
	Input			Output	Used compound + cloth	Disassembly	Input	

# Appendix D

## Initial Experiment Communication – Email to Participants

Hi \_\_\_\_\_!

I really appreciate you helping out with this project!

### About the Project

One of my classes this term is The Practice of Sustainable Design, and we are currently working on a project that aims to solve a sustainability-related problem with behavior design. The problem I'm addressing is well-intentioned people forgetting to bring reusable grocery + produce bags to the store and continuing to use disposable bags instead. This little experiment is composed of two groups trying different solutions – one digital, one purely behavioral. (I'll also be working on a material solution, but it isn't part of this experiment)

### What to Expect

The first step will be filling out the survey (linked below), after which I will assign you to a group and provide more specific instructions for the strategy you'll be testing. Both groups will be getting texts from me over the course of the next two weeks based on when your estimated grocery trips will take place (info gathered in the survey). Think of these texts as notifications, so there's no need to respond. If your shopping plans change, or you're genuinely unsure when you'll make it to the store, let me know and I'll adjust accordingly. Once two weeks are up, I will send you a quick follow up survey to capture the results of your experience.

### Survey

The **initial survey** will help gather baseline information, and takes less than 1 minute to fill out. Please complete it as soon as you can.

Thank you!

Sarah



# Appendix E

## Initial Survey Questions

1. How often do you use reusable grocery bags when shopping?
  - a. Always
  - b. Often
  - c. Sometimes
  - d. Rarely
  - e. Never
2. How often do you use reusable produce bags when shopping?
  - a. Always
  - b. Often
  - c. Sometimes
  - d. Rarely
  - e. Never
3. How do you remember to bring your reusable grocery bags to the store? (select all that apply)
  - a. I always keep them in my car
  - b. I always keep an extra bag in my purse/backpack
  - c. I have a reminder set on my phone or calendar
  - d. I have a designated spot in my house where I keep them
  - e. I just remember to grab them before I leave
  - f. Other (please specify)
4. What obstacles have you faced that prevent you from bringing your reusable bags to the grocery store? (select all that apply)
  - a. Forgetting them at home
  - b. Forgetting them in the car (while at the store)
  - c. Not having enough bags for my groceries
  - d. Being in a rush and not having time to grab them
  - e. Making an unexpected stop for groceries (without bags already in the car)
  - f. Not enjoying the bags I own (due to size, material, ergonomics, color, etc.)
  - g. Other (please specify)
5. How important is it to strive to eliminate your use of disposable bags at the grocery store?
  - a. Very important
  - b. Somewhat important
  - c. Not very important
  - d. Not at all important
6. Do you make a grocery list prior to going to the store?
  - a. Always
  - b. Sometimes
  - c. Never
7. Please provide the estimated days and times you intend to visit the grocery store in the next two weeks.
8. Is there anything else you would like to share about your experience using reusable bags or your thoughts on developing sustainable behavior changes?

