Between high-end branding and low-end goods: Finding the right scarcity format

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Table of Contents

List of Figures:

List of Tables

Abstract

The intention of this thesis is to examine the influence of scarcity messages on consumer product evaluation, and purchase intention, of functional everyday products, as well as how this links to the moderating effect of the featured brand, here specifically investigating the differential effects of a high-end versus a low-end brand. By conducting an online survey simulating a webshop setting, the study assesses the influence of manipulations of scarcity message and brand on consumer product evaluation for non-conspicuous products. The results of the study conducted show no significant effect of scarcity messages on evaluation of high-end brand products, but have indicated a significantly higher effect of limited-time scarcity (LTS) messages than limited-quantity scarcity (LQS) on low-end brand products.

1. Introduction

The main purpose of every business in the world is to generate profit. People exchange goods or services for a certain price, most often represented by money, that should leave both sides better off or at least as well-off as before the transaction occurred. Since the very beginning of economic science, economists and researchers have studied the underlying mechanisms that determine the conditions under which such transactions take place. Over the centuries many different theories have emerged and evolved, the newer ones often in stark contrast to their predecessors. And over the same time business owners followed, seeking the most effective way to run their ventures and maximize their own gains.

A quick glance at the body of literature regarding business and economics clearly shows that the number of economic theories and of factors at play is so huge that it would be completely impossible to address every single one of them. In fact, consulting companies that provide professional evaluation and advice on determining the key factors for entrepreneurs to focus on, have become a whole new business industry of their own.

In addition to the ever-growing body of economic theories and business practices, as our societies progress socially and technologically, the ways of conducting business also have to evolve, adapting to the new reality and the demands that accompany it. With new modes of operation, also come new ways of attracting customers and convincing them to make a purchase, or sometimes the old ways become revised and updated to match the new platforms they need to make use of.

Many of the radical developments, not only in the field of economics, are closely associated with the rise and popularization of the internet. Nowadays customers are not only able to find and compare information regarding different products and services that are available to them, but also make their purchases, set up deliveries, contact the buyers or producers and share their experience with a global network of other consumers, all with just a few clicks of a mouse or taps of a finger.

The businesses, as usual, have followed their customers into the web, adjusting their strategies and modes of operation to make the most out of the new platform. New means for promotion and advertising were adopted while old ones were either replaced or updated to match the new orientation. Some of them rose in popularity like never before; one such marketing technique is the usage of scarcity messages. Although scarcity messages have been known and employed in business for a long time, they were rarely considered among the main means of promotion. However, that seems to have changed with the advent of the webshops and online shopping platforms, almost all of which now make use of some sort of scarcity appeals, whether referring to hotel bookings, flight tickets, clothes and accessories or just everyday commodities. There is a wide body of research examining the effectiveness of such scarcity messages across different settings and product categories, and we seek to contribute to the understanding of their influence on customers' perceptions and purchasing behaviors.

For our philosophy of science, we follow a positivist principle of observability, believing that in order to recognize a phenomenon as significant, it must be directly observable either through particular cases representative of a universal statement, or through some of its consequences (Stace, 1944). For that reason, we have designed an experiment in the endeavor to test the hypotheses derived from the existing literature and translate them into general conclusions and implications for practitioners.

Within this study we endeavor to address the following problem statement:

To what extent do scarcity messages have an effect on consumer product evaluation (expressed through perceived quality, value, and purchase intention) in an online shopping setting, and is this effect impacted by an associated brand?

This thesis adheres to a following structure; first, we review the literature that we believe to be relevant for the purpose of our study, including theories examining consumer behavior and

decision-making, the general findings regarding the effects of scarcity messages, and contributions from newer branches of economic research: neuroeconomics and neuroscience. We explain the hypotheses we have derived from the findings of presented literature and sought out to test in our study. We then describe the experiment we have designed and conducted to test those hypotheses, together with methodological justification for our choices, as well as the limitations resulting from the study design.

Further, the data that we have managed to collect throughout the study is presented and analyzed, providing the basis for testing of our hypotheses. We then present our achieved results and discuss them in the light of existing theories. Here we also reflect on the implications that scarcity messages may have for both businesses that utilize them, as well as those consumers, who are subjected to such messages. Finally, we present a conclusion and suggest possible avenues for future research that could further develop the understanding of the mechanisms affecting the decision-making processes in the online setting.

2. Literature Review

Traditional economics is built upon several key assumptions, including that economic agents are perfectly rational, can easily obtain and interpret all of the information they need to make choices that maximize their own utility. These premises have served as the basis for a plethora of theories, many of which are still reflected in the way we analyze markets and economies today.

However, over the recent decades, these assumptions have increasingly become a subject of close scrutiny, seeing that they often failed to explain behavior of economic agents or even whole markets (Mueller, 2004). As a result, many new branches of economic research have sprung up, determined to examine whether those key premises hold any truth to them, and if not, how can the behavior of markets and actors within them be explained, without relying on unrealistic givens.

Behavioral economics and evolutionary economics are two largely influential interconnected fields that seek to provide an alternative to neoclassical economics and its rational, self-focused agents (Mueller, 2004). Behavioral economics aims to combine the observable economic behavior with the knowledge of psychology and human mentality. The goal is to explain why we do not act according to what neoclassical understanding of rationality would imply. Evolutionary economics focuses on examining how certain behaviors may have evolved over time as mechanisms that supported survival of human societies.

2.1.Behavioral Economics

2.1.1. Bounded Rationality

One of the most common criticisms towards traditional economic models addresses the concept of economic agents being fully rational, i.e. making decisions that maximize their own utility based on all existing information. While the fundamental principles of traditional economics have served as the foundation for our theoretical understanding of economics today, these ideas fall short when put to the test in practice. As empirical evidence has shown multiple times, more often than not neoclassical theories fail to correctly predict the behavior markets and actors within them, and it is mostly agreed that the reason for it is the real life situations do not fulfil the strict premises of the models that are used to analyze them (Mueller, 2004).

As a result, many researchers have dedicated their time to re-evaluating and reformulating those premises in order to make them more reflective of actual human actions. One of the first and most

influential critics of the assumption of perfect rationality was Herbert Simon (1955), who in his numerous contributions to economics and psychology, argued for bridging the gap between the two fields of research, in order to gain a more in-depth understanding of what drives the behavior of economic agents (e.g. Simon, 1955; 1981; 1990). Over the years, he has unpacked and examined many issues associated with the idea of "global rationality" as he named it and suggested instead its more modest version in the form of "bounded rationality" (Simon, 1955).

To support his argument for reevaluation of the rationality assumption, Simon (1955) pointed out that humans, just as all other organisms, are inherently cognitively constrained, both by their environment and by their physiological limits. The assumption of global rationality implies making optimal choices in the face of perfect information, which is readily and costlessly available to all agents at any given time. Furthermore, traditional economic models entail that an economic agent is always able to consistently attach values to all possible solutions of a situation and evaluate them relative to one another (Simon, 1955). This assumption again implies that the individual knows exactly if not what the outcome of each alternative will be, then at least what the probability of each of the potential outcomes is and can calculate which of the alternatives is the "best".

However, it is rarely, if ever, the case that any individual would have access to all the existing knowledge that could influence the situation they are in or the decisions they are supposed to make. It may be a result of various environmental constraints, as a given individual might only be able to gain certain pieces of information over time or might not discover some of the available choices at all. Moreover, obtaining knowledge most often incurs additional costs in terms of time and other resources an individual has at their disposal. In a world, where all resources are limited, one can only hope to gather a limited amount of information within the constrained resources (Simon, 1955).

In addition, even if the assumption that 'obtaining readily available information would incur no additional costs' held true, one would still have to account for constraints resulting from innate characteristics of the economic agent, rooted in its physiological and psychological limitations (Simon, 1955). As a result, even with free access to full knowledge regarding a particular situation, an individual would not be able to process and evaluate all the available options and the decision they would arrive to would not necessarily be the optimal in the understanding of the global rationality assumption (Simon, 1955). Tsang (2008) argued that since the human mind can only explicitly focus on one matter at the time, each of the options available to it would be evaluated

one after the other rather than simultaneously, and the final choice is only the best of the ones considered within the limited time. As such, how many alternatives are taken into account, i.e. how rational one is, effectively depends on one's computational intelligence (Tsang, 2008). Those constraints have since repeatedly found their confirmation in literature; not only in the field of economics, but also in cognitive psychology and neuroscience (Bendor, 2015).

In addition, as argued by Cosmides and Tooby (1994), what most would consider rational behavior is not, as assumed by neoclassical models, the default state of human nature. In contrast, just as all other behaviors, it is a result of long evolutionary processes that sought out the solutions that supported survival of human societies rather than individuals, and that took account of their innate physiological limitations.

