

SORTING THE ASSORTMENT

**AN EXPERIMENTAL STUDY OF HOW THE SORTING OF
PRODUCTS AFFECTS CONSUMERS' BEHAVIOR AND
EXPERIENCE IN ONLINE GROCERY STORES**

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Sorting the Assortment: An Experimental Study of How the Sorting of Products Affects Consumers' Behavior and Experience in Online Grocery Stores

Abstract:

Online grocery shopping is becoming increasingly popular and more information is needed in the field to help guide retailers in marketing and visual merchandising online. This study examines how findings from prior research in physical stores apply in the new digital format. An experimental study is used to investigate how manipulation of *product sorting* in an online grocery store affects the consumers' shopping experience. A mock-up online grocery store is created to gather data about participants' behaviors and perceptions. Data is collected in two ways; from observations of consumers' behavior when participating in the constructed experiment, and from a self-completion questionnaire. The results show that the sorting of products affects the consumers' behavior and perceptions when shopping for groceries online. Consumers are found to perceive a product assortment sorted by popularity to be more attractive and offer higher choice convenience, than if the same assortment is randomly sorted. It is further found that sorting a product assortment by popularity results in higher overall satisfaction and revisit intention among the consumers, compared to a randomly sorted assortment.

Keywords:

Visual merchandising, Consumer behavior, Online retailing, Online grocery shopping, Product sorting

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Linn Lindgren and Tilde Ivedal

Definitions

Choice overload: Complexity of a choice that exceeds the consumer's cognitive processing ability.

Choice tactics: Rules of thumb to ease the process of choosing products, such as brand, price, and previous experience.

Digitalization: The conversion to digital technologies and digital businesses.

Omnichannel sales: Sales via multiple channels, both physical and digital.

Online shopping, e-commerce: Goods and services sold and bought via the internet.

Product choice: Process of evaluating and choosing what product to buy.

Product organization: Structures used when arranging product displays in retail.

Product sorting: The order in which products are displayed on product pages in an online store.

Sensory attributes: Factors used to evaluate quality of products, such as smell, taste, and touch.

Shelf placement: A product's horizontal and vertical position in a product display.

Visual merchandising: Process of optimizing the presentation of products to attract customers' attention.

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1. Introduction

Grocery shopping may seem like a simple daily chore most do routinely. Yet, the extra curious customers may have noticed that the assortment of goods in stores is not random, but carefully selected and organized by the retailer to capture the customer's attention and maximize sales. In fact, the subject of *product organization* has been extensively researched to guide retailers to an optimal design of their grocery stores.

As *digitalization* is rapidly developing and more consumers are becoming active online (PostNord et al., 2022), grocery shopping is extending past physical stores into online alternatives. Today, it is possible for consumers to shop for groceries without even leaving their homes, and retailers are fighting for consumers' attention as the market is finding its new shape. However, the development of grocery shopping has altered the competition in the market and created gaps of knowledge in research. Consumers' behavior in online grocery stores is still relatively unexplored, and it remains unclear how online consumers respond to marketing activities such as store design, product organization, and promotions. This study is designed to research the particular area of product organization online, and further bring insights to retailers.

1.1. Background

Online shopping, or *e-commerce*, has become a staple in many people's lives, in particular during the COVID-19 pandemic (Nets, 2021) when annual online retail sales grew by 47.4% (2019-2021) (Cramer-Flood, 2022). However, studies show that only 19% of consumers are shopping for groceries online, despite food being the largest of retail categories (Nets, 2021). In 2021, the online market accounted for only six percent of total grocery sales in Sweden, corresponding to a turnover of 19 billion SEK (PostNord et al., 2022). Groceries is however reported to be the fastest-growing category of goods bought online, increasing by roughly 35% in 2021 compared to 2020 (PostNord et al., 2022).

The differences between buying groceries online compared to in physical stores are many. Numerous common in-store marketing efforts related to *sensory attributes* cannot be converted into the online environment, diminishing the retailers' control of the customers' experience and behavior (Levy et al., 2019). The work grocery retailers have put into organizing and planning their assortments must be redone when expanding online, requiring large investments. Similarly, the online context requires retailers to pack and deliver products to their customers at high speed and low cost, giving rise to logistic challenges. Despite these challenges, leading grocery retailers are fighting for market share in the digital grocery market and expanding their competencies to develop a strategy supporting omnichannel sales (PostNord et al., 2022).

1.2. Problem area and research gap

Although consumers' decision-making processes in physical grocery stores have been extensively researched and discussed by industry experts, there is still little research done on the same topic in the digital environment. Conducted studies have generally been limited to investigating the factors that motivate or hinder consumers from shopping for food online. For instance, Hansen (2008) developed a conceptual model for understanding Swedish consumers' willingness to buy groceries online and found their attitude toward online grocery shopping to be the prominent predictor of their buying intentions. Similarly, multiple authors have employed the Technology Acceptance Model (TAM) to explore how factors such as perceived usefulness and perceived risk influence consumers' intention to shop for groceries online, for instance, Gefen et al. (2003), and Driediger and Bhatiasevi (2019). However, these studies rarely answer questions about how customers behave in digital stores. Thus, much information is available about what motivates customers to shop online, while the literature about consumer behavior *in* digital stores is fairly limited. It thereby remains unclear how consumers' online decision-making may differ from the behavior they employ in the physical environment, and how retailers should design their online stores to retain customers.

1.3. Purpose and research question

As online retail sales continue to grow, more consumers are shopping for groceries online. It is therefore becoming increasingly important for grocery retailers to understand how consumers' behavior may differ between the offline and online context. This thesis aims to give potential insights into how consumers' overall shopping experience is affected by the sorting of product assortments in online grocery stores, as well as how to improve customers' overall shopping experience and retention online. The research question to be examined in this thesis is as follows:

How does the sorting of a product category assortment affect consumers' behavior and experience in an online grocery store?

1.4. Delimitations

Because of restricted time and resources for this study, certain delimitations needed to be made. Firstly, the study is limited to grocery retailing. Groceries was chosen as retail category because of the imbalance in research on visual merchandising in physical grocery stores compared to online stores. Furthermore, groceries is the fastest growing online category (PostNord et al., 2022), making it a relevant field of study. The chosen food categories were limited to juice, coffee, and candy, and evaluated based on the

number of available brands and products, to ensure that enough products existed for the design of the experiment's website. The research was further limited to Sweden, mainly because of the respondents in the study, as it was carried out in Stockholm, Sweden. However, the authors hope that the study's findings can inspire future research outside of the scope of this thesis as well.

There are several methods available for sorting an assortment online, for instance, based on price, name, and brand. However, this study focuses solely on the effects of sorting an assortment based on popularity. Furthermore, previous shopping behavior is not taken into consideration, because of limited time and technical resources. Customized offers based on previously viewed products are not included in the experiment. Product prices are excluded, to limit the influences on the study's dependent variables with anything except the sorting of the products.

1.5. Expected contribution

This study aims to contribute with more knowledge about how to build online grocery stores and organize the products presented to the customer. As the authors have found the existing literature on the selected research area to be insufficient in relation to the growth of the market, the authors aim to bring new potential insights into the area and inspire future studies on the same topic. Another objective of this study is to make use of previous research from physical retail stores to explore what can be applicable in an online environment. Thus, the authors intend to contribute with an innovative perspective of visual merchandising by examining factors affecting consumers when shopping online.

From a practical perspective, the hope is to extend retailers' understanding of consumers' behavior online and provide guidance towards competitive leadership in retailers' marketing efforts in online grocery stores. Thus, the insights can potentially contribute to beneficial financial effects in terms of increased sales, driven by increased customer satisfaction. The industry will also be helped to understand the links between behaviors and factors such as the consumers' perceived convenience, satisfaction, and intention to revisit a store. Provided insights can also be valuable for other parts of the grocery value chain. For instance, this study can empower product producers with knowledge about how placements of their products can impact sales volumes, and motivate consumers to reflect on their own purchasing behavior when shopping online.

2. Theoretical framework

The purpose of this section is to provide a more detailed understanding of the selected research area, by presenting relevant theories and conclusions from prior research. The section creates the theoretical framework of this thesis and provides a basis for the formulated and tested hypotheses as well as for the interpretation and discussion of the study's results. In section 2.1., relevant prior research related to consumers' decision-making and behavior is presented. Next, this information is related to the context of grocery shopping and research made on product organization in the physical context. Thereafter, differences between the physical and digital environments are highlighted. Last, the study's hypotheses are formulated.

The processed literature has mainly been accessed via searches in library databases, including the SSE (Stockholm School of Economics) Library and Google Scholar, where well-cited and peer-reviewed articles have been prioritized. Keywords for the literature search include visual merchandising, product sorting, product organization, consumer behavior, online grocery shopping, and e-commerce.

A summary of the theoretical framework is presented in Appendix A.

2.1. Consumer behavior

2.1.1. Consumers' decision-making process

Consumers' behavior can be described in numerous ways, and many authors have attempted to develop a model that defines their decision-making process. As visualized in Figure 1, consumers have traditionally been described to move through five separate steps when purchasing a product; need recognition, information search, evaluation of alternatives, purchase, and finally post-purchase evaluation (Jobber & Fahy, 2009):

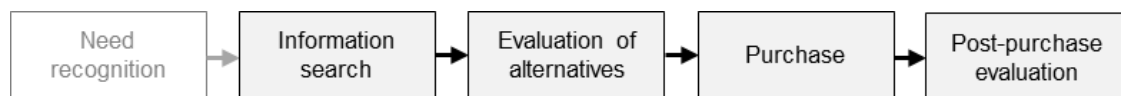


Figure 1. The traditional consumer decision-making process (Jobber & Fahy, 2009)

As this study aims to explore consumers' behavior in and experience of a grocery store, the focus is limited to the four later steps of the traditional process. It is therefore assumed that consumers have recognized a need before visiting a grocery store.

According to the traditional consumer decision-making process, a purchase results from an antecedent exploratory search and evaluation of product alternatives. While this traditional process has been extensively used as a basis for explaining consumer behavior, it has also received criticism for its simplicity. For instance, Darley et al.

(2010), Karimi et al. (2015), and Nordfält and Ahlbom (2018) agree that real decision-making processes are not as linear as traditionally suggested, since consumers are likely to both iterate and skip steps of the process. Furthermore, Nordfält and Ahlbom (2018) propose that additional emphasis is needed on consumers' limited memory capacity, causing them to only be capable of considering a limited number of product alternatives simultaneously. This is also referred to as the consumers' *evoked set* or *consideration set* of products, and is created via an internal and external search for information (Howard & Sheth, 1968; Alba & Chattopadhyay, 1985; Nordfält et al., 2004). Via internal information search, consumers use their memory to find viable solutions to their identified needs. Next, external sources are consulted to gain information that the consumer does not already hold (Alba & Hutchinson, 1987). What external sources the consumers use depend on the context they are in, as they are likely to turn to sources that are easily accessible at the given moment (Dick et al., 1990; Bettman et al., 1998). This process is followed by *product filtering*, based on evaluation criteria such as brand, price, and previous experience (Dodds et al., 1991; Bettman et al., 1998).

In addition to consumers' limited memory capacity, it is argued that the scope of the decision-making process depends on the *type* of product the consumer intends to purchase. Consumers are more involved in purchases characterized by higher risks, while choice tactics and routinized behaviors are used to minimize effort put into low-risk purchases (Antil, 1984; Hoyer, 1984). Thus, while the traditional decision-making process can provide a framework for discussion, the emphasis on its respective components should be decided with respect to the product in question, and factors like available information and perceived risks. Figure 2 illustrates examples of internal and external information that can be considered when analyzing the consumers' decision-making process:

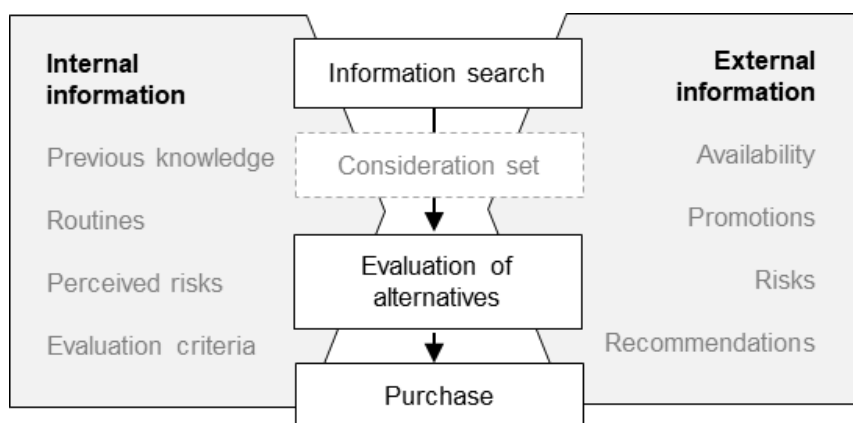


Figure 2. Examples of how internal and external information influence consumers' decision-making process.

2.1.2. The S-O-R model

The process presented in Figure 1 provides a holistic understanding of consumers' decision-making. However, it does not specify how this process is influenced by different marketing activities, nor how consumers tend to respond to these activities. This is an area where the consumer behavior model *S-O-R* is applicable, explaining the relationship between stimulus (S), organism (O), and response (R). *Stimulus* refers to the environment around the consumer, *organism* to the mediating effect of the individual's emotions, and *response* to the consumer's exercised behavior, often described in terms of approach or avoidance (Donovan et al., 1994).

The S-O-R model was introduced as a critique of Thorndike's (1927) Stimulus-Response (S-R) model. Thorndike's S-R model builds on the *law of effect*, stating that responses to a stimulus that produces a positive outcome are more likely to occur again, compared to responses that cause negative outcomes (Thorndike, 1927). When developed into S-O-R, the model also includes the *organism*, i.e., a person's conscious and unconscious emotions, meaning that responses are dependent on individuals' different experiences, values, and feelings (Mehrabian & Russell, 1974).

The S-O-R model has frequently been used in consumer research to explain how and why consumers reach certain decisions. For instance, it was used by Chang et al. (2011) to study how the retail environment influences consumers' impulse buying behavior, and by Laato et al. (2020) to study how the COVID-19 pandemic has induced new consumer behaviors, as visualized in Figure 3:

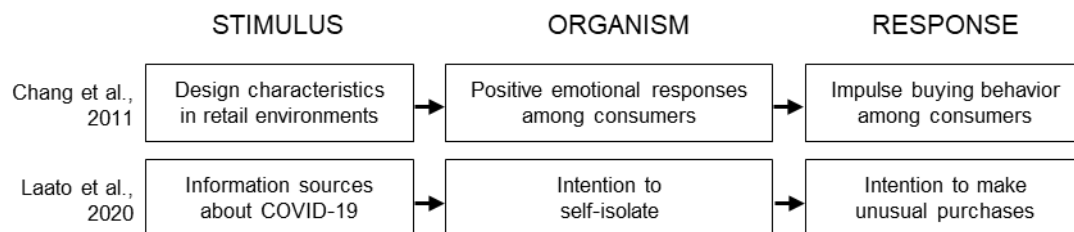


Figure 3. Examples of how the S-O-R model has been used in prior consumer behavior studies.