# Appendix F

## Initial Survey Responses

How often do you use reusable grocery bags when shopping?	How often do you use reusable produce bags when shopping?	How do you remember to bring your reusable bags to the grocery store? (select all that apply)	What obstacles have you faced that prevent you from bringing your reusable bags to the grocery store? (select all that apply)	How important is it to strive to eliminate your use of disposable bags at the grocery store?	Do you make a grocery list prior to going to the store?	Please provide the estimated days and times you intend to visit the grocery store in the next two weeks.	Is there anything else you would like to share about your experience using reusable bags or your thoughts on developing sustainable behavior changes?
Often	Sometimes	I always keep them in my car, I always keep an extra bag in my purse/backpack, I have a designated spot in my house where I keep them	Forgetting them at home, Forgetting them in the car (while at the store), Being in a rush and not having time to grab them, Making an unexpected stop for groceries (without bags already in the car)	5	Always	2x	I hope to do a better job of keeping several reusable bags in my car at all times so if I'm ever doing an emergency grocery run I'll be prepared. I usually forget due to leaving in a hurry. This was very insightful and helped me reflect a lot.
Often	Sometimes	I always keep them in my car, I have a designated spot in my house where I keep them	Forgetting them at home, Making an unexpected stop for groceries (without bags already in the car)	5	Always	Friday, 4/14 2-5 pm Saturday, 4/22 2-5 pm	Sometimes I forget them so I just carry everything in my arms!
Rarely	Never	I always keep them in my car, I am motivated by guilt when I don't bring them in from car I ask for single bags overloaded that I will carry from bottom and then I do reuse bags for purposes other than shopping	Forgetting them in the car (while at the store), being in a rush and mentally not tracking	3	Sometimes	sporadic , maybe Friday for a more significant haul	I have no interest in reusable produce bags due to sanitation. I do reuse produce bags until the water use to wash doesn't make enough sense anymore ( holes, slime)
Sometimes	Never	I have a designated spot in my house where I keep them, I just remember to grab them before I leave	Forgetting them at home, Making an unexpected stop for groceries (without bags already in the car)	5	Sometimes	M/W/F	
Often	Rarely	I always keep them in my car, I have a designated spot in my house where I keep them	Forgetting them at home, Forgetting them in the car (while at the store)	4	Sometimes	Probably on Wednesdays and Saturdays in the next two weeks.	
Often	Sometimes	I always keep an extra bag in my purse/backpack, I have a designated spot in my house where I keep them, I just remember to grab them before I leave	Being in a rush and not having time to grab them, Making an unexpected stop for groceries (without bags already in the car), Not enjoying the bags I own (due to size, material, ergonomics, color, etc.), Sometimes my partner does the shopping and forgets to bring the bags.	5	Sometimes	Once at night during the week and once during the day on the weekends.	I usually have all of my reusable bags all shoved into my one reusable chiller bag but I rarely use the few produce reusable bags bc they aren't airtight and for some produce that means they dry out and go bad faster (Kale, I'm looking at you).  I want a silicone alternative that has the tare weight on it but is also light and flexible enough to use for bulky produce. I have tried putting kale in a stasher bag but it just never holds enough/ no tare weight and super bulky. I have thought about reusing the plastic produce bags but I'm afraid I won't get them clean enough to actually be usable.
Often	Never	I have a designated spot in my house where I keep them, I just remember to grab them before I leave	Forgetting them in the car (while at the store), Making an unexpected stop for groceries (without bags already in the car)	4	Sometimes	Thursday April 13th at 3pm, Wednesday April 19th at 1pm	Reusable produce bags are not something I really think about and it would be nice to have those available for purchase in stores alongside larger reusable grocery bags if I need them
Sometimes	Never	I have a designated spot in my house where I keep them	Forgetting them at home, Making an unexpected stop for groceries (without bags already in the car)	4	Sometimes	Sunday mornings (~10am)	
Rarely	Never	I have a designated spot in my house where I keep them	Forgetting them at home	4	Sometimes	So I don't grocery shop often and don't have a routine for that at all really but if theres a certain time or day I can do my best to accommodate!!	Having cute reusable bags makes a huge difference if i want to use them or not!
Sometimes	Never	I have a designated spot in my house where I keep them, I just remember to grab them before I leave	Forgetting them at home, Making an unexpected stop for groceries (without bags already in the car)	5	Sometimes	It will really vary. This time of year given how busy work is, I'm less of a planner as it relates to meals and grocery shopping.	Would be great to find ways for grocery delivery to be more sustainable. I was sick a few weeks ago, and resorted in delivery to minimize risk of exposing others to my cold. However, with it so many paper bags end up getting used with each order (very often, things get double bagged).
Sometimes	Never	I just remember to grab them before I leave	Forgetting them at home, Not having enough bags for my groceries, Making an unexpected stop for groceries (without bags already in the car)	5	Sometimes	Tomorrow morning then unknown-we have a guest and we're going to Bend and possibly coast so my shopping will be abnormal and not predictable. Will likely shop 4X	
Sometimes	Rarely	I always keep them in my car, I always keep an extra bag in my purse/backpack	Forgetting them in the car (while at the store), I don't have enough of the individual produce bags.... Should buy more	4	Always	April 13th around 5:30pm and April 16th around 4:30pm	I think having an app that reminds you to grab your bags when parked at a grocery store would be helpful. Also unsure how to factor in reusable bags for people that do order pick up.

# Appendix G

## Digital Group Instructions – Email to Participants

Hello!

Thank you for filling out the initial survey! You will be in the Digital group. This method will be simulating notifications from an imaginary app via alerts from the Reminders app and text messages from me in the form of positive encouragement + progress feedback.

### Instructions

As it turns out, most people don't have a set schedule for their grocery shopping trips so rather than individually contacting people on days they might go, the first step will be to set up alerts through the Reminders app already on your iPhone.

We will set up two alerts: one for when you leave your house, and one for when you arrive at the grocery store. Run through all steps to set up the first reminder, and repeat step 2 for the second reminder.