With such shortcomings of the global rationality in mind, Simon (1955) set out to replace its faulty assumptions with ones that would be more realistic in the face of the environmental and physiological constraints that all economic agents are subject to (Simon, 1955). He proposed that in most situations, economic agents use various cognitive "shortcuts" and simplifications in order to be able to make a decision. This notion was later explored in much greater detail by Tversky and Kahneman (1974; 1981; 1991 and more).

Another strategy is what Simon (1995) called "satisficing". He pointed out that in real life people do not consider all available information at once. Rather, they evaluate their potential choices as they gain knowledge about them. Satisficing entails that an individual might settle for a solution or one set of solutions that they consider to be satisfactory, as soon as they become available to them during the process of gathering information, rather than "maximizing" by searching for the optimal solution, as traditional economic theory would suggest (Simon, 1955). In other words, it implies settling for a "good" solution instead of searching for the "best" one.

Unlike some other critics of the traditional economic approach, Simon (1955) did not advocate completely abandoning the assumption of rationality but rather modifying it to better match the reality in which most economic events take place. In one of his later works, he argued that the bounds of rationality only matter and need to be taken into consideration when the complexity of the situation at hand exceeds one's cognitive capacity (Simon, 1991). In other words, he believed that people can be fully rational if the choices they are facing are simple enough.

The concept of bounded rationality therefore corresponds to a belief that although humans cannot be perfectly rational as argued by neoclassical models, they generally still follow the principles of rationality within the bounds of their environmental, physiological and mental constraints.

2.1.2. Dual-process Theory

The concept of bounded rationality sheds light on why economic agents do not follow the principles of rational behavior in real situations by explaining the various limitations that humans are subject to. Simon (1955) argued that in a situation of limited cognitive capacity, our minds resort to simplifications and cognitive shortcuts in order to speed up decision-making. That idea was later widely explored by many researchers who sought to examine the processes that actually determine how we make choices, notably in numerous contributions by Amos Tversky and Daniel Kahneman (e.g. Tversky and Kahneman, 1974; 1981; 1991 and more).

One of the most important theories in the field of decision-making processes is the dual-process theory. In contrast to neoclassical models, which assume the reasoning of economic agents is always deliberate, dual-process theory posits that there are two types of cognitive systems that contribute to decision making, referred to as System 1 and System 2 (e.g. Stanovich & West, 2000) or Type 1 and Type 2 processes (e.g. Evans & Stanovich, 2013). In this thesis we will adopt the Type 1 and Type 2 terminology due to the fact that as pointed out by Evans and Stanovich (2013) "System 1" or "System 2" imply existence of a singular system responsible for all cognitive processes of that type while in reality there are multiple interconnected systems at work.

Type 1 processes are fast, highly intuitive and effortless processes that often occur automatically and subconsciously; in many ways they work similarly to perceptual operations. However, unlike perception they are not strictly restricted to reacting to current stimuli, even though those often play a major role. Instead, they also work through associations, dealing with both percepts and stored concepts. Type 1 processes are usually the first instinctual reaction of our minds and are responsible for the impression of things and situations at hand; as such they are difficult to explicitly control and often invoke reflexive emotional responses (Kahneman, 2003).

On the other hand, Type 2 processes are usually slower and require deliberate effort and consideration to conduct but are easier to intentionally redirect and control. This slow and deliberate cognitive process is the closest resemblance of the neoclassical assumption of rationality, as it is employed in the cognitive evaluation of accessible information and considers available

alternatives in terms of relatively objective criteria (Kahneman, 2003). As such, Type 2 processes are responsible for explicit judgements and can perform a control function over the impressions generated by Type 1 processes by deciding whether or not to reassess the initial associations produced by Type 1 (Evans & Stanovich, 2013). However, because of the limited processing capacity of our minds coupled with the higher cost of concentration and effort required by Type 2 processes, we can usually only effectively focus on one problem at a time. As a result, engaging in Type 2 processes should be related to a deliberate effort in order for the expense of cognitive resources to be worthwhile.

Meanwhile, Type 1 processes remain largely undisturbed when combined with other tasks, as they do not call for explicit attention (Kahneman, 2003). They are designed to work largely independently of deliberate scrutiny, and instead continuously interpret information from our surroundings. As pointed out by Tversky and Kahneman (1983) some attributes of objects and situations, which they refer to as "natural assessments", are evaluated by the perceptual system and Type 1 processes completely automatically, including such properties as size, distance, similarity, surprisingness, and especially importantly the interpretation of a received stimuli as either good or bad, which determines the intuitive response of approach or avoidance. Those features of Type 1 processes allow humans to react quickly to received information, without the need to engage in laborious Type 2 processes for every single decision.

"Accessibility", as introduced by Higgins (1996), is an important factor influencing what kind of impressions are built by the spontaneous processes of our minds. It refers to how easily informational cues in a stimulus come to mind, or in other words how salient, i.e. noticeable, they are. As has been proven by numerous experiments, even stimuli containing the same information are processed differently by intuitive processes in our brains, depending on how the information is arranged and which of its aspects are most pronounced (Kahneman, 2003). This salience can be overwritten by deliberate thinking, i.e. Type 2 processes, but such reasoning requires explicit attention and introspection at the cost of expended cognitive resources.

The impressions formed are still mainly dependent on the actual information conveyed by the given stimulus but can also be influenced by expectations and situational contexts, as well as past experiences and skills. As pointed out by Kahneman (2003), "the acquisition of skill gradually increases the accessibility of useful responses and of productive ways to organize information" (p. 1453). An example of this is seen in an emergency room study by Cabrera et al. (2015), where the

authors found that skilled postgraduate physicians had close to an 80% accuracy in assessing whether patients were sick and in need of hospitalization based solely on Type 1 assessments. As a result, skilled individuals often need far less resources to make quick judgements than novices, effectively pushing much of the decision-making on the matter towards Type 1 processes (e.g. Klein, 1998).

In addition, as argued by Evans and Stanovich (2013), although Type 2 processes perform a monitoring and corrective function over Type 1, it does not necessarily mean that they are always more accurate than Type 1; there are instances where first impressions are more truthful than deliberate judgements.

2.1.3. Prospect Theory

The literature in various fields, including psychology, economics, and neuroscience, has shown that one of the key features of human perception is that it is particularly attentive to changes and differences, as contrasts in our environment can pose potential opportunities or threats (Mobbs et al, 2015). The salience of certain information is most often based on how much it differs from its points of reference, such as initial or default state or the other simultaneous stimuli (Kahneman, 2003). As such, the intuitive impression of the information received from the percepts is also reference dependent. This point stands in opposition to the traditional economic models, which assume that only the utility of the final outcome matters, regardless of the prior level of wealth or endowment (e.g. Bernoulli, 1738).

This issue is what the prospect theory, developed by Kahneman and Tversky (1979), seeks to examine and explain. One of their first observations was that throughout various experiments they have conducted, the respondents' preferences in terms of risk-aversion and risk-seeking were not constant but changed quite rapidly across different conditions (i.e. different reference points), even if their net outcome was the same. As such, Kahneman and Tversky (1979) argued, they could not be justified by a simple utility function.

Instead, prospect theory sought to explain those rapid shifts in preferences through a value function primarily formulated in terms of relative gains and losses. The function they had presented had three key features: it was concave when relative gains were concerned, encouraging risk-averse strategies; it was convex for losses, encouraging risk-seeking behavior; and most importantly it was much steeper for relative losses than for gains, indicating that people were on average

significantly loss-averse (Kahneman et al., 1991; Tversky & Kahneman, 1992). Subsequent studies have supported this hypothesis, also proving that people perceived the same goods as more valuable when they considered them as something they could lose and demanded a much higher price to sell them, than what they were willing to pay to gain the same product (e.g. Thaler, 1980; Kahneman et al., 1991).

The value function proposed by prospect theory is mostly focused on short-term outcomes, as it reflects the expected reflexive emotional responses associated with the transition from one state of wealth to another and the relative difference between the two, rather than the long-term total utility. As argued by Kahneman (2003), it is a more realistic point of view, because although the long-term focus would be more beneficial in terms of reasonable decision-making, the utility itself is inherently tied to emotions, and those are most vividly experienced in the short-term.

2.1.4. Framing Effects

Another concept, related to both accessibility of information and the loss-aversion discussed in the previous sections, is the notion of framing effects. The economic models based on assumption of rationality consider people's preferences to be stable in the face of the same informative resources. However, as has already been pointed out, our cognitive systems are not immune to biases resulting from differences in accessibility of various facets of information that we encounter. So far, we have discussed the fact that accessibility determines how many resources we have to spend to process a given piece of knowledge.

Framing usually refers to the general context of information we encounter and try to process, from the way it is formulated, to what other stimuli it is accompanied or preceded by. Those factors influence what associations and emotional responses are activated by our Type 1 processes and as such can increase or decrease the relative accessibility of different aspects of information that is being relayed. As a result, many experiments conducted throughout the fields of psychology, behavioral economics and neuroscience have proven that in reality people's preferences tended to change when confronted with the same information formulated in different ways (e.g. Tversky & Kahneman, 1981; Johnson & Goldstein, 2003).