In the context of grocery shopping, S-O-R can help explain how marketing activities change consumer behavior. For instance, Levy et al. (2019) suggest the *store design* to provide pleasure to consumers, and Baker et al. (1992) state that in-store stimuli such as signs, color, and light can result in increased willingness to buy. Thus, the S-O-R model creates a basis to study how different stimuli influence responses such as information seeking and purchase decisions. In this study, the stimulus is limited to the sorting of products in online grocery stores.

2.2. Product organization

Prior research has established that the organization of a product assortment influences how it is perceived by the consumer, and can further influence consumers' choices. Based on the presented S-O-R model, this implies that *product organization* as a stimulus has been shown to influence consumers' responses in terms of *product choice*. For instance, via a laboratory experiment Areni et al. (1999) found that by sorting wine bottles by regions, consumers were nudged to emphasize this product attribute when evaluating alternatives, resulting in increased sales of bottles from preferred regions, and decreased sales from less preferred regions. Comparable experimental studies focused on flavor, brand, price, and consumer benefits have reached similar conclusions (Simonson et al., 1993; Huffman & Kahn, 1998; Morales et al., 2005; Lamberton & Diehl, 2013). This implies that, if holding the assortment constant, product organization can impact consumers' decisions and shopping experience.

2.2.1. The product organization's influence on product choice

It has repeatedly been suggested that a product's shelf placement influences its likelihood of selection. Referred to as the *center-stage effect* by Valenzuela and Raghubir (2009), consumers tend to prefer products placed in the horizontal center of a product display. In addition, consumers' choices have been shown to be influenced by the vertical placement of a product, since placement at eye or hand level significantly increases products' probability of being selected (Drèze et al., 1994). Hence, looking at the absolute shelf placement, products placed in the horizontal and vertical center have been found to most likely be chosen by the customer (Drèze et al., 1994).

2.2.2. The product organization's influence on consumers' perceptions

The organization of a product category assortment does not only impact the consumers' behavior in terms of product choice, but also how the assortment and the shopping experience is *perceived*. For instance, prior research has established that product organization can influence the variety and convenience a consumer perceives when shopping. Here, *perception* is defined as "the way that someone thinks and feels about a company, product, service, etc." (Cambridge Dictionary, n.d.), related to the previously presented definition of *organism* in the S-O-R model.

According to research conducted by Arnold et al. (1983) as well as Kahn and Wansink (2004),¹ retailers can either increase or decrease the *variety* a consumer perceives within

¹ Note that in 2018, six of Wansink's publications at Cornell University were retracted by the university due to an inability to provide assurance of the scientific validity of the studies (Dahlberg, 2018).

an assortment, only by changing how items are displayed. By increasing the perceived variety, retailers can provide consumers with a more pleasurable shopping experience and possibly motivate consumers to purchase larger quantities of products (Hoch et al., 1999; Kahn & Wansink, 2004). Additionally, perceived variety has been found to influence consumers' store choices (Broniarczyk et al., 1998). Despite the reported benefits of increased perceived variety, researchers also agree that too much variety can cause consumers to experience *choice overload*,² and negatively impact the consumers' satisfaction, especially for routine purchases (Hoch et al., 1999; Chernev et al., 2015).

Related to that an assortment can cause choice overload (Hoch et al., 1999; Chernev et al., 2015), its organization can also ease consumers' decision-making given that it is presented in a manner that aligns with the consumer's preferences (Morales et al., 2005). In the context of grocery shopping, scholars agree that groceries are considered *low-involvement products*, as they are relatively inexpensive and habitual (Knox & Walker, 2003; Radde & Huang, 2008; Campo & Breugelmans, 2015). Hence, consumers will pursue little or no evaluation of alternatives once they have found a product they perceive as sufficiently satisfactory, often based on brand loyalty (Hoyer, 1984; Campo & Breugelmans, 2015). Grocery shoppers can thereby be described as *satisficers* looking for a sufficient product, rather than *maximizers* who extensively search for the best available product (Schwartz, 2004; Chowdhury et al., 2009).

According to Morales et al. (2005), consumers will have an internal categorization structure of products they are familiar with, and build on prior knowledge when interpreting new stimuli related to a product category. Past studies have shown that a match between the consumer's internal and the retailer's external categorization of products can result in higher customer satisfaction (Buchanan et al., 1999; Morales et al., 2005). In contrast, a mismatch between the structures can cause dissatisfaction and result in slower evaluations of assortments, as it forces consumers to reevaluate the available alternatives (Arnold et al., 1983; Suja, 1985; Buchanan et al., 1999; Morales et al., 2005). Consequently, the extent to which the product organization affects the consumer is not only dependent on the organization itself, but also on the consumer's previous knowledge about the product category. The greater the knowledge, the more important it becomes that the retailer facilitates satisfaction through appropriate product organization (Suja, 1985, Morales et al., 2005).

² Worth mentioning is that the concept of choice overload has been subjected to criticism. In an article from 2010, Scheibehenne et al. performed a meta-analysis on published and unpublished experiments with different findings regarding choice overload and could not identify any sufficient condition that would lead to choice overload.

2.3. Online grocery shopping

As the market for online grocery shopping is growing, retailers' successful marketing efforts in the physical context must be revised to suit the new digital format. Since competitors now are only a click away (Sreeram et al., 2017) consumers are more likely to switch between different retailers (Anderson & Srinivasan, 2003; Ghazali et al., 2016). This forces retailers to explore new ways of differentiation and methods to retain customers.

2.3.1. Central differences between the online and offline environment

It is evident that previously powerful in-store marketing tools such as store layouts and end-cap product displays are difficult to convert into a digital format. The online context's absence of smell, taste, and touch limits the number of sensory attributes that influence consumers' evaluation of product alternatives, making retailers dependent on marketing activities centered around *visual* perceptions (Koufaris, 2002). Furthermore, according to Campo and Breugelmans (2015), consumers are less sensitive to different in-store marketing activities online, and also less likely to make impulse purchases. When it comes to the digital store, research on eye-tracking can bring insight into the movement of the eye's attention. According to Fleming (1997), referred to in Faraday (2000), top left locations are typically attended first online, as most cultures begin reading there. Prior studies also indicate that consumers are likely to evaluate products in the order they are encountered to find a satisfactory product, rather than browsing through the entire assortment (Chowdhury et al., 2009). They are thereby more likely to purchase products encountered earlier on the page (Anesbury et al., 2016). Further, the online context provides consumers with greater control over what and how much of the assortment they want to encounter (Anesbury et al., 2016), for instance by using various decision aids such as search tools, filters, and sorting tools (Shi & Zhang, 2014). However, consumers tend to stay with default page settings when shopping (Anesbury et al., 2016), and, as observed by the authors, most online grocery stores are currently sorting their products by *popularity* by default (Coop, 2022; ICA, 2022; Willys, 2022).

Compared to a physical store, the shelf space online is virtually limitless (Campo & Breugelmans, 2015), allowing retailers to expand their assortments without requirements for additional physical store space. Studies have found that a large assortment can act as a motivator for consumers to choose an online store instead of a physical store since it allows for more choice flexibility (Kahn & Lehmann, 1991; Campo & Breugelmans, 2015). Despite larger assortments, consumers tend to be more loyal to their preferred products when shopping online (Degeratu et al., 2000; Danaher et al., 2003; Chu et al., 2010). The lack of sensory attributes in the online environment is suggested to increase consumers' perceived financial risk of the purchase (Degeratu et al., 2000; Campo & Breugelmans, 2015), making them more dependent on elements

such as brands and previous experience when evaluating an assortment online (Degeratu et al., 2000; Koufaris, 2002).

2.4. Hypotheses

The presented prior research, summarized in Appendix A, lays the foundation for this study. Based on this theoretical framework, several hypotheses related to the study's research question are motivated and presented below.

2.4.1. Consumer behavior in low-involvement purchases³

Consumers' behavior varies depending on their level of involvement in the purchase, moderated by the associated level of routine and perceived risk (Antil, 1984). Scholars agree that groceries are considered low-involvement products (Knox & Walker, 2003; Radder & Huang, 2008; Campo & Breugelmans, 2015), and consumers are looking for products that merely are sufficient to cover their recognized needs (Hoyer, 1984, Schwartz, 2004; Chowdhury et al, 2009). This implies that consumers are more likely to evaluate and choose products encountered earlier in their shopping session and that the placement of products can largely influence the consumer's decision (Areni et al., 1999; Breugelmans et al., 2007; Chowdhury et al., 2009; Anesbury et al., 2016). Similarly, prior research from physical stores suggests the horizontal center of a display to be the most attractive position for a product (Valenzuela & Raghurir, 2009). In the digital context, this should imply that placing a product higher up and in the horizontal center of a product page will increase the likelihood of it being selected:

H1: Regardless of how products are sorted in an online grocery store, consumers are more likely to select a product located...

- a:** higher up on the online page.
- b:** in the horizontal center of the online page.

For the remaining thesis, two versions of an online grocery store are introduced; one where products are sorted by popularity, and one where products are randomly sorted. *Popularity* refers to sales volumes. The version sorted by popularity is referred to as the *bestseller sorting*, and the randomly sorted version as the *randomized sorting*.

³ Note that this thesis does not include any studies of high-involvement products, and neither any comparisons between low- and high-involvement purchases.

2.4.2. Consumer behavior based on product sorting

Prior research has established that consumers tend to be more brand loyal in the online context than offline (Danaher et al., 2003; Chu et al., 2010). Accordingly, if products are sorted by popularity, it is hypothesized that online consumers will select a product on a row higher up on a page, compared to if products are sorted randomly.

Furthermore, a product organization that does not match the consumers' preferences can cause a slower evaluation of the assortment (Arnold et al., 1983; Sujan, 1985; Buchanan et al. 1999; Morales et al. 2005). Thus, consumers are believed to need more time and scrolling to find a product they want to buy if an assortment is randomly sorted, than if the same assortment is sorted by popularity:

H2: Consumers shopping in an online grocery store where products are sorted by popularity (bestsellers) will...

- a:** select products on rows higher up
- b:** need less time to shop
- c:** be exposed to a smaller share of the total assortment

...than consumers shopping in an online grocery store where products are randomly sorted.

2.4.3. Consumers' perceptions based on product sorting

Prior studies show that a product organization can affect the perceived variety of an assortment in physical stores (Arnold et al., 1983; Hoch et al., 1999; Kahn & Wansink, 2004), making it interesting to test if this is the case also for product sorting in an online context. It is therefore hypothesized that the product sorting in an online store will influence the consumers' *perceived variety*. The hypothesis is two-sided as prior research does not give a clear indication of what type of sorting will lead to a higher perceived variety.

Further, building on the notion that groceries are low-involvement products (Knox & Walker, 2003; Radder & Huang, 2008; Campo & Breugelmans, 2015), consumers are expected to appreciate product sortings where desired products are easy to find. It is here assumed that a bestseller sorting is better aligned with the consumers' internal product structures than a randomly sorted assortment (Buchanan et al., 1999; Morales et al., 2005). Hence, consumers are hypothesized to perceive a bestseller-sorted assortment as more attractive and more convenient to shop from, than a randomly sorted equivalent:

H3 a: The sorting of products in an online grocery store will affect how much variety the consumer perceives there is in the assortment.

Consumers shopping in an online grocery store where products are sorted by popularity (bestsellers) will...

b: perceive the assortment as more attractive

c: have a higher choice convenience

... than consumers shopping in an online grocery store where products are randomly sorted.

2.4.4. Consumers' satisfaction and revisit intention based on perceptions

Prior research suggests that retailers can provide consumers with a more pleasurable shopping experience by increasing the variety the consumers perceive (Hoch et al., 1999; Kahn & Wansink, 2004). Similarly, studies in physical stores have shown that product sortings that ease consumers' low-involvement purchases result in higher customer satisfaction (Buchanan et al., 1999; Morales et al., 2005). Based on the reasoning in 2.4.3. about perceived variety, assortment attractiveness, and choice convenience, it is hypothesized that online grocery retailers will be able to improve consumers' overall satisfaction by increasing these variables. The same logic applies to consumers' intention to revisit a store:

H4 a: Perceived variety of a product assortment...

b: Perceived attractiveness of a product assortment...

c: The consumer's choice convenience...

...will have a positive effect on the consumer's overall satisfaction when shopping in an online grocery store.

H5 a: Perceived variety of a product assortment...

b: Perceived attractiveness of a product assortment...

c: The consumer's choice convenience...

...will have a positive effect on the consumer's revisit intention when shopping in an online grocery store.

2.4.5. Consumers' satisfaction and revisit intention based on product sorting

Finally, based on the reasoning above, a bestseller-sorted product assortment is expected to provide consumers with both higher overall satisfaction and revisit intention, compared to its randomly sorted equivalent:

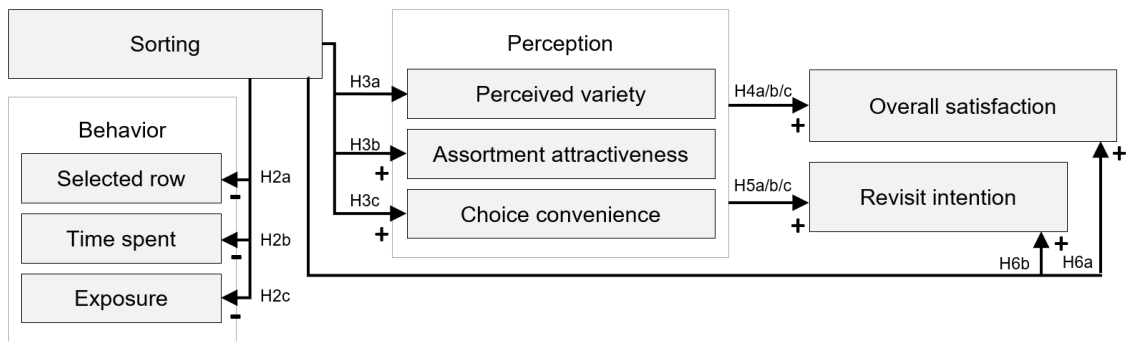
H6: Consumers shopping in an online grocery store where products are sorted by popularity (bestsellers) will have a...

- a:** higher overall satisfaction
- b:** higher revisit intention

...than consumers shopping in an online grocery store where products are randomly sorted.