### Step 1: Check Location Settings

- Open your iPhone's 'Settings'
- Scroll down and tap on 'Privacy'
- Click on 'Location Services' – you should ensure this is toggled to on.
- Scroll to 'Reminders' and ensure that you're allowing location access "While Using the App"

### Step 2: Set Location-Based Reminders

- Next, open your Reminders app. This app is built-in to your phone already, no need to download any new apps.
  - Find the app by pulling down on your home screen until a search toolbar appears. Type in "Reminders"
- Click the "+" sign to add a new reminder
- Type in what you would like the reminder to say
  - For the first reminder: "Remember to bring my reusable bags!"
  - For the second reminder: "Text Sarah the number of reusable bags I'm bringing into the store" (you can literally just text me a number, and I will keep track of these)
- Click on the info button, "i" to the right of the text that was typed in
- Toggle "Location" to on
- Find the location you would like the reminder to be associated with
  - For the first reminder: choose "Getting In" marked by the car icon (alternatively, you could set it for leaving your home, but you might get farther away before you're reminded)
  - For the second reminder: search and select your primary grocery store (you can set multiple reminders for different stores if needed). Select the desired location and tap on "When I Arrive" to get the pop-up when you arrive.
- Select 'Done'

I know the instructions are lengthy, but it should take less than five minutes to set up. In the next two weeks most people will make 2-6 grocery trips, so hopefully this won't be too much work on your end (have I reminded you lately how much I appreciate you?!). That being said, if you want to opt out, just let me know.

Once two weeks are up, I will send you a quick follow up survey to capture the results of your experience. Please reach out with any questions in the meantime.

Thank you again!

Sarah

# Appendix H

## Behavioral Group Instructions – Email to Participants

Hello!

Thank you for filling out the initial survey! You will be in the Behavioral group. This method looks at developing a solution without relying on a new product (digital or physical).

### Instructions

For this experiment, I'm asking that you complete a set of actions in a certain order every time in the effort to develop new habits. I recognize that this trial time is quick, but we'll see what happens!

After you read this email, please take a second to put a couple grocery bags in your car, or set a reminder on your phone to do so at your earliest convenience. The experiment will work best if everyone can start from the same place.

Once you complete a shopping trip and unload your groceries at home, I would like you to consolidate all the reusable bags (grocery/produce) that you typically use inside your favorite bag and set it in front of your door. The next time you leave, regardless if it is for a grocery trip or not, you will bring the bags to your car. If they become too obstructive in the meantime, you're welcome to take them out to the car sooner. Ideally, it will become more appealing to immediately take your bags out to the car as soon as groceries have been put away. If you feel resistance to the extra effort, keep in mind the importance rating you gave in the initial survey to striving to eliminate the use of disposable bags.

I will periodically send reminder texts as well with a little mantra to associate with this task: "plastic waste just won't do, remember your bags, it's up to you!" (no need to reply/engage, it's just to keep the bags top of mind). If you forget your reusable bags, but are in a position where you could still backtrack and get them (i.g. you left them in the house but you haven't driven away yet, or you left them in the car but you're still walking through the parking lot, etc.) try repeating the mantra to yourself as motivation to make the extra effort to retrieve them.

In the next two weeks most people will make 2-6 grocery trips, so hopefully this won't be too much work on your end (have I reminded you lately how much I appreciate you?!). That being said, if you want to opt out, just let me know. Once two weeks are up, I will send you a quick follow up survey to capture the results of your experience. Please reach out with any questions in the meantime.

Thank you again!

Sarah

# Appendix I

## Final Survey Questions

1. How many times did you go grocery shopping since agreeing to participate in this experiment?
  - a. 1
  - b. 2
  - c. 3
  - d. 4
  - e. 5
  - f. Other
2. How often did you use reusable grocery bags when shopping?
  - a. Always
  - b. Often
  - c. Sometimes
  - d. Rarely
  - e. Never
3. If you were to estimate, how many reusable grocery bags did you use over the course of the experiment?
4. How often did you use reusable produce bags when shopping?
  - a. Always
  - b. Often
  - c. Sometimes
  - d. Rarely
  - e. Never
5. If you were to estimate, how many reusable produce bags did you use over the course of the experiment?
6. Were any changes in your behavior directly related to the experiment? Please explain why, or why not.
7. What could have made the experiment more successful in initiating a sustainability-focused behavior change?
  - a. Conducted over more time to allow for more chances to go to the store
  - b. More reminders
  - c. More positive encouragement
  - d. Different strategy
  - e. Other
8. Do you feel more motivated now after the experiment to continue building the habit of remembering to bring reusable bags to the grocery store?
  - a. Yes
  - b. No
  - c. Maybe
  - d. Other
9. Any last thoughts?