Kahneman and Tversky (1979; 1981) have introduced studies that have shown that humans tend to overweigh consequences that are certain relative to those of moderate or high probability in their decision-making processes. In addition, the same experiments proved that the final choice was very

much dependent on whether the certain consequence was expressed in positive or in negative terms, even though the relative numbers were exactly the same. As such, an option of certainly saving 200 out of 600 people was considered more attractive than an option of saving everyone with one-third probability or losing everyone with two-thirds probability, but the reverse applied when the first option was framed as certainly losing 400 out of 600 people (Tversky & Kahneman, 1981).

Another phenomenon that has been of much interest is the framing effect of assigning one of the possible alternatives as a "default" option. It has been proven that introducing one of the choice options as the default makes it, if not more attractive, then at least more likely to be chosen in the eyes of an average decision-maker, which applied to multiple different aspects of life from car insurance policies to organ donation programs (Johnson and Goldstein, 2003). This effect has been referred to as the "passive acceptance" and it has been argued that because of its passiveness, people are not likely to spontaneously consider different framings of the same information and as such, the chance they will expend additional resources to acquire more knowledge is lower, since one answer is already presented to them (Kahneman, 2003).

Finally, a framing effect known as "narrow framing" is presented in opposition to rationality-based decision models. In contrast to theories that assume each decision is made by an agent with consideration of all possible alternatives and consequences thereof, empirical evidence suggests that in most cases the extent of human consideration is much narrower (Kahneman & Lovallo, 1993). In fact, very often an instance when a decision has to be made is treated as a once-off situation with little consideration for other dilemmas faced at the time. Moreover, it is most common for people to put more weight on the short-term outcomes of such a decision than on the long-term or global picture of its consequences.

As observed by Kahneman (2003), the concept of narrow framing reflects the circumstances in which most decisions are made. Rather than having a global perspective of all problems, solutions and their consequences, people usually encounter their dilemmas one at a time, and "the principle of passive acceptance suggests that they will be considered as they arise" (p. 1460). As a result, the most pressing issues and their immediate consequences are usually seen as more accessible than other problems and are more likely to be considered only within their own context.

2.1.5. Heuristics

Simon (1955) was among the first to account for the limitations in information gathering and processing due to finite cognitive resources of human minds. He speculated that in order to simplify and speed up decision making, people would rely on various mental shortcuts and simplifications. These shortcuts, known in the literature as heuristic principles or just "heuristics", have been later examined in greater detail, most notably by Tversky and Kahneman (1974).

Tversky and Kahneman (1974) concluded in their research that people tend to make use of several main types of heuristic principles in order to reduce the complexity of mental operations required for their decision-making processes, replacing them with simpler and more manageable tasks. Kahneman and Frederick (2002) later proposed that heuristics simplify judgement formulation through attribute substitution, i.e. replacing the unknown information of an attribute with a value of different attribute that is more accessible. Since heuristics are mainly rooted in percepts and Type 1 processes, similar factors can affect which attribute is taken as a substitute, including preceding and simultaneous stimuli. For example, Strack and colleagues (1988) have shown in their experiment that when respondents were asked about their general life satisfaction and then about the number of dates, they had been on in the previous month, there was no significant correlation between the answers. However, when the order of those questions was reversed, the life satisfaction suddenly became closely related and influenced by dating activity of an individual, as reflected by the answers of the study participants (Strack et al., 1988).

This goes to show that although heuristics can be quite helpful and effective in decreasing the amount of resources needed for evaluating information, they can also lead to severe biases and errors (Tversky & Kahneman, 1974). That is due to the fact that substituting one attribute for another makes our minds more prone to cognitive illusions; the most accessible information is often not the most relevant for the task at hand and sometimes the context of the situation can largely influence the final decision made. This is especially prominent in case of information that is generally not easily computed, such as various types of calculations, including sums, probabilities, or numerary estimates (Kahneman, 2003). As a result, there are a number of biases that people are prone to succumb to when seeking to simplify such computations. The two most common types include "violations of monotonicity" and "extension neglect" (Kahneman, 2003).

Violations of monotonicity refer to the phenomenon that increasing the extent or number of elements of a set might lower the average and decrease the evaluation of the target variable

(Kahneman, 2003). This type of bias can be seen in people judging a two-element statement as being more probable than one or both of its individual components or assigning higher prices to goods when evaluated separately than when evaluated at the same time. Extension neglect describes how extending a set or category can increase the total value of its components but leave the perceived average or representation unchanged (Kahneman, 2003). Such a bias can be observed when people estimate their willingness to pay for public goods (where the extent of good does not significantly change how much they are ready to contribute) or evaluate physical experiences as less unpleasant if the level of "unpleasantness" is lower towards the end of the experience, even if the experience itself was longer in duration or contained the shorter episode that was rated as more unpleasant.

In addition to exposing faults and short-comings of our thinking process, these observations yet again challenge the neoclassical economic models relying on the assumption that people have stable preferences and can always evaluate one as better than the other. However, accounting for the biases human minds are prone to renders this assumption unrealistic, especially in the face of empirical evidence showing that we often choose those alternatives that are inferior in our own "objective" reasoning.

Although biases seem to permeate our cognitive and reasoning processes, it is worth remembering that heuristic principles used in simplifying decision-making are mostly rooted within Type 1 processes and the impressions generated within them; they are a quick and intuitive way to resolve cognitive dilemmas. However, as with all other Type 1 processes, the final judgements and actions taken by an individual, as well as the mistakes resulting from them also rely upon the Type 2 processes. It is Type 2 processes' role to evaluate and potentially correct the initial impressions and estimates of Type 1 in order to determine the final course of action. And as argued by Kahneman (2003) based on results of various studies, Type 2 processes are "aware" of the existence of rational rules and do consider them to be the "right" option to follow, however such instances are usually limited to unusual situations in which the impressions of Type 1 processes are quite obviously incorrect.

2.2.Scarcity Messages

Scarcity messages as a marketing technique have been known and employed by businesses for a long time, whether it be special deals at supermarkets and stationary stores or, more recently,

exclusive offers encountered on shopping websites. Their application and effects on consumers' behavior, including such factors as purchase intention or product evaluation have also been examined and discussed by economists and researchers over the last couple of decades.

The main purpose of all scarcity messages is to induce the consumer with a conviction that their ability of obtaining a particular product or service is being constrained (Aggarwal et al., 2011). Such a statement invokes a sense of urgency in the recipient of the message, which might influence how quickly they decide to purchase, how carefully they evaluate the product or how much additional information they are willing to gather before making the final choice. This tendency links to bounded rationality and the two types of cognitive processes from dual-process theory; if the time to make the decision is being limited, less information can be gathered and fewer alternatives can be considered.

The commonly encountered scarcity messages can be classified based on several different criteria, such as quantity-based scarcity versus time-based scarcity (e.g. Cialdini, 2008; Aggarwal et al., 2011), or demand-induced versus supply-induced scarcity (e.g. Gierl & Huettl, 2010; Ku et al., 2012), and their effects have been examined across a wide variety of moderating factors, including cultural context (Lee et al., 2015), type of product (Gierl & Huettl, 2010; Jang et al., 2015), consumer motivation (Ku et al., 2012) and many others.

2.2.1. Scarcity of quantity vs. scarcity of time

The most common distinction between scarcity messages is the one depending on the type of constraint that the message indicates, namely quantity-based scarcity and time-based scarcity (Cialdini, 2008; Jang et al, 2015). Quantity-based scarcity (also referred to as limited-quantity scarcity or LQS) indicates that the product is scarce because there is only a restricted number available for purchase, and whenever that number is sold out, one will not be able to buy it anymore (Aggarwal et al., 2011). A good example of LQS is "limited edition" goods. Time-based scarcity (also limited-time scarcity or LTS) signifies that a particular product or service will only be available for a specified period of time, after which it will become unattainable (Aggarwal et al., 2011). This type of scarcity often accompanies special discount offers or seasonal goods.

The studies conducted across various settings and products have indicated that scarcity messages are quite effective in influencing consumer behavior, increasing the purchase intention, as well as

the perceived quality and desirability of a product (Aggarwal et al., 2011). In addition, as substantiated by multiple researchers, while restricted availability of a product makes it seem more valuable, consumers will want it even more when they have to compete for it with others (e.g. Worchel et al., 1975; Cialdini, 2008; Kristofferson et al., 2016). This primarily ties to two factors. First, many of the goods we purchase and consume represent more than just their utility value and address needs beyond those associated with their primary function; many brands and products have a "symbolic" value that allows consumers to fulfil their social needs, such as a feeling of uniqueness or sense of belonging to an exclusive community (Gierl & Huettl, 2010). Second, as discussed previously, humans do not possess perfect information regarding all the choices available to them. As a result, they often rely on the opinions and decisions of others, i.e. social proof, which follows the logic that if a product is scarce, it means many others have already bought it, and if many others have bought it, it is probably a good product that is worth getting (Gierl & Huettl, 2010).