2.5. Visualization of hypotheses

The defined hypotheses include ten variables: *sorting*, *selected column*, *selected row*, *time spent*, *exposure*, *perceived variety*, *assortment attractiveness*, *choice convenience*, *overall satisfaction*, and *revisit intention*. *Sorting* is the study's independent variable, and the remaining variables are considered as dependent variables. The variables are further described in section 3.3.4. Figure 4 visualizes how the variables included in hypotheses H2-H6 are interconnected:



Note: The plus- and minus signs in Figure 4 illustrate the expected effects of sorting a product assortment based on popularity (bestseller sorting), compared to if the same product assortment is randomly sorted. H1, including the variable *selected column*, is not included in Figure 4 as it is independent of the relationships illustrated above.

Figure 4. A visualization of hypotheses H2-H6.

3. Methodology

The purpose of this section is to explain the reasoning behind the scientific approach and experimental design used in this study. The section contains details about the conducted preparatory study, main study, employed measurements as well as the study's validity and reliability.

3.1. Scientific approach

This study aims to give potential insights into how consumers' overall shopping experience is affected by the sorting of product assortments in online grocery stores. A quantitative method was used to investigate this subject, entailing the collection and analysis of quantitative data. An experimental study was conducted, and quantitative data were collected in two ways; from observations of consumers' behavior when participating in the constructed experiment, and from a self-completion questionnaire.

The scientific approach used can further be described by its epistemological and ontological position of positivism and objectivism. The positivist epistemological position of this thesis promotes the investigation of social reality based on principles found in natural science studies, supporting the collection of data in a precise and rigorous manner (Bryman & Bell, 2015). Furthermore, the objectivist ontological position of this thesis implies an assumption that social phenomena have an existence independent of social actors (Bryman & Bell, 2015). Following this position, the hypotheses used in this study have been deduced based on prior research. Quantitative data were collected in an objective manner, where the authors designed the study per the recommendations provided by Bryman and Bell (2015).

The decision to conduct a quantitative and experimental study was based on that data could be statistically tested, and thereby provide insights and conclusions more generally applicable to similar situations, compared to qualitative data. This is aligned with the purpose of this study, as the authors intend to provide knowledge useful for multiple grocery retailers and other parts of the associated value chain. Alternative methods for this study include qualitative research or the combination of quantitative and qualitative research. Through qualitative research, the study could have resulted in more in-depth insights regarding consumers' behaviors and perceptions, for instance via interviews with selected participants including follow-up questions about decisions. This could have resulted in more elaborated answers regarding key factors influencing consumers' behaviors and choices. The limited ability to collect this kind of information is thereby seen as a limitation of the method chosen for this study. Furthermore, a study including technology for *eye-tracking* could have provided deeper insights into how consumers behave online. To gain further knowledge about similarities and differences

between consumers' behaviors in the physical compared to the digital environment, a comparative qualitative study could have been conducted. However, a qualitative method may not provide generalizable results due to limitations in sample size and possibilities of statistical analyses.

3.2. Preparatory study

A preparatory study was conducted between March 15th and March 20th, 2022 to test the manipulation used in the main study, namely two versions of product sorting in online grocery stores; popularity sorting (bestsellers) and randomized sorting. A questionnaire was constructed in Qualtrics and distributed to the authors' private networks, generating 32 valid responses. Participants were exposed to the six different product assortment pages included in the main study; three bestseller-sorted assortments and three randomly sorted assortments (see Appendix B). Participants were then asked to give three indications for each product page; whether they had tried many of the products in the presented assortment, if they easily could find a product they would like to purchase in the assortment, and if they agreed with the statement that "the products in the assortment are bestsellers". Responses were analyzed using the statistics software SPSS, by IBM.

3.2.1. Insights from the preparatory study

The results from the preparatory study indicated that the manipulation, i.e., the different sorting of the assortments, had been interpreted in the way the authors intended. Participants were more familiar with the products in the main study's bestseller sorting and agreed that these were indeed bestsellers. Analysis in SPSS confirmed differences between sortings to be statistically significant (see Appendix B).

3.3. Main study

The main study included three central parts: an introduction, a shopping experience, and a self-completion questionnaire. Participants were divided into two experimental groups to test how different product sortings influenced consumers' behavior and perceptions of an online grocery store. While the introduction and questionnaire were identical for the study's experimental groups, the manipulation took place in the shopping experience, as illustrated in Figure 5:



Figure 5. A visualization of the main study’s central parts.

Before the study was conducted, it was distributed to a small group of the authors’ contacts to collect feedback regarding formulations of instructions and questions.

3.3.1. Sampling and distribution

The main study was conducted between March 22nd and March 25th, 2022. Due to limited time and resources, data collection was geographically delimited to Stockholm, Sweden. Furthermore, a convenience sample was used. Data was foremost collected at the city’s universities, where bypassing students were asked to participate. To incentivize participation, respondents were rewarded with candy. Due to the convenience sample, respondents were mainly students studying at the graduate level or higher. The main study was not distributed to any of the participants in the preparatory study or in the feedback collection.

In total, 110 responses were collected. Due to incorrect answers to the questionnaire’s attention check, three answers were excluded (2.7%). By the authors being present while the respondents participated in the experiment, the risks of dropout and incomplete questionnaires were decreased, resulting in zero incomplete responses. Despite the authors being present at the point of data collection, respondents participated independently. Hence, the authors’ presence should not have influenced the participants’ behavior or answers.

Table 1. Overview of respondent sample

Variable	<i>n</i>	% of total sample
Gender		
Male	59	55.1%
Female	48	44.9%
Non-binary	0	0%
Age		
18-20 years	19	17.8%
21-25 years	83	77.6%
26-30 years	5	4.7%
>30 years	0	0%

Note: See Appendix G for additional details.

3.3.2. Introduction

All participants, regardless of experimental group, received the same written instructions. Each respondent was informed about the purpose of their participation, the estimated time of completion, and how the survey data was handled, in accordance with GDPR. They were then asked to give their consent to participate in the study. Next, each participant was instructed to imagine that they had discovered that they were out of three products at home; juice, coffee, and candy. They were instructed to shop for one item from these three product categories in the online grocery store they soon would be visiting, as if they were shopping for themselves or for the people they usually do grocery shopping for. The full instructions are available in Appendix C.

3.3.3. Shopping experience and manipulation

After receiving instructions, participants were assigned to one of the two experimental groups via a randomization link created in Google Apps Script (see Appendix C). This resulted in a double-blinded study where not even the authors were aware of what experimental group the participant was part of, until when the collected data was later analyzed. Depending on the experimental group, participants visited one of two versions of an online grocery store, with the sole difference being the sorting of the assortment within it. Participants were never informed that different versions of the online store existed.

Website design

To create a realistic shopping experience simultaneously customizable for the purpose of this thesis, a mock-up online grocery store was built by the authors using the online tool Wix.com (see Appendix C). Inspiration was collected from the design and layouts of Sweden's three largest grocery retailers' websites; ICA, Coop, and Willys (Axfood, 2022). The number of products displayed (vertically and horizontally) on the study's

website imitated the design of these three inspirational websites, as well as the decision to employ continuous scrolling (see Appendix C).

Due to limited resources, the authors only included three product categories on the website; juice, coffee, and candy. The products within each product category were present on at least two of the three retailers' websites looked at, resulting in 72 juice alternatives, 58 coffee alternatives, and 95 candy alternatives. Images and product descriptions were copied from ICA Maxi Lindhagen's assortment and pasted into the experiment's website. As the study did not look at how price influences product choice, product prices were excluded. Private label products were excluded to make the study's implications applicable for retailers regardless of their selection of own-brand products.

To create the manipulation, the constructed website was duplicated and given separate URLs. In the first version the product assortment was sorted by bestseller, while the assortment in the second version was randomly sorted. The bestseller sorting was based on ICA Maxi Lindhagen's website. To ensure that this sorting was accurate, ICA Maxi Lindhagen's bestseller sorting was compared to bestseller sortings in other online grocery stores, including ICA, Coop, and Willys. The randomized sorting was generated using a randomization function in Microsoft Excel.

Method motivation

Compared to previous studies, the design of this experiment avoided using only images of websites to collect data but was rather designed in a similar fashion to a real online grocery store. This made the experiment more realistic and gave the participant the possibility to scroll through the product pages just like in a real website. Furthermore, this design allowed a realistically large assortment of products in the categories to be included in the study. The chosen methodology also enabled data collection about how the consumers behaved on the website. On the flip side, the design complicated the data analysis, as manual data processing was required.

3.3.4. Questionnaire and measurements

Once one item of each category had been added to the cart, respondents were asked to proceed to the checkout of the online store to fill in a questionnaire consisting of nine blocks (see Figure 6) with a total of 23 questions (see Appendix D). The questionnaire was constructed using the online tool Qualtrics.

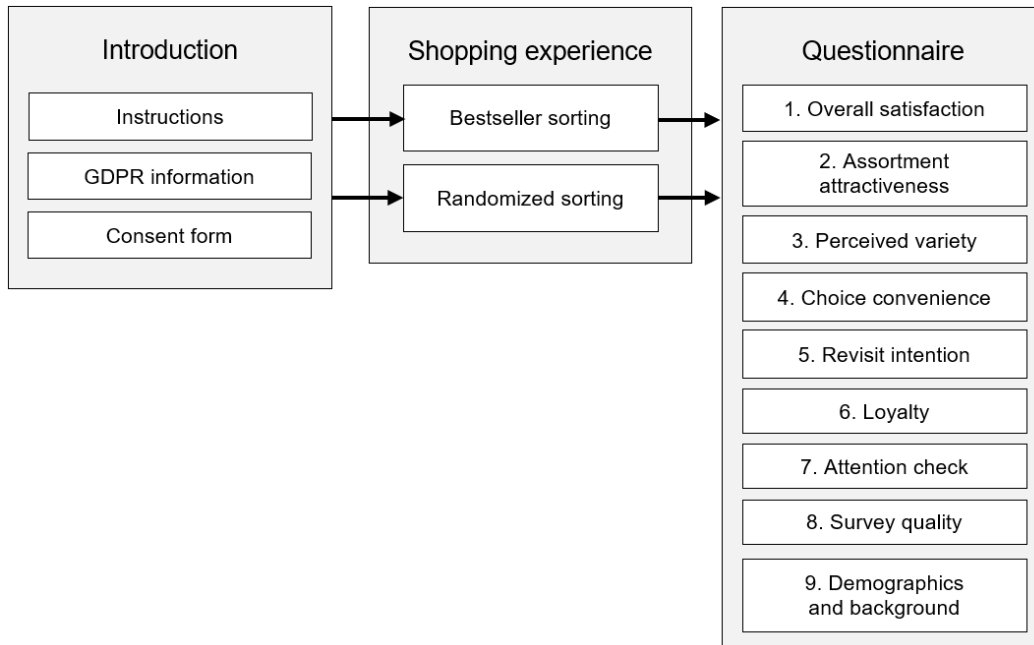


Figure 6. The study's main components and contents of the questionnaire.

Independent and dependent variables

As the experiment's manipulation was created by changing the sorting of the product assortment in the online website, the *sorting* is the study's independent variable. The study's remaining variables described below are to be considered dependent variables in all hypotheses, except in hypotheses H4 and H5. For H4-H5, the variables *perceived variety*, *assortment attractiveness* and *choice convenience* are treated as independent variables instead, to test their mediating effect between sorting, overall satisfaction, and revisit intention. This is further explained in section 3.3.2., and all variables are further explained in Table 2. *Overall satisfaction* and *revisit intention* should be considered as the thesis' main dependent variables, as illustrated in Figure 4.

Questionnaire measurements

The questions used in the questionnaire (see Appendix D) were mainly constructed based on scales tested in prior research, primarily collected from the *Marketing Scales Handbook* by Bruner and Gordon (2017), and *Handbook of Marketing Scales*, by Bearden et al. (2011). The quality of the multi-item measurements used was evaluated using Cronbach's alpha, discussed in 3.5.1. All measurements but demographics were measured on a 7-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (7).

Table 2. A summary of the measurements included in the study's questionnaire.

Variable	Description
Perceived variety	Refers to how the participant perceived the variety of the assortment in the online store, also referred to as <i>variety within the assortment</i> in prior research. Measured using three items. Minor modifications were made to the scale used by Kahn and Wansink (2004) and Townsend and Kahn (2014).
Assortment attractiveness	Concerns how attractive the participant perceived the assortment, measured using three items. Minor modifications were made to Diehl et al.'s formulation in 2015. Has been referred to as <i>assortment perceptions</i> and <i>attitudes toward the website (product assortment)</i> in prior studies (Bruner & Gordon, 2017).
Choice convenience	Indicates the participant's perceived convenience of choosing products from the assortment, using three items first introduced by Emrich et al. in 2015 (Bruner & Gordon, 2017).
Overall satisfaction	Concerns the participant's satisfaction with the shopping experience, measured using one item formulated based on the After-Scenario Questionnaire (ASQ) (Lewis, 1995). Intentionally placed in the beginning of the questionnaire to avoid any influence from other questions.
Revisit intention	Concerns consumers' attitude or willingness to shop in a store again. Measured using one item based on items used by Pounders, Babin, and Close in 2014 (Bruner & Gordon, 2017), modified to suit the experiment's context.
Loyalty	Refers to participants' tendencies to remain with the same brands and products when grocery shopping. Measured using three items based on Baumgartner and Steenkamp's (1996) scale for exploratory buying behavior tendencies (Bearden et al., 2011).
Demographics and background	Participants were asked to submit their age, gender, occupation and how frequently they shop for groceries online.

Behavioral measurements

The study included four behavioral variables, for which data were collected by analyzing the participants' behaviors in the simulated websites. A detailed explanation of how the behavioral variables were measured can be found in Appendix E:

Table 3. A summary of the study's behavioral measurements.

Variable	Description
Time spent	Seconds spent shopping in the online grocery store.
Exposure	How many rows the participant exposed themselves to.
Selected row	The vertical positions (row) of the products the participant selected.
Selected column	The horizontal positions (column) of the products the participant selected.

3.4. Data analysis

3.4.1. Video analysis

Each shopping experience was screen recorded using the online video tool Vimeo, resulting in one video for each participant. Each video was manually analyzed by the authors to extract data for the behavioral measurements defined in Table 3. To ensure that the recorded videos of the participants' shopping were analyzed in the same way by both authors, video analysis guidelines were constructed (see Appendix E).

3.4.2. Statistical analysis

Once the screen recordings had been analyzed, data from the video observations and questionnaire were paired in Microsoft Excel, based on the timestamp recorded in Vimeo and Qualtrics respectively. Thereafter, data were imported to IBM SPSS Statistics 28, where all statistical tests were conducted. In SPSS, low-quality answers were filtered out based on the attention check included in the questionnaire, resulting in 107 remaining valid responses, 55 and 52 from the two experimental groups respectively. Since each group included more than 30 participants, data were assumed to be normally distributed (Kwak & Kim, 2017).