# Appendix J

## Final Survey Responses

How many times did you go grocery shopping since agreeing to participate in this experiment?	How often did you use reusable grocery bags when shopping?	If you were to estimate, how many reusable grocery bags did you use over the course of the experiment?	How often did you use reusable produce bags when shopping?	If you were to estimate, how many reusable produce bags did you use over the course of the experiment?	Were any changes in your behavior directly related to the experiment? Please explain why, or why not.	What could have made the experiment more successful in initiating a sustainability-focused behavior change?	Do you feel more motivated now after the experiment to continue building the habit of remembering to bring reusable bags to the grocery store?	Any last thoughts?
2	Always	6	Always	4	Taking the survey ahead of time and the text reminders really helped me remember to take bags wherever I went (grocery shopping and clothes shopping). It was really rewarding when I remembered that I'd receive the text reminder. Very helpful and helped me stay accountable.	Conducted over more time to allow for more chances to go to the store, More positive encouragement	Yes	
5	Often	4	Never	0	Knowing that I would be accountable to these survey results made me much more attentive to remembering my bags before I left the house!	I don't know that the strategy needed any tweaking, I just should have invested in reusable bags before the experiment!	Yes	
3	Often	4	Never	none	yes I felt personally connected because of the project. The relationship was important and motivating	Conducted over more time to allow for more chances to go to the store, More positive encouragement, Different strategy, a punchcard for a prize after i bring in my bags 10x or a free (mint) when i bring my bags	Yes	because i do repurpose my bags i rationalize when i do buy them
2	Always	4	Never	0 but I didn't use plastic produce bags either	I remembered to put my bags in the car more regularly!	Conducted over more time to allow for more chances to go to the store	Yes	Thank you!! This was fun.
3	Often	12	Sometimes	2	I don't think so. I still used them at the same times I would have but I couldn't get my partner to want to change with me and there would be time where we would take his car instead but my bags were in my car.	Different strategy, Having better reusable produce bags might have helped me make the transition more.	Yes	I think leaving bags in a visible space on my way out the door is better for my remembering them because once they are in the back of my car they are very much out of sight out of mind.
4	Always	5	Never	0	I put my reusable bags in my car rather than keeping them in my front closet, and I encouraged my partner to use them more often even if he didn't think they were necessary for small trips	Conducted over more time to allow for more chances to go to the store, I think the reusable produce bags are interesting and I don't have any. If able I think it would be helpful to either directly supply 1-2 reusable bags (large and produce) or provide external resources where people can affordably find them.	Maybe	I think the texts were cute and a helpful quick reminder. The first one did remind me to move my bags to my car. I shop at Costco often and will use recyclable boxes for groceries rather than my own bags, but moving the bags to my car helped me avoid plastic bags during short or last minute stops at the store.
3	Often	3	Never	I didn't use a reusable produce bag as I don't own one, but I didn't use a plastic bag either.	Yes, I didn't always bring my bag back out to my car, but I did regularly set it by the door.	Conducted over more time to allow for more chances to go to the store	Yes - but I think it just re-motivated me to get back to it	
2	Always	2	Never	2	I knew I needed to tell Sarah how many I used when I went so I made sure to bring one when I did and that gave me some accountability.	Conducted over more time to allow for more chances to go to the store	Yes	I love you Sarah!!
3	Always	7	Rarely	0 - I still need to buy some	Yes, I didn't want to disappoint Sarah so I was extra good at bribing my bags	Conducted over more time to allow for more chances to go to the store	Yes	
5	Often	3	Never	0	Yes. I was more conscious of putting my reusable shopping bags back in my car and bringing them in the store. I had guests from out of town and we also traveled out of town, so I was not in my normal routine and was not successful at remembering to use reusable produce bags. I did finally put a bunch of them inside my reusable shopping bags so the next time I go to the store I can use them.	Conducted over more time to allow for more chances to go to the store, More reminders	Yes	Because I was busy with guests, I may have missed some of your reminders.
1	Always	2	Never	0	Yes. It made me be more intentional about my grocery trips.	N/A	Yes	
1	Always	2	Never	0	Yes - the system on my phone helped remind me to bring bags when heading to the store	Conducted over more time to allow for more chances to go to the store, Maybe the experiment could also include having participants keep a grocery list and plan ahead when they're going to shop. Then reminder could be tied to specific dates / times	Yes	