Following this argument, Aggarwal et al. (2011) have specifically examined the relative influence of LQS and LTS messages, hypothesizing that if consumer competition really improves the perceived value and desirability of a product, then LQS messages would be on average more effective than LTS messages. As the authors argued, under a limited quantity condition the availability of a product is almost exclusively dependent on the extent to which others have already bought it. On the contrary, they did not expect such a restriction under limited time condition; one can buy as many products as one wants during the specified time period, regardless of whether or how many other people have acquired, as "LTS implies unrestricted supply for the duration of the promotion" (Aggarwal et al., 2011, p. 21). The studies conducted by Aggarwal et al. (2011) have indeed supported this hypothesis, showing that, while both types of scarcity messages increased perceived desirability and purchase intention – as compared to a situation where no scarcity was indicated – that effect was significantly larger for LQS messages than for LTS messages, confirming the relevance of consumer competition. Moreover, the authors have discovered that this difference was especially prominent in the case of *symbolic* brands when compared to *functional* brands. A graphical representation of their results is presented in Figure 1.

FIGURE 1
The Moderating Role of Brand Concept: Study 2

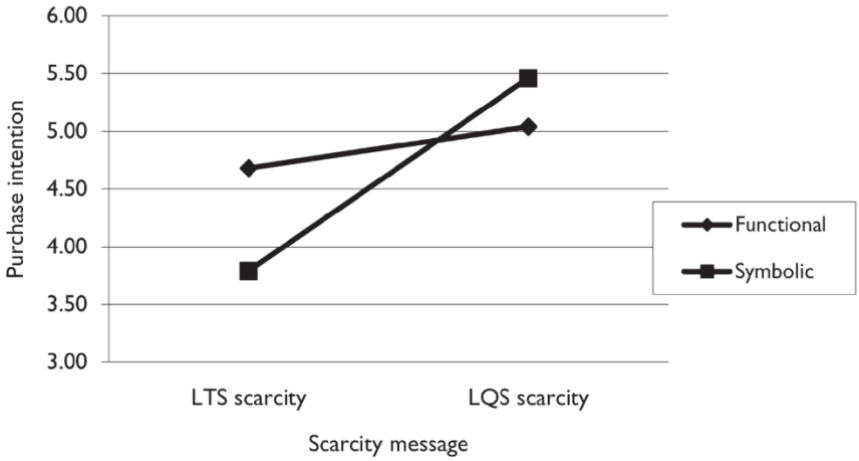

Figure 1. The Moderating Role of Brand Concept: Study 2. Numbers represent the mean values of Purchase Intention. Reprinted from "Scarcity Messages," by P. Aggarwal, S.Y. Jun and J.H. Huh, 2011, *Journal of Advertising, 40*(3), p. 26. Copyright 2020 by Taylor & Francis. Reprinted with permission.

In their 2011 paper, Aggarwal et. al specify the symbolic brand concept as emphasizing "social and hedonic aspects of a product and is understood primarily in terms of consumers' expressions of self-concept or self-image" (p. 21), whereas the functional brand concept "stresses the performance of the product in terms of the functional or utilitarian needs of a consumer" (p. 21). In other words, when compared to functional brands, symbolic brands gain a larger effect from LQS on purchase intention, because these emphasize exclusivity and social status instead of functionality and utility. A prerequisite for the use of symbolic and functional brands in research is that the consumers have 'brand awareness', i.e. can recognize the brand, and have perceptions and attitudes tied to the 'brand image', e.g. as being either symbolic or functional (Hsu & Chen, 2018). Aggarwal et al (2011) accomplish this in their studies by either using Swatch as an established wristwatch brand or framing a fictitious brand to fit the description of either of the two categories.

Another argument that supports LQS being more effective than LTS is seen in how the limited quantity may have an inherent time restriction on the availability, as the faster the quantity is depleted, the less time one has to act. Indeed, several studies on the subject of scarcity and competition found that product availability promotions using LQS lead to increased aggressive and competitive behavior, whereas promotions using LTS did not trigger such behavior (Kristofferson et al., 2016).

These findings have been supported and extended in several other studies, often involving considerations for other moderating factors. For example, Lee and colleagues (2015) set out to

examine whether the effectiveness of different types of scarcity messages would be influenced by the cultural context a particular consumer finds themselves in. They have conducted an internet study among Korean and Chinese consumers and, although those two cultures are relatively similar (on a global scale) there were some significant differences between those two sets of respondents. While LQS messages have proven to be more effective in both of the groups, it has also been discovered that the difference between LQS and LTS messages was significantly smaller in case of Chinese participants, supporting the hypothesis that cultural context might influence the effectiveness of scarcity messages. The researchers have also observed that internet advertising and scarcity messages in general are still less widespread in China than in Korea, which might give them an air of novelty and increase their effectiveness among Chinese consumers (Lee et al., 2015).

2.2.2. Demand vs. supply-induced scarcity

Another type of distinction frequently made in literature is based on the source of implied scarcity and is assumedly caused either by limited supply or high demand for a given product or service (Verhallen, 1982). Unlike in the case of LQS and LTS, the distinction between these kinds of messages is rather subtle. Demand-induced scarcity implies that the availability of the product is limited due to a large number of purchases made by other consumers and is usually indicated by phrases referring to the remaining stock, such as "nearly sold out" or "only X pieces left". Supply-induced scarcity usually suggests that the original stock was already relatively small, and the product was intended as unique or exclusive as in case of "limited edition" or collector items (Gierl & Huettl, 2010). In fact, these kinds of messages could be considered different subtypes of LQS messages, as both most often imply a restricted number of products available.

In their paper, Gierl and Huettl (2010) have argued that the effectiveness of a scarcity message depends not only on the message itself, but also on the type of goods the message is applied to. They have divided the products into two categories: conspicuous and non-conspicuous. Conspicuous goods are those whose consumption is easily visible to other people and carries a meaning beyond its simple utility or functionality; such products can be purchased in order to satisfy one's social needs, such as signaling wealth or status, expressing uniqueness and individuality, or granting a sense of belonging to a distinct and exclusive group (Gierl & Huettl, 2010). On the other hand, non-conspicuous goods are usually those products that one buys simply for their main features and utility value. Considering different motivations for buying conspicuous versus non-conspicuous products, one could assume that the most effective scarcity message would

be the one that addresses the main purchase motive for a given product. Gierl and Huettl (2010) suggested that supply-induced scarcity would have a more pronounced effect when applied to conspicuous goods, as it implies certain exclusivity and rareness of the product. On the contrary, non-conspicuous goods do not carry such emotional weight to them, so presenting them as unique might not bring about the same results.

The authors hypothesize that in case of products purchased simply for their functionality, a demand-induced scarcity message might prove more persuasive because it implies the product is popular among other consumers, which is likely to indicate that it's of high quality (Gierl & Huettl, 2010). These assumptions are then confirmed in the studies conducted by the researchers, showing that indeed supply-induced scarcity is likely to improve perceptions and evaluations of conspicuous goods, while demand-induced scarcity is more effective in case of non-conspicuous goods. Interestingly, if a conspicuous product is presented as being scarce due to high demand, its evaluations might actually deteriorate, as the message supposedly contradicts the need for uniqueness and exclusivity. On the other hand, supply-induced scarcity does not seem to have any major effect on non-conspicuous goods (Gierl & Huettl, 2010).

Similarly, Ku and colleagues (2012) have examined the relationship between demand and supply-induced scarcity and consumer motivation but in the dimension of prevention or promotion focus. They utilize the "regulatory focus theory" (Higgins, 1997) to classify what type of goals consumers are pursuing while deciding whether or not to make a purchase. Prevention-focused consumers are those whose decisions are mainly motivated by desire of security and avoidance of mistakes and other negative consequences, while promotion-focused consumers mostly determine their course of actions with possible benefits in mind, concentrating on the opportunities rather than risks (Ku et al., 2012).

Following this reasoning, the authors argue that demand-based scarcity should be more effective in case of prevention-focused consumers, as it indicates that a large number of people have already bought the product, which provides a sense of security and reassurance; it suggest that the product is of good quality and the risk of mistaken choice is smaller. For the same reason, supply-based scarcity would not have a major effect, as it gives little indication regarding the quality or purchase behavior of other consumers (Ku et al., 2012). On the other hand, promotion-focused consumers would find supply-based scarcity more compelling, seeing it as an opportunity of obtaining something other people would not be able to get, rather than a risk of making a mistake (Ku et al.,

2012). The subsequent studies have confirmed these arguments, showing in addition that framing the scarcity message in a way that supported the prevention or promotion-specific features of the product further increased its effectiveness for its respective orientation.