In SPSS, descriptive statistics were retrieved and multiple statistical tests were performed. Pearson correlation was used for H1a. To test hypotheses related to differences between the two experimental groups, independent samples t-tests were performed. Tests for significance were two-sided, and a significance level of $p < .05$ was used as an upper limit for statistical significance in all tests, in line with the convention among most business researchers (Bryman & Bell, 2015).

To test hypotheses H4-H5, multiple mediator models were created using *model 4* in Hayes' macro PROCESS in SPSS. In this model, the relationships between an independent variable (X) and a dependent variable (Y) are explored via one or multiple mediators (M_i), creating multiple paths of effect.⁴ The *a*-path refers to X's effect on M, while *b* is M's effect on Y, and *c*' is the direct effect of X on Y. In addition, an indirect effect of X on Y is calculated as $a*b$ (Hayes, 2013):

⁴ Note that even though a mediation analysis is significant, it does not necessarily prove that M is a mediator. Fiedler et al. (2011) explain this common misunderstanding in the article *What mediation analysis can (not) do*.

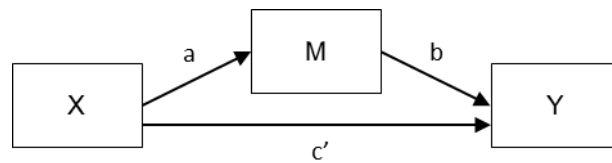


Figure 7. Illustration of Hayes' model 4 in the SPSS add-in PROCESS (Hayes, 2013).

Mediation analyses were performed at a confidence level of 95% and 5000 bootstrap samples. In addition, lower and upper levels of confidence intervals (LLCI, ULCI) were analyzed to identify statistical significance. Following directives stated by Hayes (2013), results were considered to be statistically significant if the reported confidence interval did not include zero, meaning that the confidence interval did not range from negative to positive. In addition, assumptions for linear regressions including linearity, normality, homoscedasticity, and absence of multicollinearity were tested and assessed in accordance with Hayes' (2013) recommendations.

3.5. Reliability and validity

The study was designed to increase reliability and validity in accordance with recommendations by Bryman and Bell (2015), with the purpose of improving the trustworthiness of the results.

3.5.1. Reliability

Reliability concerns the consistency of measures in an experiment and refers to errors-based deviations between the observed value and the real value (Söderlund, 2005). Reliability is commonly tested by assessing to which extent the same results can be obtained from several measurements (Bryman & Bell, 2015), often by using multi-item measurements, i.e., asking multiple similar questions to answer the same main theoretical property in an experiment. The internal consistency within the multi-item measurement is further used as an indicator of the study's reliability (Söderlund, 2005). In this experiment, multi-item measurements were used to measure the variables *perceived variety*, *assortment attractiveness*, and *choice convenience*, including three items each, sourced from prior research. The average of the three items was later used for statistical analysis, and the items' internal consistency was assessed using Cronbach's alpha, a reliability indicator that represents the average conformity between the items (Cronbach, 1951). The analyzed variables all had an alpha > .7, which is considered a satisfactory degree of internal consistency for basic research (Nunnally, 1978; as cited by Peterson, 1994, and Tavakol & Dennick, 2011). To ensure *inter-rater reliability*, i.e., consistency of judgments in the analysis of the data (Bryman & Bell, 2015), the authors created and followed guidelines for data analysis (see Appendix E). No concrete measures of inter-reliability were calculated, however, this could easily be

done regarding the measurements of the search behaviors via computer log files. Furthermore, to reduce the negative effect on reliability and the risk of type 1-errors from the experiment (Bryman & Bell, 2015), the chosen significance level was $p < .05$.

Table 4. Cronbach's alpha for indexed variables

Variable	Cronbach's alpha	<i>N</i>	Number of items
Perceived variety	.71	107	3
Assortment attractiveness	.86	107	3
Choice convenience	.83	107	3

Note: The table displays the Cronbach's alpha for the entire sample. When experimental groups were analyzed separately, results for Cronbach's alpha were very similar to grouped results.

3.5.2. Validity

Validity refers to the degree to which a measure is free of random and systematic errors and answers the question of if what is measured is what is meant to be measured (Bryman & Bell, 2015). To ensure high *content validity*, the questions asked in the study were based on the study's theoretical framework and answered on a 7-point Likert scale capturing extreme values, ranging from *strongly disagree* (1) to *strongly agree* (7) (Söderlind, 2005). To ensure high *construct validity* and decrease the risk of misinterpreting the study's results, questions were designed based on measurements tested in prior research (Bryman & Bell, 2015). Additionally, to ensure high *external validity* and make sure the results apply to multiple product categories, three different categories were included in the experiment (Bryman & Bell, 2015).

To ensure quality of answers, an attention check was included in the questionnaire asking the participants what objects they were asked to buy. All but three participants answered correctly. Furthermore, the pre-study was performed to confirm that participants perceived the study's manipulation as intended, ensuring that what was intended to be studied was actually studied, which is in line with Bryman and Bell's (2015) definition of *measurement validity*.

3.5.3. Survey judgment

At the end of the questionnaire, participants were asked to evaluate its quality. Approximately 80% found it realistic, 79% meaningful, 96% clearly formulated, and 76% not trying to influence answers (see Appendix E). Clearly formulated questions as well as a realistic design further secure the validity of the study (Bryman & Bell, 2015).

4. Results

In the following section, results from the data analysis of the experiment are presented. A summary of the tested hypotheses can be found in Appendix F. The results from the conducted pre-study are available in Appendix B.

4.1. Descriptive statistics

After filtering low-quality responses, the study generated 107 valid responses. Slightly more men (55.1%) than women (44.9%) participated in the study. On average, respondents were aged 22.07 ($SD = 1.94$). Most participants were students (95.3%) and had never shopped for groceries online before (43.0%). In Appendix G, an overview of the two experimental groups is provided. Table 5 presents descriptive statistics for variables measured in the study, as well as results from independent samples t-tests performed to compare the two experimental groups:

Table 5. Descriptive statistics of variables and results from independent samples t-tests

Experimental group, sorting	Bestseller <i>n</i> = 52		Randomized <i>n</i> = 55		Independent samples t-test	
Variable	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
Selected row, average ^a	4.06	1.99	5.78	2.02	-4.45	<.001***
Time spent, total, seconds	104.54	40.60	104.65	39.09	-0.02	.988
Exposure, total rows displayed	29.23	9.46	31.75	6.76	-1.57	.119
Perceived variety	6.47	0.66	6.25	0.84	1.55	.125
Assortment attractiveness	6.17	0.77	5.62	1.29	2.68	.009**
Choice convenience	5.54	1.15	4.53	1.61	3.75	<.001***
Overall satisfaction	5.94	0.98	5.35	1.43	2.53	.013*
Revisit intention	5.50	1.44	4.84	1.76	2.13	.036*

Note: *N* = 107. * $p < .05$, ** $p < .01$, *** $p < .001$. *df* = 105.

^aSum of the selected products' row numbers, divided by 3.

4.2. Hypothesis testing

4.2.1. H1: Selected row and column

Hypothesis H1a was tested using correlation analysis.⁵ Negative correlations between row number and selection frequency were anticipated for empirical support. Separate analyses were made for each product category since the total number of rows varied

⁵ Note that hypothesis H1a could also have been tested using chi-square tests in SPSS.

between them. As shown in Table 6, significant negative correlations were found for all categories. Thus, H1a was empirically supported. A detailed overview of the distribution of selected rows can be found in Appendix G.

Table 6. Pearson correlation: Row number and selection frequency

Product category	Number of rows	Correlation, row number and selection frequency
Juice	12	-.67*
Coffee	10	-.76*
Candy	16	-.89**

Note: $N = 107$. *Correlation is significant at the 0.05 level.

**Correlation is significant at the 0.01 level.

H1b was tested by analyzing how frequently participants selected products from the different columns. The six columns were divided into three groups based on their position relative to the center of the page. The hypothesis implied that products from columns three and four would be selected more frequently than products from the other columns. Statistics showed that 32.1% of the 321 total selections were made from columns one and six, 34.9% from columns two and five, and 33.1% from columns three and four. Thus, hypothesis H1b was not supported.

In addition, the six columns were analyzed separately, showing that products were most frequently selected from the first column from the left (21.5%). The sixth and final column was the least frequently selected (10.6%).

4.2.2. H2: Selected row, time spent and exposure

To test hypotheses H2a-H2c, independent samples t-tests were performed. As displayed in Table 5, empirical support was found for hypothesis H2a. Thus, it was statistically significant that respondents in the group exposed to the bestseller-sorted assortment selected products placed on rows higher up on the product page than respondents in the group exposed to the randomly sorted assortment. Hypotheses H2b and H2c were not empirically supported (see Table 5).

4.2.3. H3: Perceived variety, assortment attractiveness, and choice convenience

Independent samples t-tests were conducted for hypotheses H3a-H3c, comparing the two experimental groups' means for *perceived variety*, *assortment attractiveness*, and *choice convenience*. As displayed in Table 5, significant differences were found between the two groups for assortment attractiveness and choice convenience. Thus, H3b and H3c were empirically supported. No empirical support was found for

perceived variety (H3a). Descriptive statistics for all included items are provided in Appendix G.

4.2.4. H4-H5: Mediating effect of perceived variety, assortment attractiveness and choice convenience between sorting and overall satisfaction/revisit intention

Hypotheses H4-H5 were tested using model 4 in Hayes' add-in PROCESS in SPSS. For H4, X was defined as sorting and Y as overall satisfaction. For H5, X was defined as sorting and Y as revisit intention. Further, the randomized sorting was coded as X=1, and the bestseller sorting as X=2. Perceived variety, assortment attractiveness, and choice convenience acted as mediators (M1, M2, and M3 respectively) in the performed tests.⁶ 5000 bootstrap samples and a confidence interval of 95% were employed. Correlations between the variables are provided in Appendix G.

The relationships between X and M1/M2/M3 were tested via regression analyses in the PROCESS add-in. Aligned with the results from the t-tests performed for H3a/b/c, statistically significant influences of sorting were found on assortment attractiveness (M2) and choice convenience (M3), but not on perceived variety (M1):

Table 7. Regression analyses: Effect of sorting on perceived variety, assortment attractiveness and choice convenience

Outcome variable	Model summary			Effect of sorting		
	<i>R</i> ²	<i>F</i>	<i>p</i>	<i>B</i> -coefficient	<i>SD</i>	<i>p</i>
Perceived variety	0.02	2.36	.128	0.23	0.15	.128
Assortment attractiveness	0.06	7.00	.009*	0.55	0.21	.009**
Choice convenience	0.12	13.78	<.001***	1.01	0.27	<.001***

Note: *N* = 107. **p* < .05, ***p* < .01, ****p* < .001. *df*₁ = 1, *df*₂ = 105.

H4a-H4c: Relationships between mediators and overall satisfaction

A multiple mediator model was created to test the effects of the three mediators on overall satisfaction. The model displayed statistically significant effects from assortment attractiveness and choice convenience on overall satisfaction, but not from perceived variety. Thus, H4b and H4c were empirically supported, while no empirical support was found for H4a. No significant direct effect was found of sorting on overall satisfaction. These relationships are displayed in Figure 8. Looking at the indirect

⁶ Note that the relationships illustrated in Figure 8 and Figure 9 could potentially be different. As discussed by Fiedler et al. (2011), it is not certain that M always affects Y. Instead Y could affect M, especially if questions regarding the Y-variables are presented to the participants prior to questions about the M-variables in a questionnaire.

effects of sorting on overall satisfaction, the effect via choice convenience (M3) was found to be statistically significant, as displayed in Table 8.

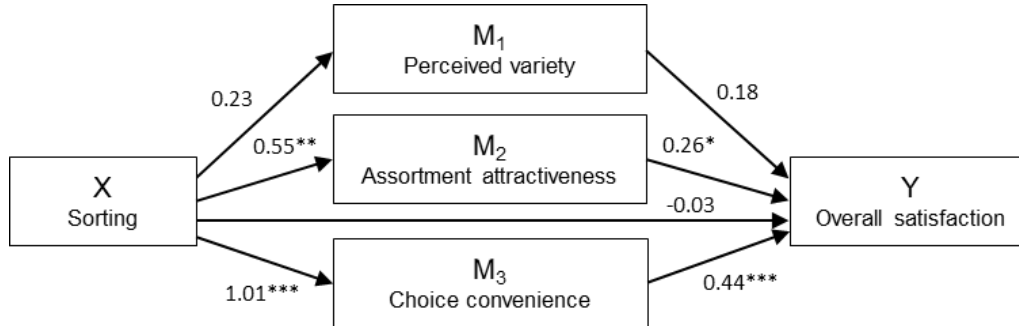


Figure 8. Multiple mediator model: Overall satisfaction

Table 8. Multiple mediator model: Overall satisfaction

Model summary	<i>R</i> ²	<i>F</i>	<i>p</i>	<i>df</i> ₁	<i>df</i> ₂
Overall satisfaction (Y)	0.48	23.30	<.001***	4	102
Effects of mediators	Effect	<i>SD</i>	<i>p</i>	<i>LLCI</i>	<i>ULCI</i>
Perceived variety (M1)	0.18	0.16	.273	-0.14	0.50
Assortment attractiveness (M2)	0.26	0.13	.043*	0.01	0.51
Choice convenience (M3)	0.44	0.08	<.001***	0.29	0.59
Effect of sorting	Effect	<i>SD</i>	<i>p</i>	<i>LLCI</i>	<i>ULCI</i>
Direct effect	-0.03	0.19	.868	-0.42	0.35
Indirect effects					
Total	0.63*	0.18	-	0.29	1.00
Perceived variety (M1)	0.04	0.04	-	-0.05	0.13
Assortment attractiveness (M2)	0.14	0.11	-	-0.03	0.40
Choice convenience (M3)	0.45*	0.17	-	0.16	0.83

Note: *N* = 107. **p* < .05, ***p* < .01, ****p* < .001.

LLCI and ULCI: Lower and upper levels of confidence intervals.

H5a-H5c: Relationships between mediators and revisit intention

For H5, the mediator model showed a statistically significant effect from choice convenience on revisit intention, empirically supporting H5c. No empirical support was found for H5a and H5b (see Figure 9). While no significant direct effect was found of sorting on revisit intention, the indirect effect via choice convenience was found to be statistically significant, as displayed in Table 9.