2.2.3. Limited edition products

Building upon the findings of previously discussed papers and seeking to examine the effects of quantity-scarcity and time-scarcity messages on different types of goods, Jang and colleagues (2015) decided to specifically investigate the influence of scarcity on different types of products. They employ the term "limited edition" (LE) products, which is simply an umbrella term for both of the already introduced concepts of limited-quantity scarcity (i.e. LQS) and limited-time scarcity (i.e. LTS). This term should not be confused with how we employ the scarcity wording "limited edition" to indicate LQS. To ensure clarity in the terms used for the remainder of the thesis, we only refer to "limited edition" to indicate LQS specifically.

Following the practice by Gierl and Huettl (2010), Jang et al. (2015) also employ the distinction of conspicuous versus non-conspicuous goods, but rather than focusing on supply and demand-based scarcity, they choose a wider lens and inspect the relative effectiveness of quantity-related scarcity versus time-related scarcity (Jang et al., 2015).

The authors challenge findings of previous studies on scarcity messages that had argued for LQS messages generally being more effective than LTS messages (e.g. Aggarwal et al., 2011). While Jang and colleagues (2015) agreed that quantity-based scarcity could be more effective in the specific case of conspicuous goods, they were not entirely convinced that the impact of quantity-based scarcity would also be optimal in the case of non-conspicuous goods. Instead, they held the firm assumption that time-based scarcity would in fact be more effective than quantity-based scarcity when applied to non-conspicuous goods (Jang et al., 2015). Their hypothesis is based in the fact that, since non-conspicuous goods do not fulfill social needs (i.e. signaling status, providing sense of uniqueness, etc.), restricting the quantity of such a good might actually decrease purchase intention, as many consumers would become frustrated by its low availability and simply not consider it worth the extra effort required to attempt obtaining the product (Jang et al., 2015).

The results of the studies conducted by Jang et al. (2015) confirm this hypothesis, showing greater impact of LQS messages on purchase intention of conspicuous goods, while LTS messages proves

more effective in case of non-conspicuous goods (Jang et al., 2015). In addition, these experiments have shed light on an interesting phenomenon in terms of consumer behavior, suggesting that people who are most likely to be influenced by LQS messages (due to high desire for status or uniqueness signaling and similar factors), are then significantly less likely to provide word-of-mouth recommendations to others after purchasing the product themselves. This finding aligns with desire for exclusivity, which would become diluted, if the product suddenly became widely available. It might pose a dilemma for marketers, especially in times when internet advertising is heavily dependent on social media platforms (Jang et al., 2015) and the internet equivalent of word-of-mouth, i.e. user recommendations shown on webshops (Guo et al., 2016).

2.2.4. Other considerations

All of the above-mentioned studies are aimed at examining the influence of different types of scarcity messages in relation to a variety of factors and situations. Although the relative effectiveness of a particular scarcity message differs from condition to condition, most studies confirm that in general such messages have a positive effect on factors such as purchase intention or brand perception. Perhaps for that reason scarcity messages are an increasingly popular marketing technique, used extensively across many industries, from flight tickets and hotels, to apparel and accessories shops, to special offers at supermarkets.

However, as Mukherjee and Lee (2016) argue in their paper, scarcity messages might not be an appropriate marketing approach in every situation. Using insights from literature on persuasion knowledge, cognitive load and consumer expectations, the authors argue that the positive effect scarcity messages have on perceived product and brand quality can be mediated or even reversed, if the consumer does not expect the given product or service to be scarce or if they do not consider the message to be truthful (Mukherjee & Lee, 2016).

This argument is reflected in the results of the studies by Mukherjee and Lee (2016) that have shown that if a scarcity message is applied to a product that the respondents expected to be scarce – either due to popularity of a brand or the season being characterized by high demand – it does indeed improve the evaluation of the quality and value of the brand and product itself. However, if the same message was applied to a product where the scarcity expectation was low, it did not have any significant effect on the product perception (Mukherjee & Lee, 2016). In addition, if persuasion knowledge had been activated prior to the exposure to the stimuli, consumers were discovered to

be more likely to closely consider the scarcity message itself and question its truthfulness. That in turn has shown to have a negative effect on brand attitude and product evaluation, especially when the product in question was not expected to be scarce (Mukherjee & Lee, 2016). As a result, this paper suggests that scarcity messages, while effective in many situations, might also have an effect opposite than intended, especially if consumers do not find them credible.

2.3.Neuroscience

Although traditional economics is still the most prevalent tool for analyzing markets and economic agents, much progress has been made in terms of reevaluating and correcting its non-realistic assumptions. The principles of behavioral and evolutionary economics, drawing from other fields of research such as psychology or sociology, have proven helpful in explaining many of the behaviors and biases that more traditional approaches had failed to capture. However, even with insights from those subfields, some aspects and motivations for actions of economic agents still elude us, sometimes because subjects of the studies do not answer truthfully, and sometimes because they are perhaps unaware of their own preferences and emotions (Lin et al., 2018). But when a consumer is unaware of what she actually wants, how can the marketer be any wiser on how to fulfil her needs? While concepts from classic marketing theory like the 'attention, interest, decision, action' (AIDA) model can clearly depict the purchasing process, and emphasize milestones of effectiveness, i.e. to "Grab the potential client's or customer's attention [...] Arouse the potential customer's interest by using visuals [...] Give the customer a desire for the product or service [...]" (Priyanka, 2013, p. 40), models like this often fall short when it comes to practical implication. With the advance of neuroscience, marketers now have access to a scientific approach, which actually enables them to better understand and even measure concepts such as attention, interest, arousal, and desire at a neurological level of resolution (Plassmann et al., 2012). With these tools in hand, a new path for reaching the aforementioned milestones is revealed.

Neuroscientific research is bridging the gap between stated preferences and factual responses in human behavior. Neuroscience seeks to discover and explain the mechanisms guiding human behaviors on a neurological basis. It does so by using advanced sensory technology to monitor various bodily functions such as brain activity, blood oxygenation levels, or eye movement in relation to stimuli and elicited consumer behavior (Plassmann et al., 2012). There are several branches of economic and business research that draw from neuroscientific findings, most notably

neuroeconomics and neuromarketing. While there are numerous insights from neuroscientific cross-disciplinary studies with economics and marketing that could enhance our understanding of consumer behavior, there are two recurring concepts that we have found especially relevant for the purpose of this thesis, namely the concept of salience, i.e. visual attention, and the concept of emotions, i.e. arousal and desire.

2.3.1. Salience and visual attention

As has been observed in literature and most likely experienced by every one of us, some of the stimuli that we encounter in our daily lives are more easily noticeable and memorable than others. We can often recall an event or an individual we have come across that has particularly caught our attention but would struggle to describe as accurately what happened before or after, or who else was present at that time. In other words, that one event or individual was in our eyes more salient than the rest.

The concept of saliency refers to how easily a particular stimulus is spotted and processed by our minds. There are many factors that influence the saliency of a given element, including its size or intensity, shape, color or brightness (Hasan, 2016), as well as how much it contrasts with the rest of its environment and comparable elements (Orquin & Mueller Loose, 2013) and how strong of an emotional response it triggers in those perceiving it (Adam, Astor & Krämer, 2016). The notion of salience is thus closely related to the "accessibility" of certain pieces of information, as discussed in the section regarding dual-process theory; both concepts refer to how easily and how quickly the stimulus is spotted and processed.

Since humans primarily rely on eyesight to orient themselves in their environments, visual cues have a relatively large impact on attention when compared to the other human senses. As such, very often how noticeable and memorable a stimulus we encounter is, heavily depends on its visual salience, which directly ties into the notion of visual attention: how often and for how long we look at particular things. Research on the has shown, elements that stand out, i.e. are more visually salient, attract our gaze for a longer period of time (Milosavljevic et al., 2012), and in terms of buying behavior, the products we look at for a longer duration are often evaluated as more attractive and are more likely to be purchased (Clement et al., 2015).

As argued by Clement and colleagues (2015), visual saliency and attention is especially crucial in the case of purchasing functional products with little emotional value to them, such as daily commodities. Because of the relatively low stakes of the decisions of e.g. grocery shopping, we automatically expend as little of our cognitive resources as possible to accomplish the goal. However, because of the wide variety of products available in most shopping situations nowadays, there are usually too many choices to effectively consider them all (Clement et al., 2015), which is an observation in line with Simon's (1955) argument of the limited cognitive processing capacity at our disposal. Most of the time, there is just too much information to take into account to make a fully informed decision, so consumers tend to instead rely on their well-established axioms based on previous experience to serve as decision guidelines (Clement et al., 2015).

Consumers tend to look for solutions that cause their choices to be easier to make, as this enables them to expend fewer resources. That often includes relying on cues within the context of the decision that is supposed to be made. As argued by Scarpi (2008), the framing of that context can influence what the consumer will consider as most relevant for their final choice, and what attributes they will use as substitutes for information that is not immediately available (as originally proposed by Kahneman and Frederick, 2002). As previously discussed in the heuristics section, the attribute that serves as a substitute is in most cases more readily available, which also explains why more salient elements may have a more pronounced effect on our decisions – the information they convey is simply easier to access and base a choice on.

Furthermore, as argued by Clement (2007) visual attention can be understood as both a top-down and a bottom-up process (see also Orquin & Mueller Loose, 2013). Posner and colleagues (1980) introduced a distinction between orientation-attention and discover-attention. Orientation-attention serves as an initial low-effort search process, much like the Type 1 processes from dual-process theory, that is able to handle a lot of basic inputs simultaneously. Its purpose is to give a general overview of the available alternatives within a specific field or category and pinpoint the most relevant ones for further investigation without expending too many resources (Clement et al., 2015). The discover-attention comes into play after this initial search as a high-effort process that examines the most relevant information in greater detail. Similar to Type 2 processes, it requires deliberate focus and can analyze only one feature at the time, but it allows an individual to concentrate on a single element and evaluate all of the information related to it (Posner et al., 1980).

This allows one to re-evaluate the initial impression provided by orientation-attention and either accept the choice as satisfactory or reject it and look for a more suitable alternative.

Although some features that influence the saliency of an element are largely influenced by its innate characteristics, e.g. color, shape, intensity etc., and the context within which it finds itself, i.e. how much it stands out, as pointed out by Clement (2007), some of the earlier theories of visual attention were more dependent on deliberate thought. Factors such as expectations and intention can affect what elements are considered easier to notice; for example a person looking for a specific brand or product will be more attentive to stimuli that they associate with that specific item, such as packaging color or shape, even if they are generally less salient than other elements (Clement, 2007).

In general, visual saliency is extremely important, especially in the times of informational overload that we encounter in our daily shopping situations; it increases the chance that a particular product will be spotted and singled out in the initial search process. That in turn means it will be more likely to be examined further by the deliberate discover-attention, and akin to the AIDA model, potentially be chosen for purchase above other substitutes, if the product meets the purchase decision criteria. As such, visual saliency effectively increases the chance of the product being sold by making a product noticed, as that is how we make a majority of our daily shopping choices (Clement et al., 2015).

Visual saliency is also worth considering when examining scarcity messages. Most scarcity appeals, whether in physical stores or on online shopping platforms, are designed in a way that's supposed to attract attention – either by use of bright colors, exclamation marks and big letters, by creating contrast with the rest of the context or by modelling the message in a form of a warning. Following the conclusions from literature, that initial attention attracted by the scarcity appeal should translate to more attention paid to the associated product itself. Combining it with the sense of urgency that scarcity appeals are designed to evoke, consumers should be more inclined to examine the product more closely and less inclined to look for alternatives, overall increasing the chances of the product being chosen and purchased.

2.3.2. Emotions and their role in our choices

Another matter of great interest to marketers and researchers is the question of what makes marketing and advertising effective. As many have argued, the key feature of effective marketing is its ability to evoke certain emotional responses in its recipients. However, what exactly would qualify as an emotional response has been a matter of debate over the last century (Berridge, 2018).

There is an ongoing debate among psychologists and neuroscientists regarding the definition of emotions and whether they should be understood only in terms of conscious, describable feelings or whether they should also include unconscious, implicit reactions to encountered stimuli (Berridge, 2018). Although there are some who claim only the explicitly felt and described sensations should be taken into account, most researchers believe that the intuitive responses to stimuli are just as important, even if they do not have an effect on our subjective mood (Berridge, 2018). Damasio and Carvalho (2013) argue for a distinction between emotions – understood as automatic physiological reactions to changes in body state and our surroundings, and feelings – explicit mental experiences most often (but not always) associated with and resulting from those emotions.

Supporting the need for such a distinction, empirical evidence from various experiments suggests that some characteristics of human emotions and their influence on resulting behavior cannot be observed through introspection and self-reported data. For example, a study by Winkielman and colleagues (2005) has shown that people exposed to subliminally brief stimuli associated with either happiness or anger exhibited significant differences in behavior and attitude following the exposure; those who were presented with images of happy faces were more inclined to drink more a beverage presented to them and were willing to pay a higher price for said beverage. Meanwhile the group exposed to images of angry faces was willing to drink less and pay less, even though neither of the groups reported any changes in their subjective mood (Winkielman et al., 2005).

Similarly, Adam and colleagues (2016) found out that in an internet auction scenario people exposed to images associated with competition demonstrated a more aggressive bidding behavior than those exposed to images related to community, and Clement and Kokkoli (2014) have shown that displaying images of happy and attractive people in association with a photo and description of a medicine increased its perceived trustworthiness among the study respondents as compared to neutral images of pills or pictures unrelated to the product. It goes to show that the stimuli we are

exposed to influence our behavior even without us realizing it and yet again serves as proof that most often the choices that we make are not as rational as we would probably like to believe.

Another interesting phenomenon is the relationship between emotional arousal and receptibility of salient stimuli. Sutherland and Mather (2017) examined how arousal, both negative and positive, influenced how easily we perceive and process more versus less salient elements. They have found out that higher reported level of arousal corresponded to stronger bias favoring stimuli of higher saliency, increasing the influence of bottom-up salience (Sutherland & Mather, 2017).

This conclusion could be of relevance for the research in the field of scarcity messages, taking into account that their main goal is to increase the level of arousal by creating a sense of urgency in its recipients. In fact, it is in line with the findings of Guo and colleagues (2017) who examined the influence of scarcity appeals on perceived levels of arousal and their relationship to purchase intention in an online shopping situation. On average, the respondents of their study indeed reported a higher level of arousal when the products they were viewing were accompanied by LQS or LTS messages and indicated they felt more inclined to make a purchase under such conditions (Guo et al., 2017). Unfortunately, the study relied primarily on self-reported data so whether there existed a physiologically motivated relationship between scarcity appeals, salience and purchase intention was not uncovered.

3. Hypotheses formulation

From the reviewed literature on scarcity messages, we employ the scarcity terms of 'LQS' to indicate limited-quantity scarcity and 'LTS' to indicate limited-time scarcity. For the brand concept, we introduce the two terms 'high-end brand' that reflects the aspects of a symbolic brand, and 'low-end brand' that reflects the aspects of a functional brand. Finally, we use the two descriptive categories of goods to specifically describe products as being either 'conspicuous' or 'non-conspicuous' products.

Following the findings of the scientific literature presented above, we are convinced that scarcity messages can indeed influence consumers' perceptions and decisions, both in in-store and online settings. For the purpose of this study we have focused on the online shopping websites, partially due to their widespread, and partially due to the ease of testing and fewer distracting stimuli consumers would be exposed to in such settings.

We believe scarcity messages on online shopping sites can influence consumers by increasing their product evaluation, i.e. their perceptions of product *quality* and product *value*, as well as increase their subjective *purchase intention*, as has been indicated by the majority of findings in the literature. As such, we have formulated the following hypothesis:

H1: Scarcity messages have an effect on the overall product evaluation, irrespective of the brand.

In addition, most of the studies following the distinction between Limited Quantity Scarcity and Limited Time Scarcity have indicated that the former has a significantly larger effect on customers' product evaluation and purchase intention across most settings (Aggarwal et al., 2011), even though the opposite can be true for specific types of products or product types (Gierl et al., 2010). As a result, we also intend to verify H2:

H2: A scarcity message indicating limited quantity has a significantly greater effect on the overall product evaluation than a scarcity message indicating limited time has, irrespective of the brand.

Furthermore, taking into account the differentiating effect of symbolic versus functional brands (Aggarwal et al., 2011), we posit that the influence of scarcity messages is more pronounced for

high-end (i.e. symbolic) brands, when compared to low-end (i.e. functional) brands. As such, the following hypotheses will be tested:

H3: The brand affects the subject's overall product evaluation irrespective of scarcity message.

H4: When compared to the control message, the effect scarcity messages have on the overall product evaluation is significantly greater when coupled with a high-end brand, than when coupled with a low-end brand.

Moreover, if the above hypotheses turn out significant, we could test the following hypothesis:

H5: Scarcity message of limited quantity is more effective than limited time at affecting the overall product evaluation in each level of brand.

4. Methodology

In our methodology section, we have employed the framework by Bickman and Rog (2008) to explain our approach to the applied research design. Furthermore, we have used the recommendations by Lipsey & Hurley (2008) regarding statistical tests in social sciences to conduct our descriptive statistics and inferential statistical tests. For our data collection, we have designed and conducted an internet study using Qualtrics survey software. Here we tested participants' attitudes towards generic products with scarcity messages as opposed to neutral messages, as well as being presented with a high-end versus low-end brand.