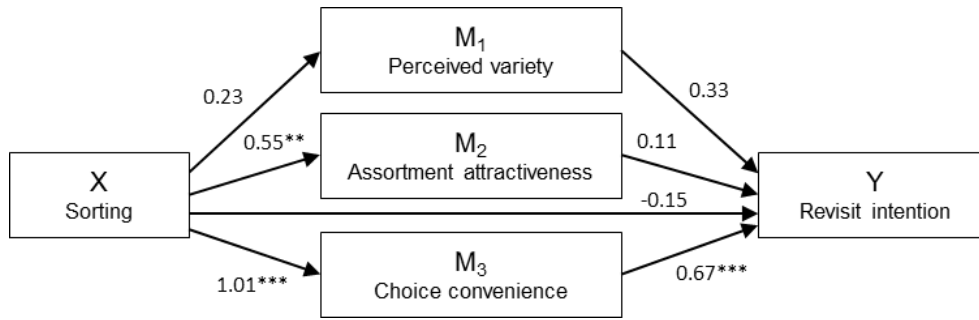


Figure 9. Multiple mediator model: Revisit intention

Table 9. Multiple mediator model: Revisit intention

Model summary	<i>R</i> ²	<i>F</i>	<i>p</i>	<i>df</i> ₁	<i>df</i> ₂
Revisit intention (Y)	0.45	20.56	<.001***	4	102
Effect of mediators	Effect	<i>SD</i>	<i>p</i>	<i>LLCI</i>	<i>ULCI</i>
Perceived variety (M1)	0.33	0.22	.135	-0.10	0.76
Assortment attractiveness (M2)	0.11	0.17	.514	-0.23	0.45
Choice convenience (M3)	0.67	0.10	<.001***	0.47	0.87
Effect of sorting	Effect	<i>SD</i>	<i>p</i>	<i>LLCI</i>	<i>ULCI</i>
Direct effect	-0.15	0.26	.569	-0.66	0.37
Indirect effects					
Total	0.81*	0.24	-	0.37	1.32
Perceived variety (M1)	0.07	0.08	-	-0.06	0.27
Assortment attractiveness (M2)	0.06	0.13	-	-0.18	0.33
Choice convenience (M3)	0.68*	0.22	-	0.30	1.14

Note: *N* = 107. **p* < .05, ***p* < .01, ****p* < .001.

LLCI and ULCI: Lower and upper levels of confidence intervals.

4.2.5. H6: Overall satisfaction and revisit intention

In addition to testing direct and indirect effects via mediation models (Tables 8 and 9), independent samples t-tests were performed to compare the two experimental groups' means for overall satisfaction and revisit intention. The experimental group exposed to the bestseller-sorted assortment had higher overall satisfaction and revisit intention than the group exposed to the randomly sorted assortment (see Table 5). Thus, empirical support was found for hypotheses H6a and H6b.

5. Discussion and conclusion

The purpose of this thesis is to give potential insights into how consumers' overall shopping experience is affected by the sorting of product assortments in online grocery stores, and to answer the following research question:

How does the sorting of a product category assortment affect consumers' behavior and experience in an online grocery store?

5.1. Discussion of results

5.1.1. Consumer behavior in low-involvement purchases

Products placed higher up on a product page in the online grocery store were more likely to be selected (H1a). This was found for all three product categories tested. The results are congruent with Anesbury et al.'s findings from 2016; consumers were more likely to select products encountered earlier on the page. The findings also relate to prior research's suggestions that consumers want to minimize the effort spent on low-involvement purchases (Antil, 1984; Hoyer, 1984; Schwartz, 2004), by selecting the first product considered to be satisfactory instead of searching through an entire assortment for the best alternative (Hoyer, 1984, Schwartz, 2004; Chowdhury et al., 2009).

While prior studies from physical grocery stores suggest the horizontal center of a product display to be the most attractive (Drèze et al., 1994; Valenzuela & Raghubir, 2009), this reasoning did not apply to the digital format of this study (H1b). Instead, data indicated the page's leftmost position to be the most attractive (H1b). This can possibly be explained by findings from previous studies on online eye-movement patterns, suggesting that left locations are typically attended first (Fleming, 1997, as cited in Faraday, 2000). The findings can be said to align with Drèze et al.'s (1994) conclusions on vertical placement, stating that products placed at eye or hand level have a significantly higher probability of being selected as the eye is naturally drawn to these products.

5.1.2. Consumer behavior based on product sorting

Participants who shopped in the grocery store where products were sorted by bestsellers selected products located higher up on the product page compared to if products were randomly sorted (H2a). Based on prior findings regarding consumers' consideration set, internal filters (Howard & Sheth, 1967; Alba & Chattopadhyay, 1985; Nordfält et al., 2004), and search process for low-involvement purchases (Hoyer, 1984, Schwartz, 2004; Chowdhury et al., 2009), the observed behavior indicates that the bestseller-

sorting allowed consumers to find satisfactory products earlier on the page. This can be further motivated by consumers being more familiar with bestseller products than random products, as confirmed in the conducted pre-study (see Appendix B). Therefore, based on Buchanan et al. (1999) and Morales et al.'s (2005) previous reasoning, results indicate that the bestseller-sorting better matched consumers' internal product structures, compared to the randomized sorting.

No significant differences were found between the two groups regarding time spent or how many rows of products they exposed themselves to. Thus, results indicate that even if consumers identified a satisfactory product early on the page, they tended to explore the entire available assortment, conflicting with Chowdhury et al.'s (2009) findings regarding consumers' propensity to browse. However, as discussed by Chowdhury et al. (2009), it is important to note that the results regarding time and exposure may vary depending on time pressures and the size of the assortment.

5.1.3. Consumers' perceptions based on product sorting

Contrasting to Hoch et al.'s (1999) suggestion that product organization can influence the level of variety the consumer perceives, the study's participants did not find one of the product sortings to offer a greater perceived variety than the other (H3a). One possible explanation for the result's deviation from Hoch et al.'s (1999) findings from the physical store can be that this study's experiment was performed digitally. In addition, the perceived variety might have been different if the product organization was made in a different manner, for instance by sorting products by colors or flavors, instead of popularity.

When products were sorted by bestsellers, participants perceived the assortment as more attractive and had a higher choice convenience than when the same assortment was randomly sorted (H3b, H3c). Thus, both the study's behavioral (5.1.2) and perceptual (5.1.3) measurements indicate that the bestseller-sorting was better aligned with the participants' internal product structures than the randomized sorting (Buchanan et al., 1999; Morales et al., 2005). The findings further align with previous research by Antil (1984), Hoyer (1984), and Schwartz (2004), explaining how consumers appreciate a product sorting that eases their low-involvement purchasing processes. However, it should be noted that even though the differences in assortment attractiveness and choice convenience between the experimental groups were statistically significant, they can be considered relatively small ($M_{\text{Bestseller}} = 6.17$ and $M_{\text{Randomized}} = 5.62$ for assortment attractiveness, $M_{\text{Bestseller}} = 5.54$ and $M_{\text{Randomized}} = 4.53$ for choice convenience).

5.1.4. Consumers' satisfaction and revisit intention based on perceptions

Consumers who perceived higher assortment attractiveness and choice convenience were also more satisfied with their experience (H4b, H4c). The study's findings thereby

align with previous findings in the physical context regarding the benefits of easing consumers' purchasing process via product organization (Sujan, 1985; Buchanan et al., 1999; Morales et al., 2005). In contrast to what has previously been suggested in the literature (Hoch et al., 1999; Kahn & Wansink, 2004), increased perceived variety did not have a positive effect on overall satisfaction. This could be explained by risks of choice overload increasing with perceived variety (Huffman & Kahn, 1998; Chernev et al., 2015). While the online context's limitless shelf space can offer consumers with greater choice flexibility (Kahn & Lehmann, 1991; Campo & Breugelmans, 2015), enlarging an assortment could backfire in terms of choice overload, causing the positive effect of increased perceived variety on overall satisfaction to be canceled out.⁷

Consumers' revisit intention was significantly positively influenced by increased choice convenience (H5c), but not by assortment attractiveness or perceived variety (H5a, H5b). The results thereby indicate that consumers prioritize convenience when choosing what grocery store to visit online. However, there is a risk that results regarding revisit intention were influenced by misinterpretations from the study's participants. For instance, participants might have compared the study's online grocery store to other real alternatives or might not have had an intention to shop groceries online at all. In retrospect, the study's reliability could have been improved by measuring overall satisfaction and revisiting intention using multi-item measurements, and clarifying how they should have been interpreted.

Additional analyses showed that sorting's influence on overall satisfaction and revisit intention was created via the studied mediators rather than through direct effects. Via choice convenience, sorting was found to indirectly affect both overall satisfaction and revisit intention. This implies that the bestseller sorting significantly improved consumers' choice convenience, and thereby also increased overall satisfaction and revisit intention. Even though a similar relationship was expected to be found between sorting and overall satisfaction via assortment attractiveness, no such indirect effect was significant. This could possibly be a consequence of intercorrelations between the mediators, but was not explored further within the scope of this study. Additionally, it is important to note that this study only includes a limited number of mediating variables between the study's independent and dependent variables. Thus, there are possibly

⁷ Here, it is also relevant to consider the reliability and validity of academic research, and to note that multiple studies conducted by Brian Wansink were retracted by the Cornell University in 2018 due to an inability to assure the studies' validity (Dahlberg, 2018). Insufficient validity of previous studies can potentially have contributed to that contrasting results were found in this study. Furthermore, this highlights the importance of replicating previously performed studies to verify results and improve the quality of academic research. The ongoing discussion about the replication crisis, further described by Dreber and Johannesson (2018), emphasizes that false-positive results in academic research are commonly caused by phenomena such as *fishing*, *p-hacking* and *forking*.

many variables outside of the scope of this study that are influenced by the researched stimulus in reality.

5.1.5. Consumers' satisfaction and revisit intention based on product sorting

Finally, consumers who visited the grocery store with products sorted by bestsellers were more satisfied and reported a greater intention to revisit the store, than consumers in the randomly sorted store (H6a, H6b). Accordingly, as shown in previous research in physical grocery stores (Arnold et al., 1983; Sujan, 1985; Buchanan et al., 1999; Morales et al., 2005), product organization activities also influence consumers' overall satisfaction and revisit intention in the digital environment. However, as discussed, these influences were not created directly from the sorting but were mediated via other variables. These findings can further be related to how Thorndike's (1927) S-R model was developed into S-O-R. In this case, product sorting is the *stimulus*, overall satisfaction and revisit intention are the *responses*, and the three studied mediating variables are the *organisms*. Without any analysis of the organisms, the study's results show that the stimulus affects the responses. However, by including the organisms, one can gain a deeper understanding of *how* the responses are affected by the stimulus, and that the organism plays a crucial role for the stimulus-response relationship to exist.

Similar to the discussion in 5.1.3., the differences between the experimental groups' overall satisfaction and revisit intention were statistically significant but relatively small ($M_{\text{Bestseller}} = 5.50$ and $M_{\text{Randomized}} = 4.84$ for overall satisfaction, $M_{\text{Bestseller}} = 5.94$ and $M_{\text{Randomized}} = 5.35$ for revisit intention). However, due to the increasingly competitive landscape in the market for online grocery shopping, minor differences in satisfaction can be argued to have a more meaningful impact in the digital environment, compared to the physical environment. Since the otherwise important factor of the store's location is eliminated in the online environment, the importance of the consumer's satisfaction is possibly amplified online.

5.2. Conclusions and implications

5.2.1. Main findings

As predicted by literature from physical contexts, the sorting of products does affect the consumers' behavior and perceptions when shopping for groceries online. As discussed in 5.1., the authors found that shopping in a store where products are sorted by popularity resulted in consumers choosing products higher up on the product page as they were able to find satisfactory products earlier. Additionally, they perceived the assortment as more attractive and had a higher choice convenience, which had a positive effect on the overall satisfaction. Higher choice convenience was also shown to affect revisit intention positively, indicating that consumers prioritize convenience when

choosing what grocery store to visit online. Both the study's behavioral and perceptual measurements indicated that the bestseller sorting was better aligned with the participants' internal product structures than the random sorting. Thus, sorting a product assortment by bestsellers was shown to result in higher overall satisfaction and revisit intention among the consumers compared to a randomly sorted assortment.

Opposite to what theory suggested, sorting of the assortment was not shown to affect the amount of time spent on shopping, the number of products the consumer was exposed to, or the amount of variety perceived. Additionally, the perceived attractiveness of the assortment was not shown to positively affect consumers' revisit intention.

5.2.2. Theoretical implications

The findings in this study can help bring insights into the subject of visual merchandising online and add to the currently modest volume of academic literature on the topic. As a theoretical framework from physical contexts was extended into the digital environment, the study explores how previously conducted research can be tested in new contexts in order to identify applicability and deviations. This study shows the need to continuously develop literature as the context of retailing is ever-changing, and what holds true in one context of retailing might not hold true in another. The results from the study show that product sorting, described to affect consumers in physical stores, also affects them in the online environment.

Compared to previous studies made on the subject, a live representation of an online grocery store was used to closely resemble a real online grocery store. Features like scrolling and clicking were included to better understand the consumer's behavior online. With this, the authors hope to inspire more future research to examine consumer behavior online with methods that closely resemble real-life situations.

5.2.3. Practical implications

The study shows that retailers can affect consumers' perceptions and actions in their online stores via the organization of the product assortment. The findings include that a bestseller sorting of an assortment improved the consumers' perceived convenience when shopping, and also led to higher overall satisfaction and intention to revisit the store. Participants also perceived the assortment as more attractive when sorted by bestsellers, indicating that consumers shopping online have a preference for product organizations that ease their decision-making process. For retailers, this implies opportunities to influence consumers' behaviors, perceptions, and improving satisfaction by sorting their assortments by popularity by default. Since the otherwise important factor of the store's location is eliminated in the online environment, the importance of the consumer's satisfaction is possibly amplified online, making the

findings relevant to remain competitive in the growing market of online grocery shopping. By consciously sorting product assortments, retailers can facilitate a more convenient shopping experience to attract and retain customers in the online environment.

Furthermore, the study shows that products placed higher up on a product page were more likely to be selected, implying that retailers can optimize sales of products by placing them at the top of the page. These practical implications extend beyond retailers, and can, for instance, provide suppliers with greater negotiation power in relation to retailers, when informed about how placement impacts the likelihood of a product being chosen. Additionally, this study can guide and inspire retailers and suppliers in other categories of retailing to test how sorting affects their customers' behaviors, and if similar conclusions can be drawn in adjacent areas of retail.

5.3. Limitations and future research

5.3.1. Sampling

The convenience sample used in this study resulted in a sample unrepresentative of the entire population. Allowing for a more varied distribution of ages and occupations in future research can make the understanding of consumer behavior when online grocery shopping more nuanced. The authors also reflected on the fact that differences in previous experience of online grocery shopping, and how long the participants had lived in Sweden may have affected how familiar they were with the assortment of groceries in the experiment. By making these two background variables a larger part of upcoming studies, future research can add deeper insights into differences between consumers' behavior based on demographic elements.