4.1. Research Design

In order to test the hypotheses discussed in the previous section, we have chosen to employ an experimental research design to conduct quantitative research on the effect of scarcity messages through the online survey tool Qualtrics. We have chosen this design for our empirical thesis, as it best reflects how to statistically test the existence of a causal relationship between our variables (Bickman & Rog, 2008, p. 16).

Our independent variables are 'scarcity messages' (Limited Quantity versus Limited Time versus Dummy) and 'brand' (High-end versus Low-end). Based on the scarcity formats and scarcity wording defined by Chang & Kwon (2013), we have created three variations of messages displayed in the stimulus. For the scarcity format of LQS, we have utilized the wording "limited edition" in the message indicating a quantity-based scarcity of products available. For the format of LTS we have used the wording "only this week" indicating time-based scarcity based. Finally, we use "more colors" as a neutral control message, i.e. dummy message, as this did not give any indication of the product's availability in terms of quantity or time. We chose this solution instead of simply removing the message to ensure that the layout of the template, and the number of elements presented, were as similar as possible across all conditions. This helps reduce the risk of random error. Furthermore, all of the tested products were presented with a brand logo of either high-end or low-end. For high-end, we chose the Danish high-end department mall *Magasin*, which ensured that a featured product indicated it was associated with a high-end brand. For low-end, we used Flying Tiger Copenhagen (Flying Tiger), which is a Danish variety store chain known for having competitively low-priced products, as this would make featured products become associated with a low-end brand.

For this purpose, we selected 12 webshop products offered by Flying Tiger. The selection criteria were that the products had to be generic, i.e. relatively neutral and inconspicuous in design, but still classic enough for the products to realistically be sold by either a high-end or low-end brand. For the study products were chosen from the "Kitchen & Cooking" and "Practical Things" collections (Flying Tiger Copenhagen Webshop, 2020). By choosing generic products we also minimized the risk of participants recognizing them as Flying Tiger Copenhagen products. Our choice fell on Flying Tiger as the low-end brand, as it is a well-known Danish company with a strong brand identity that is known for its non-conspicuous goods, which recently have been made available for online purchase with the opening of the new company webshop. Most importantly though, if the claim by Aggarwal et al. (2011), i.e. that LQS should be more effective than LTS for low-end brands too, turns out to be true for Flying Tiger, which is arguably the 'least likely' case company to support that claim, then we have support for generalizing how it is likely to be true for many other webshop companies of equal or higher brand image as well.

Each product was placed within a template imitating the layout of an online shopping website with elements captured from the actual Flying Tiger Copenhagen webshop. This included the picture and name of the specific product, name and logo of the brand, scarcity or neutral message, as well as some background webshop elements, such as available colors, product selection bar or "add to basket" button, as presented in Figure 2 and 3 (see appendix A for all products). The template was used to ensure that all the elements are of comparable size and shape across all tested factors, in order to reduce the influence of random error in the data collection process. Furthermore, we ensured our selection of website design features followed criteria that would not be irritating for the consumers to interact with, i.e. avoiding unpleasant navigation as well as "poor layouts, small fonts, eye glaring colors, and inappropriate graphics" (Hasan, 2016).

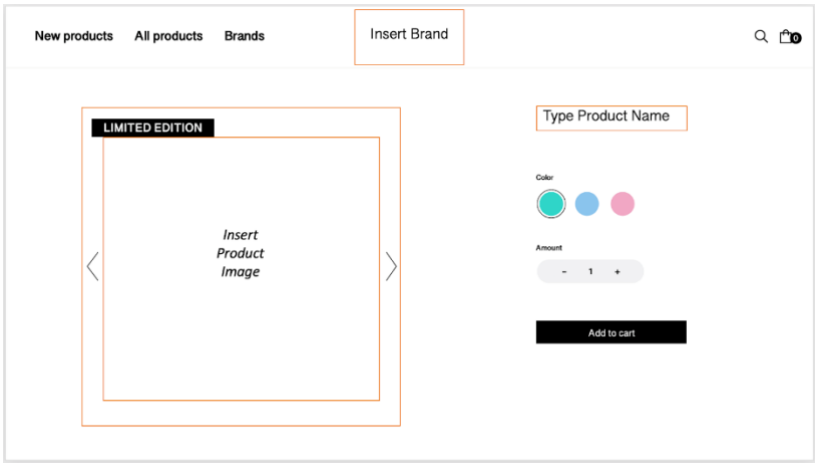

Figure 2. The template used to create uniform product stimuli.

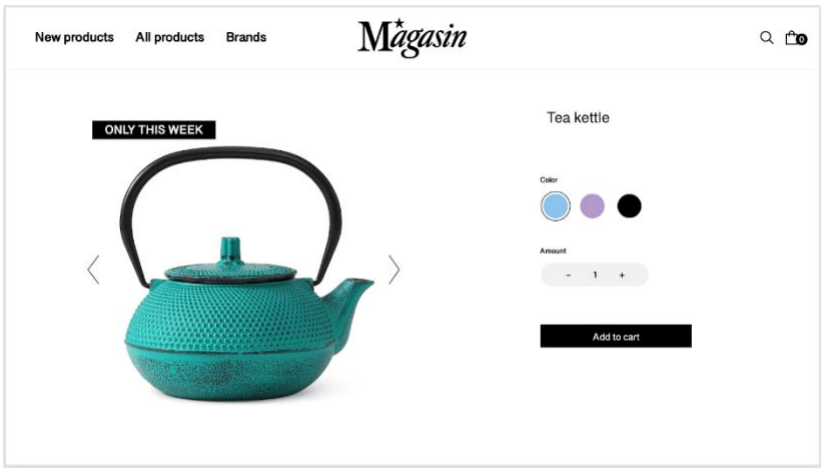

Figure 3. A product stimulus created via the template.

Furthermore, we created 14 distractors (see appendix B & C), of which four were fixed at the beginning of the study, and the remaining 10 were randomly shown among the 12 actual stimuli. The four fixed distractors allowed participants to become acclimated to the study. The 10 random distractor stimuli was included to minimize the risk of bias resulting from participants understanding the focus of the study. The 10 distractor stimuli were also presented with their own variety of messages, including "vegan", "organic" or "in stock", as well as brand names and logos, some of high-end brands such as *Hugo Boss* or *Chanel*, and some of fictitious brands. The four fixed distractors at the beginning of the study have been given a mixture of brands and messages from both groups to ensure consistency throughout the study.

We have then created six groups, each of them presenting the same products, but with different brand-scarcity combinations as shown in Table 1. This was in order to ensure that the responses were not simply based on the design of a particular product alone. Each group has been composed of a welcome message, the four fixed distractors at the beginning of the study, and then the main block of the study that included the particular combination of the 12 stimuli products and 10 distractor products in a randomized order. At the end of the survey, the participants were asked to answer a few demographic questions regarding their age, level of education, years lived in Denmark, employment status, online shopping habits, etc. Each participant was randomly assigned to one of the six groups.

Independent variables		Products											
Brand	***Scarcity Message***	**P01**	**P02**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**P10**	**P11**	**P12**
Symbolic	Limited Quantity	**1**	6	5	4	3	2	**1**	6	5	4	3	2
Symbolic	Limited Time	2	**1**	6	5	4	3	2	**1**	6	5	4	3
Symbolic	Control	3	2	**1**	6	5	4	3	2	**1**	6	5	4
Functional	Limited Quantity	4	3	2	**1**	6	5	4	3	2	**1**	6	5
Functional	Limited Time	5	4	3	2	**1**	6	5	4	3	2	**1**	6
Functional	Control	6	5	4	3	2	**1**	6	5	4	3	2	**1**

The above table shows which Group (1-6) a given Product × Brand-Scarcity-combination belongs to.

Table 1. Design for crossover study.

Each product stimulus was followed by a set of questions that had the participants evaluate the product on a 7-point Likert scale in terms of its perceived quality ("How do you perceive the quality of this product?"), value ("How do you assess the value of this product?"), and desirability ("How likely would you be to purchase this product for yourself?"), as presented in Figure 4. The Likert scale question of sustainability ("How do you estimate the sustainability of this product?") was included to blur the purpose of the study.

Figure 4. The 7-point Likert scales with associated questions and sliders, as used in the study.

We distributed the survey through social media to nine different Facebook groups - five Danish groups and four international groups. Five of the nine groups were specifically made for university students, whereof three were international and two were Danish. To incentivize dedicated participation in the study, the first 100 participants to enter were promised a gift card of a value of 100DKK that could be redeemed in an undisclosed online shop. After completion of the survey, these participants received a generated gift-card code via email that they could use in the Flying Tiger online shop. We avoided specifying which store the gift code would be applicable to beforehand, in order to reduce the risk of biasing participants' evaluation of the product stimuli during the study.