5.3.2. Product categories and instructions

Another limitation of this study is the fact that only three product categories were tested and laid the foundation for the analysis and conclusions made. Since juice, coffee, and candy are all groceries and thereby treated as low-involvement products, the results may not be applicable for other product categories or online shopping as a whole. Future research could thereby test other product categories, possibly associated with higher levels of involvement. Finding out if the conclusions for assortment sorting are the same for multiple categories can further help retailers in their decisions of how to organize their websites. This can lead to a higher success rate than if the decisions are based on only a few tested product categories. Furthermore, that participants were asked to buy three specific products which were not based on their real needs could have affected their behavior on the website. The results might therefore not be entirely representative of the participants' behaviors in a real online grocery store.

5.3.3. Stimulus and website design

Discussed as a delimitation of this study, only one type of product organization was tested, namely product sorting based on popularity. However, the online context offers numerous possible sorting alternatives that were not included in this study, such as based on price, brand, and color. Similarly, real online grocery stores often have promotions and banners on the product page. Promotional items are commonly placed at the top of retailers' website pages regardless of the sorting of the product, making it interesting to study sales offers as stimulus in online grocery shopping in future research. Additionally, product prices were consciously excluded from the study's website. Hence, this study was not able to catch if the consumers completely disregarded price as a factor, or if they acted based on previous knowledge about the prices of the goods presented. Thus, there are multiple opportunities to redesign the performed study to add insights related to the topic of product organization in online grocery stores.

One additional suggestion for future research is to test how product sorting affects consumers' behavior and experience in a real online grocery store. Manipulation of a real grocery store website could enable observation of behaviors closer to reality than what was possible for this study, since participants would be able to shop based on their personally identified needs. The volumes of a real grocery store would also allow a greater number of participants and hence contribute to higher data quality. Studying shoppers' behaviors in a real setting could for instance be done by collaborating with an online grocery retailer.

Final remarks

Understanding consumers' behaviors and perceptions is crucial for a retailer's success. As e-commerce continues to grow, retailers must understand how consumers' behavior may differ between the offline and online contexts. This study shows that by consciously sorting a product assortment, retailers can improve both consumer satisfaction and retention, paving the way for competitive leadership in the market of online grocery shopping.

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Appendices

Appendix A: Summary of theoretical framework

Table 10. Summary of theoretical framework

Consumers' decision-making and behavior in physical stores	
Authors	Findings
Jobber & Fahy, 2009	Traditionally, consumers are described to move through five steps when purchasing a product; need recognition, information search, evaluation of alternatives, purchase and post-purchase evaluation.
Thorndike, 1927; Mehrabian and Russell, 1974	Consumers' behavior can be explained as a response to external factors (stimulus), and is affected by emotions of people (organisms).
Howard & Sheth, 1968; Alba & Chattopadhyay, 1985; Nordfält et al., 2004	Consumers' limited memory and factors such as previous knowledge and perceived risks influence what products they consider.
Dick et al., 1990; Bettman et al., 1998	For external search of information, consumers turn to sources that are easily accessible and that can support their decision-making.
Antil, 1984; Hoyer, 1984; Knox & Walker, 2003; Schwartz, 2004; Radder & Huang, 2008; Chowdhury et al., 2009; Campo & Breugelmans, 2015	Groceries are considered as low-involvement products, indicating that consumers want to minimize the amount of effort spent on the purchase, by the use of choice tactics, routinized behaviors and brand loyalty.
Visual merchandising and product organization in physical stores	
Authors	Findings
Baker et al., 1992; Levy et al., 2019	In physical grocery stores, in-store marketing activities based on different sensory attributes can improve the customers' experience.
Simonson et al., 1993; Huffman & Kahn, 1998; Areni et al., 1999; Morales et al., 2005; Lamberton & Diehl, 2013	The organization of products can influence how the assortment is perceived and the likelihood that a product is selected.
Drèze et al., 1994; Valenzuela & Raghubir, 2009	Products placed in the horizontal and vertical center of a product display will receive more attention and are more likely to be selected.
Arnold et al., 1983; Broniarczyk et al., 1998; Hoch et al., 1999; Kahn & Wansink, 2004	The sorting of products within a product category can influence the level of variety the consumer perceives, likely to influence consumers' choice of store.
Arnold et al., 1983; Sujana, 1985; Buchanan et al., 1999; Morales et al., 2005	A match between the consumers' internal and the retailers' external sorting of products will result in easier processing of alternatives and improve the consumers' evaluation of the experience.

Online grocery shopping

Authors	Findings
Chowdhury et al., 2009; Anesbury et al., 2016	Consumers are likely to stay with a website's default settings, evaluate products in the order they are encountered, and buy a product presented earlier on the page.
Kahn & Lehmann, 1991; Huffman & Kahn, 1998; Hoch et al., 1999; Schwartz, 2004; Campo & Breugelmans, 2015; Chernev et al., 2015	The limitless shelf space online improves consumers' choice flexibility, but an assortment that is too large can cause choice overload and negatively affect the consumers' experience.
Degeratu et al., 2000, Koufaris, 2002; Danaher et al., 2003; Chu et al., 2010; Campo & Breugelmans, 2015	The lack of sensory attributes online causes consumers to be less likely to be influenced by in-store marketing activities online than offline. Consumers' perceived risks increase, making them more brand loyal online.

Appendix B: Preparatory study

Questionnaire

To identify if the manipulation used for the main study would be correctly interpreted, a pre-study was conducted, using a questionnaire created in Qualtrics. 32 valid answers were collected, and results were analyzed before the main study’s design was finalized. Respondents in the pre-study were asked to indicate if they agreed with the statements displayed in the example below, for six different product assortments sortings; two for juice, two for coffee and two for candy. The example below displays the random sorting of juice:

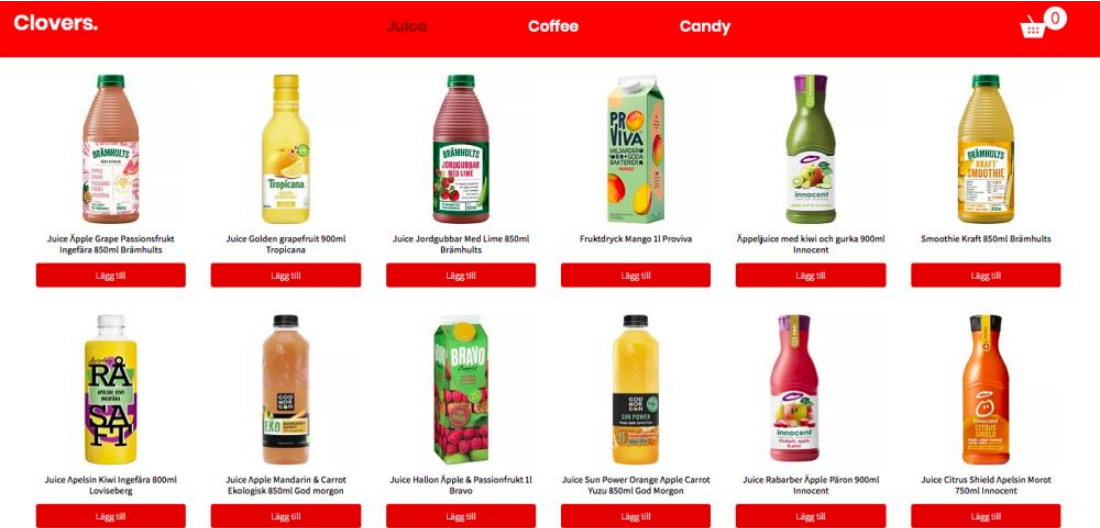


Figure 10. Product page for juice, randomly sorted.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I have tried many of the products in the assortment	☐	☐	☐	☐	☐	☐	☐
I can easily find a product I want to purchase in this assortment	☐	☐	☐	☐	☐	☐	☐
The products in the assortment are bestsellers	☐	☐	☐	☐	☐	☐	☐

Figure 11. Questions included in the questionnaire of the preparatory study.

Results and data analysis from preparatory study

Table 11. Preparatory study, descriptive statistics and paired samples t-test

Sorting Item	Bestseller		Randomized		Paired samples t-test	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
I have tried many of the products in the assortment						
Juice	5.53	1.52	2.66	1.60	8.22	<.001***
Coffee	4.25	2.34	3.28	2.02	4.27	<.001***
Candy	5.75	1.72	4.34	1.62	4.63	<.001***
Average across product categories	5.18	1.56	3.43	1.14	7.61	<.001***
I can easily find a product I want to purchase in this assortment						
Juice	5.69	1.38	4.09	1.67	5.77	<.001***
Coffee	4.75	2.23	3.69	1.99	3.74	<.001***
Candy	6.00	1.55	4.69	1.73	5.21	<.001***
Average across product categories	4.48	1.26	4.16	1.21	6.81	<.001***
The products in the assortment are bestsellers						
Juice	5.91	1.03	3.12	1.62	7.37	<.001***
Coffee	5.50	1.16	3.78	1.60	5.96	<.001***
Candy	5.78	1.24	3.97	1.60	4.78	<.001***
Average across product categories	5.73	0.98	3.63	1.26	7.15	<.001***

Note: $N = 32$, $*p < .05$, $**p < .01$, $***p < .001$, $df = 31$. Measured on a 7-point Likert scale, ranging from *strongly disagree* (1) to *strongly agree* (7).

Appendix C: Experiment and website design

Website design and instructions to participants

Information about the project and GDPR

The survey is a part of a BSc thesis conducted by Tilde Ivedal (24743@student.hhs.se) and Linn Lindgren (24741@student.hhs.se) in spring 2022. Supervisor for this project is Hanna Berg, institution for marketing and strategy at SSE (hanna.berg@hhs.se).

The personal information collected in this survey includes your age, gender, and occupation, however, your answers will be treated anonymously and in accordance with GDPR. All data will be stored and processed safely and will be permanently deleted when the project is completed. No personal data will be published. You are welcome to visit <https://www.hhs.se/en/about-us/data-protection/> in order to read more and obtain information on your rights related to personal data. Participation is entirely voluntary. You can at any time withdraw your consent and your data will thereafter be permanently erased.

I have taken part of the information provided above and consent to take part in this study:

Initials *

Today's date (YYYY-MM-DD) *

Submit

Figure 12. GDPR information and consent of participation

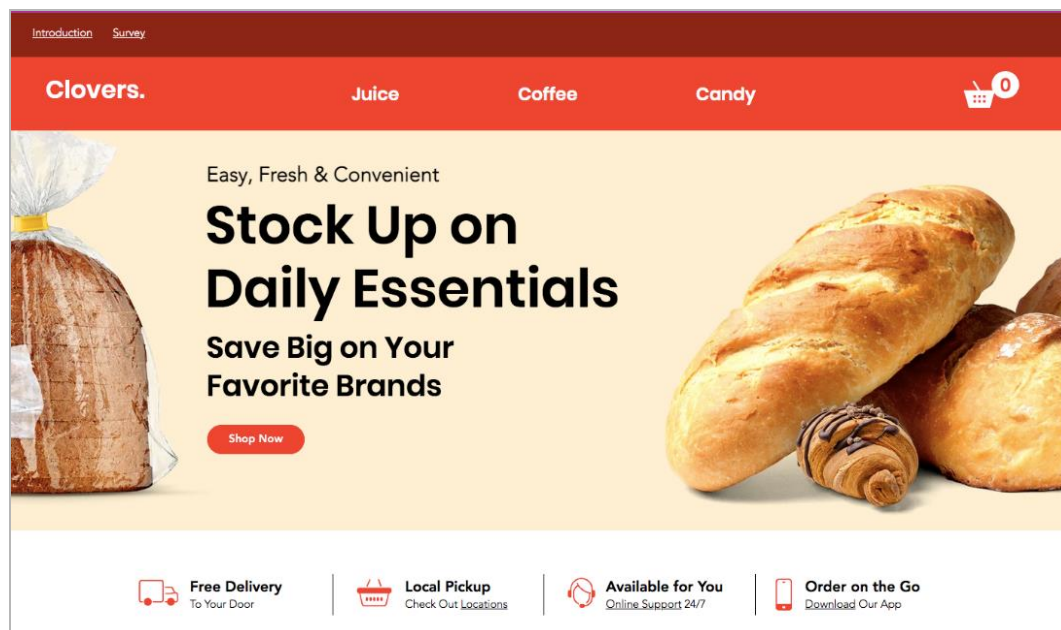


Figure 13. Start page on website

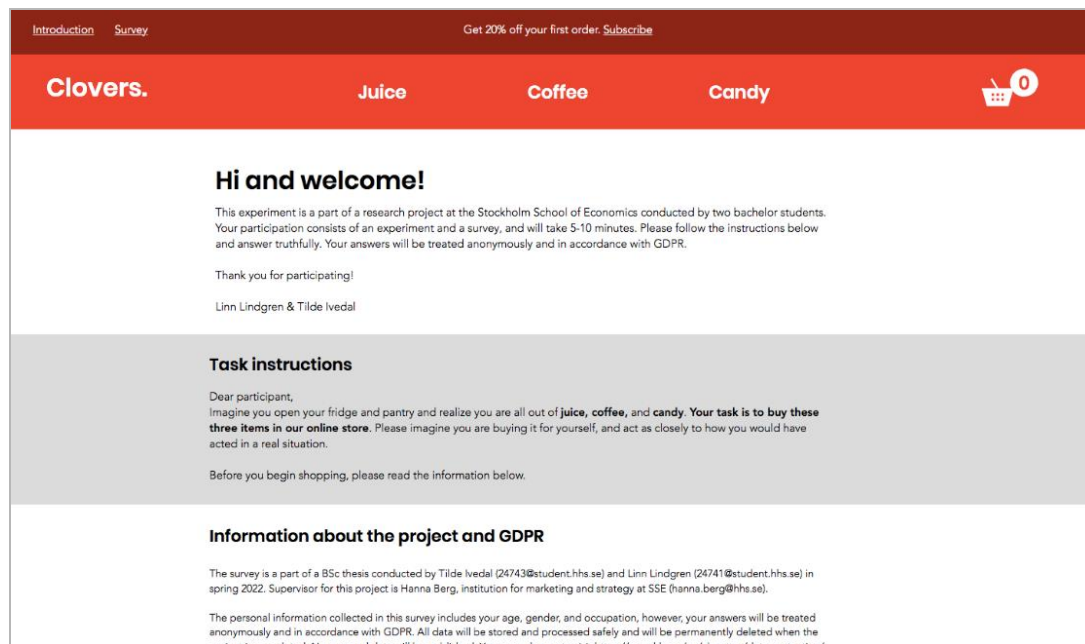


Figure 14. Instruction page

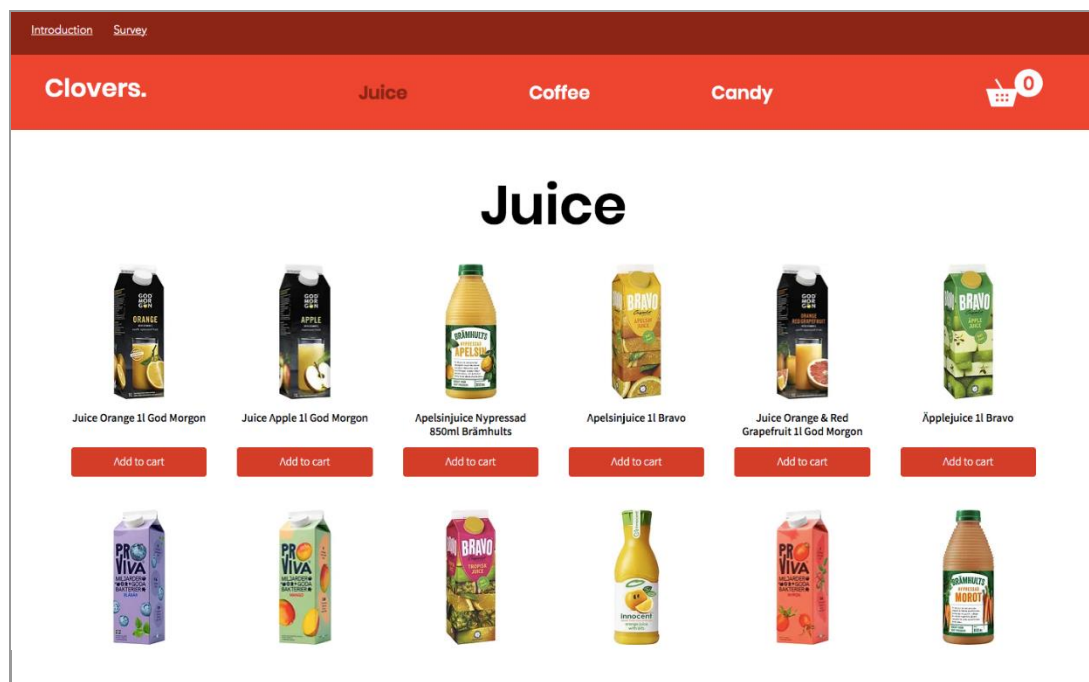


Figure 15. Product page for juice, bestseller-sorted assortment

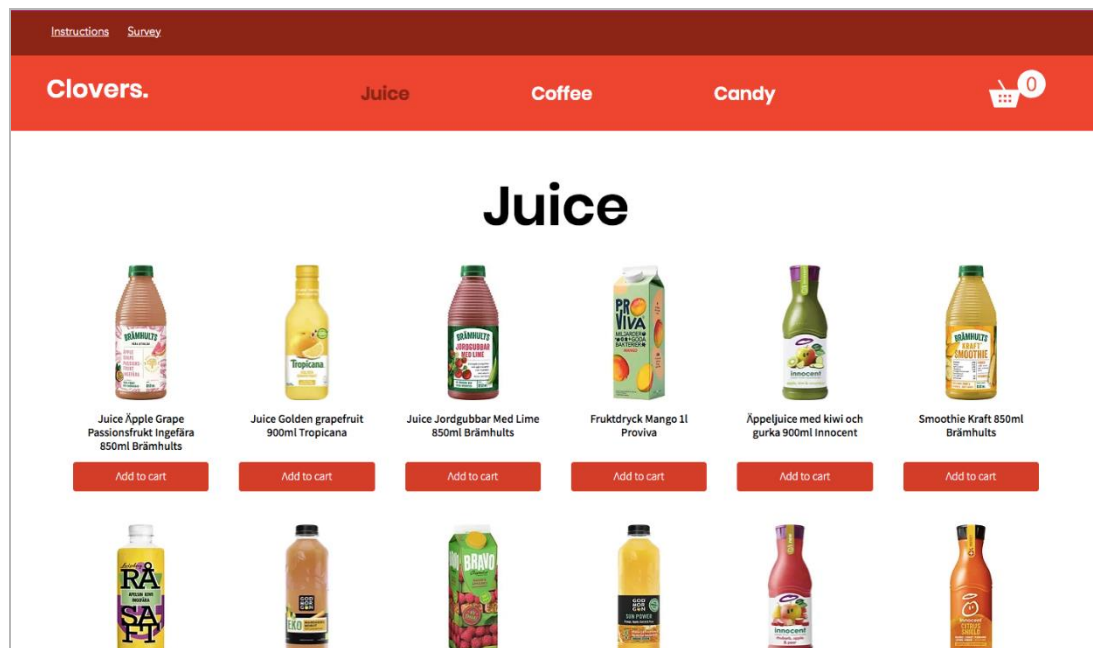


Figure 16. Product page for juice, randomly sorted assortment

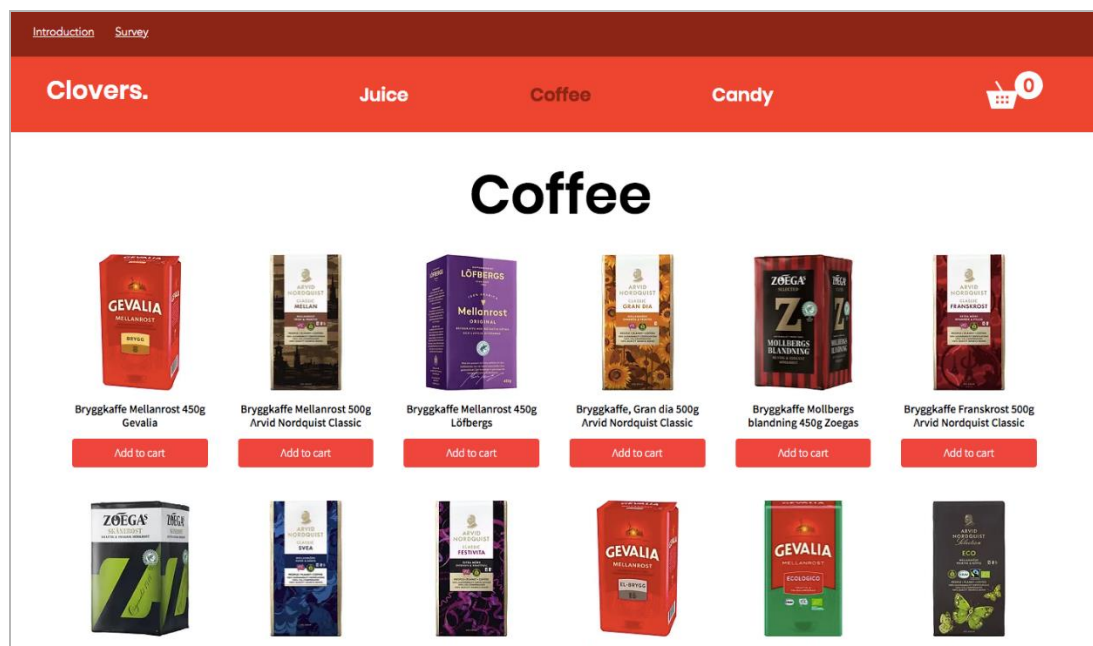


Figure 17. Product page for coffee, bestseller-sorted assortment

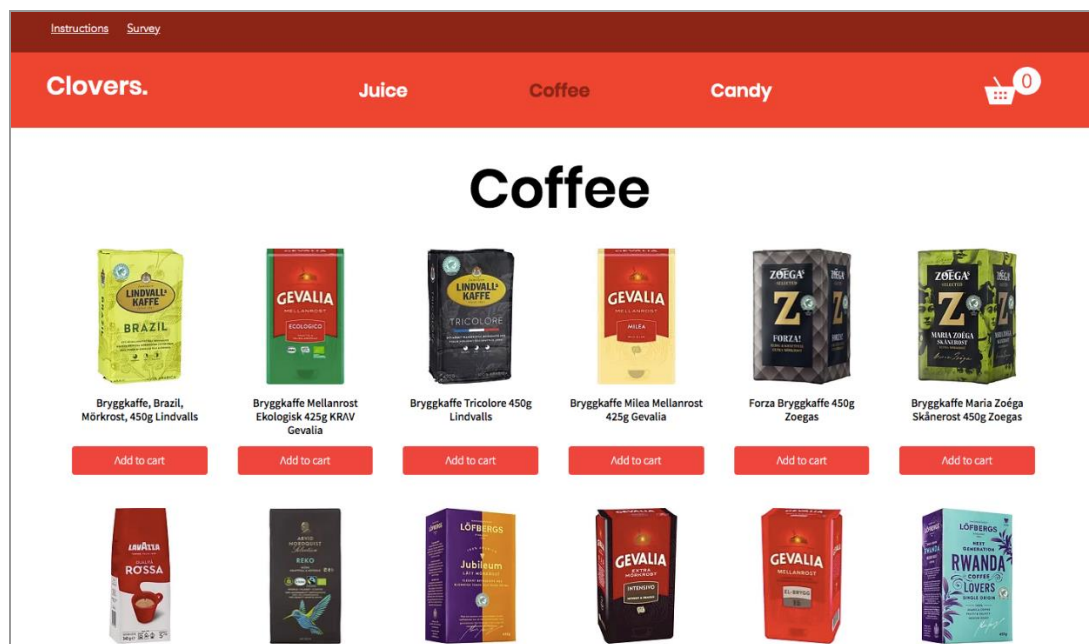


Figure 18. Product page for coffee, randomly sorted assortment

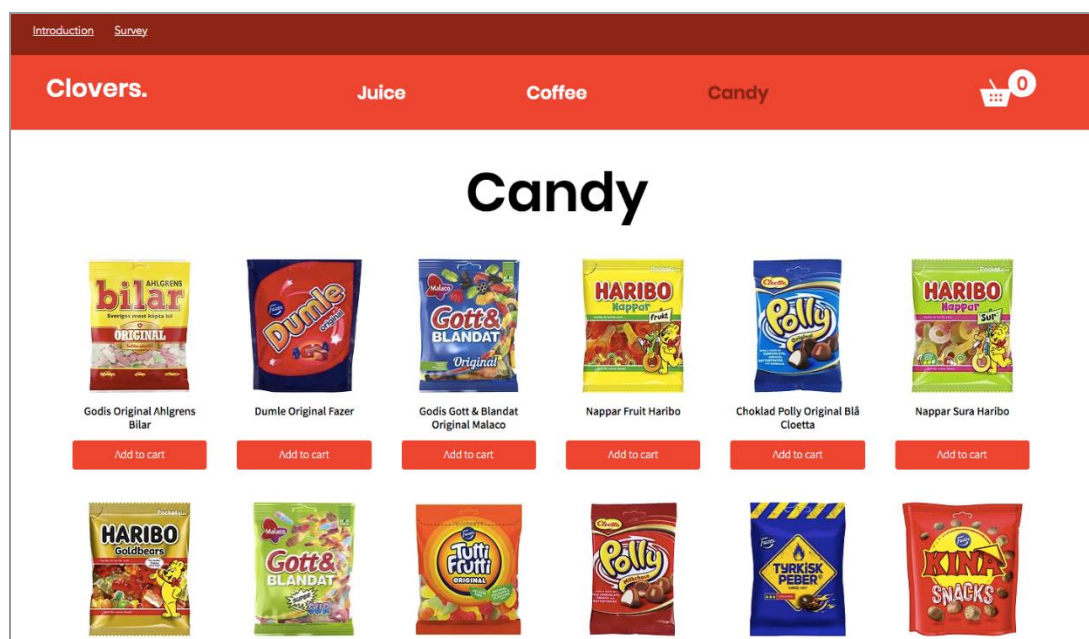


Figure 19. Product page for candy, bestseller-sorted assortment

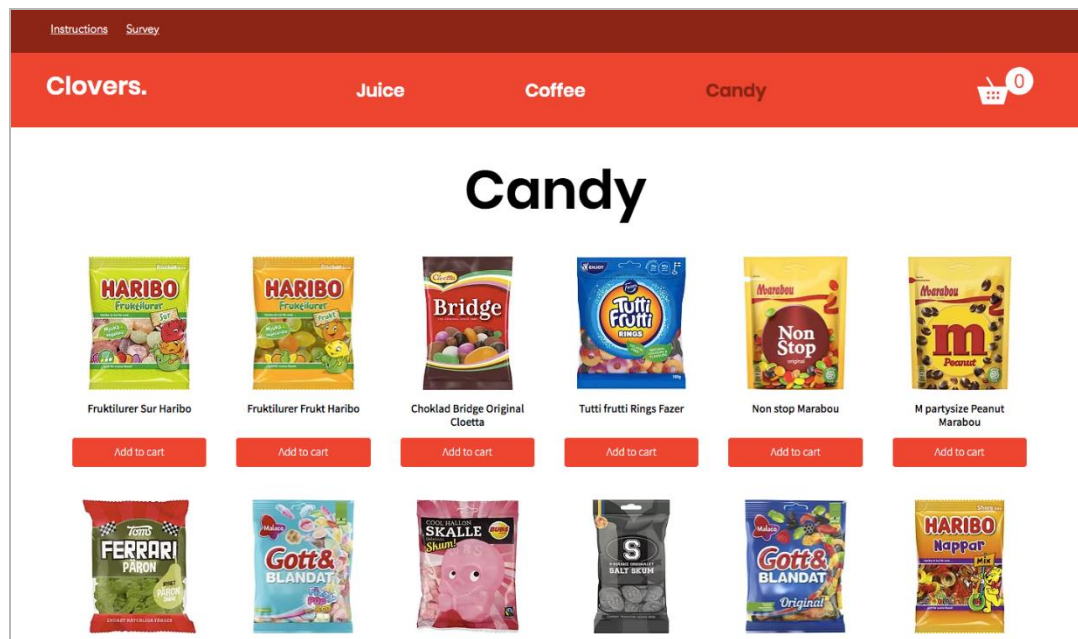


Figure 20. Product page for candy, randomly sorted assortment

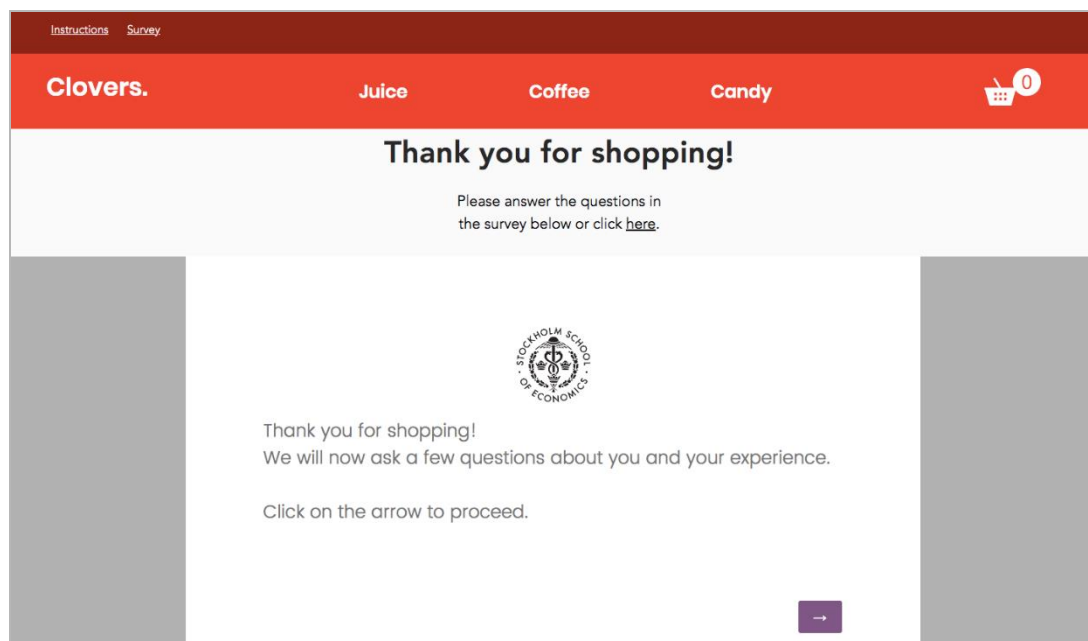


Figure 21. Checkout page and questionnaire

Randomization link

```
function doGet() {  
  var webpages = [];  
  webpages.push("https://tildeivedal.wixsite.com/my-site-a");  
  webpages.push("https://tildeivedal.wixsite.com/my-site-b");  
  var random_page = Math.floor(Math.random()*webpages.length);  
  var redirect = webpages[random_page];  
  return HtmlService.createHtmlOutput("<script>location.href = '" + redirect +  
  "';</script>");  
}
```

Inspiration from Swedish grocery stores online

Table 12. Product displays in Swedish grocery stores online

Store	Columns of products	Number of rows displayed at a time ^a	Type of scrolling
ICA	6	1.5	Continuous
Coop	6	1.75	Continuous
Willys	6	1.75	Continuous

Note: Websites ica.se, coop.se and willys.se were studied in February 2022.

^a How many rows of products consumers see on their screen at a time, if zoom settings are set to 100% (default) in browser.

Appendix D: Self-completion questionnaire

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
[Block 1: Overall satisfaction] Overall, I am satisfied with my shopping experience.	☐	☐	☐	☐	☐	☐	☐
[Block 2: Assortment attractiveness] I am satisfied with the assortment of groceries on the store's web page.	☐	☐	☐	☐	☐	☐	☐
The assortment of groceries was attractive.	☐	☐	☐	☐	☐	☐	☐
The assortment was inviting.	☐	☐	☐	☐	☐	☐	☐
[Block 3: Perceived variety] The assortment of groceries offered a lot of variety.	☐	☐	☐	☐	☐	☐	☐
The assortment of groceries gave me at least one option I like.	☐	☐	☐	☐	☐	☐	☐
The assortment in the store had many product alternatives to choose from.	☐	☐	☐	☐	☐	☐	☐
[Block 4: Choice convenience] Overall, I was able to choose quickly and easily from the assortment at the web page.	☐	☐	☐	☐	☐	☐	☐
Choosing from the assortment required little time and effort.	☐	☐	☐	☐	☐	☐	☐
It was easy to find the products in the assortment I was looking for.	☐	☐	☐	☐	☐	☐	☐
[Block 5: Revisit intention] If I could, I would shop in this store.	☐	☐	☐	☐	☐	☐	☐
[Block 6: Loyalty] Even though certain food products are available in a number of different flavors, I tend to buy the same flavors.	☐	☐	☐	☐	☐	☐	☐
I think of myself as a brand-loyal consumer.	☐	☐	☐	☐	☐	☐	☐
If I like a brand, I rarely switch from it just to try something different.	☐	☐	☐	☐	☐	☐	☐
[Block 7: Attention check] What groceries were you asked to shop for in the online grocery store?	Yoghurt, bread and dish soap		Juice, coffee and candy		Pasta, milk and salt		
	☐		☐		☐		

[Block 8: Survey quality]	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I think the purchase situation at the retailer was realistic.	☐	☐	☐	☐	☐	☐	☐
The survey was meaningful.	☐	☐	☐	☐	☐	☐	☐
The questions were clearly formulated.	☐	☐	☐	☐	☐	☐	☐
The survey tried to influence your answer in any direction.	☐	☐	☐	☐	☐	☐	☐
[Block 9: Previous online grocery shopping experience and demographics]	Once a week	Once every two weeks	Once a month	Once every 3 months	Once every 6 months	Once a year	Never
How frequently do you shop for groceries online?	☐	☐	☐	☐	☐	☐	☐
What is your age? (Please answer by entering a number, e.g. "30")							
What is your gender?	Male	Female	Non-binary/ other		Prefer not to say		
	☐	☐	☐		☐		
	Student	Unemployed	Part-time employed	Full-time employed	Retired	Other	
What is your main occupation?	☐	☐	☐	☐	☐	☐	

Appendix E: Video analysis and survey judgement

Guidelines for video analysis

Time spent	Time per product category: Time spent on the product category's page, measured in seconds. From clicking on the product category's tab, until leaving that tab. Total shopping time: Sum of time spent on the three product categories' pages.
Exposure	The final row on a product page that the participant scrolls down to. Only rows that are fully exposed on the screen are counted.
Selected row	The vertical positions (row) of the products the participant selected, calculated from top to bottom. The juice category holds 12 rows, coffee 10 rows, and candy 16 rows.
Selected column	The horizontal positions (column) of the products the participant selected (1-6), calculated from left to right.

Survey judgement

Table 13. Judgement of survey, distribution of answers in percentage

Statement	1	2	3	4	5	6	7
I think the purchase situation was realistic	2.8%	3.7%	8.4%	4.7%	21.5%	39.3%	19.6%
The survey was meaningful	0.9%	1.9%	0.9%	17.8%	15.0%	39.3%	24.3%
The questions were clearly formulated	0%	0%	0.9%	2.8%	5.6%	32.7%	57.9%
The survey tried to influence your answers in any direction	36.4%	29.9%	9.3%	12.1%	3.7%	4.7%	3.7%

Note: $N = 107$. Scale ranging from *strongly disagree* (1) to *strongly agree* (7).

Table 14. Judgment of survey, means and standard deviation

Statement	M	SD	min	max
I think the purchase situation was realistic	5.35	1.50	1	7
The survey was meaningful	5.59	1.25	1	7
The questions were clearly formulated	6.44	0.80	3	7
The survey tried to influence your answers in any direction	2.46	1.67	1	7

Note: $N = 107$. Measured on a 7-point Likert scale, ranging from *strongly disagree* (1) to *strongly agree* (7).

Appendix F: Summary of hypothesis testing

Table 15. Summary of hypothesis testing

Hypothesis	Results
H1 Regardless of how products are sorted in an online grocery store, consumers are more likely to select a product located...	
a: higher up on the online page.	Supported
b: in the horizontal center of the online page.	Not supported
H2 Consumers shopping in an online grocery store where products are sorted by popularity (bestsellers) will...	
a: select products on rows higher up	Supported
b: need less time to shop	Not supported
c: be exposed to a smaller share of the total assortment	Not supported
...than consumers shopping in an online grocery store where products are randomly sorted.	
H3 a: The sorting of products in an online grocery store will affect how much variety the consumer perceives there is in the assortment.	Not supported
Consumers shopping in an online grocery store where products are sorted by popularity (bestsellers) will...	
b: perceive the assortment as more attractive	Supported
c: have a higher choice convenience	Supported
...than consumers shopping in an online grocery store where products are randomly sorted.	
H4 a: Perceived variety of a product assortment...	Not supported
b: Perceived attractiveness of a product assortment...	Supported
c: The consumer's choice convenience...	Supported
...will have a positive effect on the consumer's overall satisfaction when shopping in an online grocery store.	
H5 a: Perceived variety of a product assortment...	Not supported
b: Perceived attractiveness of a product assortment...	Not supported
c: The consumer's choice convenience...	Supported
...will have a positive effect on the consumer's revisit intention when shopping in an online grocery store.	
H6 Consumers shopping in an online grocery store where products are sorted by popularity (bestsellers) will have a...	
a: higher overall satisfaction	Supported
b: higher revisit intention	Supported
...than consumers shopping in an online grocery store where products are randomly sorted.	

Appendix G: Additional descriptive statistics

Descriptive statistics of respondent sample

Table 16. Descriptive statistics of respondent samples, total and between experimental groups

Experimental group, sorting	Bestseller <i>n</i> = 52		Randomized <i>n</i> = 55		Total <i>N</i> = 107	
Variable	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Male	25	48.1%	34	61.8%	59	55.1%
Female	27	51.9%	21	38.2%	48	44.9%
Non-binary	0	0%	0	0%	0	0%
Age						
18-20 years	15	28.8%	4	7.3%	19	17.8%
21-25 years	41	78.8%	42	76.4%	83	77.6%
26-30 years	3	5.8%	0	0%	5	4.7%
>30 years	0	0%	0	0%	0	0%
Occupation						
Student	50	96.2%	52	94.5%	102	95.3%
Unemployed	0	0%	0	0%	0	0%
Part-time employed	1	1.9%	2	3.6%	3	2.8%
Full-time employed	1	1.9%	1	1.8%	2	1.9%
Retired	0	0%	0	0%	0	0%
Other	0	0%	0	0%	0	0%
Frequency of online grocery shopping						
Once a week	5	9.6%	4	7.3%	9	8.4%
Once every two weeks	5	9.6%	2	3.6%	7	6.5%
Once a month	8	15.4%	7	12.7%	15	14.0%
Once every three months	3	5.8%	5	9.1%	8	7.5%
Once every six months	6	11.5%	6	10.9%	12	11.2%
Once a year	5	9.6%	5	9.1%	10	9.3%
Never	20	38.5%	26	47.3%	46	43.0%

Distribution of selected row

Table 17. Selection frequency per row within product categories, total and between experimental groups (%).

Product / Group	Juice			Coffee			Candy		
Row	B ^a	R ^b	Total	B	R	Total	B	R	Total
1	26.9	10.9	18.7	48.1	5.5	26.2	19.2	5.5	12.1
2	9.6	10.9	10.3	11.5	10.9	11.2	15.4	10.9	13.1
3	5.8	7.3	6.5	9.6	20.0	15.0	13.5	10.9	12.1
4	1.9	21.8	12.2	5.8	10.9	8.4	17.3	9.1	13.1
5	15.4	7.3	11.1	3.8	10.9	7.5	9.6	9.1	9.3
6	17.3	5.5	11.2	3.8	9.1	6.5	5.8	14.5	10.3
7	5.8	3.6	4.7	13.5	9.1	11.2	0.0	7.3	3.7
8	0.0	3.6	1.9	0.0	5.5	2.8	1.9	7.3	4.7
9	5.8	1.8	3.7	0.0	9.1	4.7	5.8	7.3	6.5
10	7.7	12.7	10.3	3.8	9.1	6.5	3.8	1.8	2.8
11	1.9	10.9	6.5	-	-	-	0.0	3.6	1.9
12	1.9	3.6	2.8	-	-	-	1.9	1.8	1.9
13	-	-	-	-	-	-	0.0	0.0	0.0
14	-	-	-	-	-	-	3.8	5.5	4.7
15	-	-	-	-	-	-	1.9	5.5	3.7
16	-	-	-	-	-	-	0.0	0.0	0.0

Note:

^a B refers to *bestseller sorting*.

^b R refers to *randomized sorting*.

The table reflects the percentage of selections that were made from the row. 107 selections/category, 52 in the experimental group exposed to the bestseller-sorted assortment and 55 in the group exposed to the randomly sorted assortment.

Descriptive statistics of studied multi-item measurements

Table 18. Descriptive statistics of multi-item measurements

Experimental group, sorting	Bestseller <i>n</i> = 52		Randomized <i>n</i> = 55	
Scale/items	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Perceived variety	6.47	0.66	6.24	1.29
The assortment of groceries offered a lot of variety.	6.33	0.94	6.09	0.78
The assortment of groceries gave me at least one option I like.	6.58	0.85	6.24	1.29
The assortment in the store had many product alternatives to choose from.	6.52	0.90	6.42	0.90
Assortment attractiveness	6.17	0.77	5.62	1.29
I am satisfied with the assortment of groceries on the store's web page.	6.31	0.83	5.67	1.48
The assortment of groceries was attractive.	6.27	0.87	5.67	1.48
The assortment of groceries was inviting.	5.94	1.13	5.53	1.35
Choice convenience	5.54	1.15	4.53	1.61
Overall, I was able to choose quickly and easily from the assortment on the webpage.	5.69	1.42	4.49	1.82
Choosing from the assortment required little time and effort.	5.73	1.30	4.85	1.83
It was easy to find the products in the assortment I was looking for.	5.21	1.55	4.25	1.88
Overall satisfaction: Overall, I am satisfied with my shopping experience.	5.94	0.98	5.35	1.43
Revisit intention: If I could, I would shop in this store.	5.50	1.44	4.84	1.76

Note: *N* = 107. Measured on a 7-point Likert scale, ranging from *strongly disagree* (1) to *strongly agree* (7). Cronbach's alpha available in Table 4.

Correlations between studied variables

The correlation matrix in Table 19 displays significant positive correlations between most of the studied variables for both experimental groups. The correlation between the variables *perceived variety* and *choice convenience* was not significant for any of the experimental groups. For the experimental group exposed to a randomly sorted assortment, *perceived variety* did not significantly correlate with *overall satisfaction* or *revisit intention*.

Table 19. Correlations between studied variables per experimental group.

Variable	1	2	3	4	5
Bestseller sorting					
1 Perceived variety	-				
2 Assortment attractiveness	0.53**				
3 Choice convenience	0.07	0.57**			
4 Overall satisfaction	0.37**	0.52**	0.49**		
5 Revisit intention	0.31*	0.44**	0.46**	0.48**	-
Randomized sorting					
1 Perceived variety	-				
2 Assortment attractiveness	0.66**				
3 Choice convenience	-0.03	0.37**			
4 Overall satisfaction	0.19	0.51**	0.65**		
5 Revisit intention	0.14	0.41**	0.71**	0.68**	-

Note: Pearson's correlation. *Correlation is significant at the 0.05 level, **correlation is significant at the 0.01 level (2-tailed).