We have found this experimental research design as appropriate when studying cause-effect relationships, in accordance with Bickman & Rog (2008). The suitability of this research design is reflected in how it strengthens our control over internal validity - "that is, the ability to rule out potential alternative explanations for apparent treatment or program effects" (Bickman & Rog, 2008, p. 17). Furthermore, the randomization of our experimental study allows for better control of any unmeasured variables, in turn strengthening our internal validity. Although a limitation of random assignment is how we cannot control for participant biases, such as individual product or brand preference.

4.2.Data Collection

We used the advanced web-based survey tool Qualtrics to gather our self-report data. This tool allowed us to branch and randomize participants evenly among the six groups, as well as randomize the sequence of product stimuli and distractors within each group. Furthermore, when compared to a physical experiment, maintaining compliance with the research protocol is easier in an online survey setting, since the survey actually becomes the protocol. This entails a reduced risk of researchers biasing participants before, during, and after experiment participation, e.g. by behaving in varying ways, forgetting a part of the protocol, or not being properly instructed. Another major benefit of the online survey is how it simulates the real-world "online shopping"-setting relatively closely, which reduces the risk of random error. Being online, we had instant access to the data, which was rapidly collected and continuously updated. As suggested by Bickman & Rog (2008), using this form of data collection allows the researchers to track the rate of completion. One week into our data collection, we used this advantage to act accordingly and increase the rate of responses, while the survey was still ongoing. The survey platform serves as a reliable data platform and all the gathered data is easily managed in its already computerized form. While the survey accessibility has a clear benefit, there may also be drawbacks from it being too accessible, i.e. single participants entering the survey several times just to accrue several gift-cards, which would most likely result in inaccurate/flawed data. We find the greatest limitation of an online survey to be reflected in the lesser amount of control over respondent participation and engagement. We have attempted to minimize the effect of this limitation by delaying the rewarding of the earned gift card by up to seven days from survey completion. Furthermore, upon dispensing the survey access link, we clearly communicated that spam and inauthentic responses would be removed and as such could not count towards a response eligible for receiving a gift-card.

Pilot

Further attempts to limit potential errors were done by conducting pilot testing, which helped design the larger study. We did three pilot tests. These proved useful for user experience (e.g. adjusting survey length, removing progress bar, branching out users on mobile, expanding stimuli size dimensions to match an online shopping setting), effective randomization of participants (i.e. equally divided among six groups), and data extraction (i.e. naming stimuli systematically, which allowed for more intuitive comparisons of data points).

4.3.Statistical Analysis

For our statistical analysis, we utilize the procedure of Linear Mixed Models to develop a within-subject, multilevel mixed model with random effects and repeated measures (The Linear Mixed Model, 2020). The 'multilevel' aspect allows us to specify the two factors *Brand* and *Scarcity Message*, and their six factorial interactions, in the model. With this, we can inspect how each factorial interaction can have a different linear effect on each dependent variable. The model is 'within-subject' for both of these factors, since all 110 subjects are exposed to all levels of each factor. As each subject is an independent individual and can be identified by the variable *SubjectID*, we assume that the residual errors are correlated *within* each subject, but independent *across* subjects. With a 'random effects' structure, the model enables us to specify the covariance relationship between the levels of random effects. Finally, the 'repeated measures' allow us to relax the assumption of independence of the error terms. Having added the variable *Product* as a repeated effect to the model, it serves as a marker of the 12 observations recorded for each individual subject.

In this model, the data requirements are flexible, but we still had to take two main points into consideration. Firstly, we added numeric values to the factors Brand and Scarcity Message, as this was necessary for enabling classification of factor-levels in the SPSS statistical analysis software. Secondly, our dependent variables should be quantitative. While Likert scale values are typically classified as ordinal, i.e. Agree-Disagree, Bürkner & Vuorre (2019) argue that at an ordinal scale of 7 or more, the distribution of values and residuals often satisfy the assumption of normality. As this practice is common in the field of neuroscience (e.g. Aggarwal et al. 2011; Jang et al. 2015), we allow our values to be treated as quantitative on an interval scale.

From the literature on Linear Mixed Models in SPSS, we adhere to the following assumptions (Linear Mixed Models, 2020):

- "The dependent variable is assumed to be linearly related to the fixed factors, random factors, and covariates.
- The fixed effects model the mean of the dependent variable.
- The random effects model the covariance structure of the dependent variable. […]
- The repeated measures model the covariance structure of the residuals.
- The dependent variable is also assumed to come from a normal distribution."

The benefit of receiving all our necessary results from one analysis is that we reduce the risk of Type I error in conducting separate analyses (Salkind, 2010). For this reason, we also use the

Bonferroni adjustment for multiple comparisons, which is a stricter version of statistical test, as it reduces the threshold for significance by dividing the alpha level for each comparison by the total amount of comparisons. This ensures that our statistically significant findings are much more robust.

4.4.Validity, reliability and generalizability

In the following, we assess how our methodology contributes to the validity, reliability and generalizability of our research (Bickman & Rog, 2008).

The internal validity

For our validity, we are primarily concerned with maximizing the internal validity and statistical conclusion validity, as these are most essential to our study question, which aims to test the causal "effectiveness of an intervention" (Bickman & Rog, 2008).

Our statistical conclusion validity is strengthened by the use of appropriate sample size. We find our measures to be appropriate and accurate, as the use of ordinal Likert-scale measures can be applied as interval scale quantifiable variables applicable for statistical analysis, which is supported by the statistical literature and indeed common practice in scientific research in disciplines, such as scarcity message research. Furthermore, the measures for our dependent variables are prevalent in the existing scarcity literature, which also makes them comparable to previous studies in the field (Aggarwal et al., 2011; Jang et al., 2015). Finally, we employ a rigid statistical test at the highest level, followed by individual statistical tests with Bonferroni adjustment of the alpha-level of .05 for multiple comparisons. This ensures the reduction of potential Type I errors from repeated univariate tests and repeated comparisons, respectively (Salkind, 2010).

As our internal validity is heavily based on the extent to which we can draw causality in our results, we rely on the statistical analysis to infer correct causal relationships in between our variables (Bickman & Rog, 2008). Furthermore, while the laboratory setting enables for the highest degree of control, it is also a setting that is quite unusual to be conducting online shopping in. Although it is difficult to quantify, we believe that the internal validity gained from being able to conduct the survey from the comfort of one's own home outweighs the loss of experimental control that occurs, when we as researchers cannot observe our subjects.

The reliability

While random error cannot be entirely avoided, we have actively sought to reduce the amount of random error by ensuring a uniform survey procedure experience, i.e. a protocol that does not change between participants (Bickman & Rog, 2008). One way we have reduced the amount of systematic error in participant survey-experience is by prohibiting mobile access to the survey. We believe that our analysis procedure is highly replicable and should yield consistent results, as the data collection method through online survey was near autonomous when compared to e.g. an unstructured interview. By employing consistent statistical analysis, the findings should also yield the same results. By using a statistical software program, such as SPSS, we are constantly able to review our recent analysis in the coded logs, which enables for quick assessment of comparability across analysis iterations and dependent variables analyzed.

Generalizability

While we can draw inferences for the population of a mix of international and Danish students in Denmark based on our sample of this group, it is difficult to draw broader generalizations. What we can say however, is that there is a statistical significance for the results we obtain in the following analysis segment to at least describe the population. Without being able to draw the specific geographical lines for the generalizability of our results, we can still argue that the underlying, fundamental brain processes, i.e. visual attention, are inherited and shared among humans across populations, location, and time. That being said, when it comes to how specific scarcity messages may affect the individual, i.e. whether they actually activate the expected neural circuits in response to a scarcity stimulus, there can be great cultural and contextual differences in scarcity message effectiveness, e.g. familiarity with online shopping or inherent attitudes towards brands and advertisements.

4.5.Considerations

Full disclosure: One of the authors of this master's thesis is employed at the company, Flying Tiger Copenhagen. While this has enabled easier access to key stakeholders, it is important for us and the research design to acknowledge the potential biases this could lead to. First of all, it is important for us to stress that we have no vested interest and will not receive any sort of compensation for conducting this study. The relevance of our connection to the company is purely from the

perspective of access. The engaged stakeholders are from a completely different department in the company, and there is no relationship between us and company stakeholders that could compromise the study. In our negotiation, we asked for permission to use the products and website layout, as well as the support in the form of 100 gift-cards of 100 DKK, which was granted. In exchange, we have offered to share our thesis with the key company stakeholder as well as a brief summary of mean values of the dependent variables per product, if relevant for the company. All appendices and data are anonymized and summarized in such a way that it could not be used to identify individual participants that contributed to the study.

4.6. Limitations

Although we did our best to make the study as objective and reliable as possible, there are still some limitations resulting from the particular research design we have decided to adopt that we are aware of. First of all, the results obtained through the survey are largely reliant on self-reported data which is in itself subject to personal biases and subconscious emotions that even the participants themselves might not be entirely aware of (Bickman & Rog, 2008).

Secondly, some of the answers to some of the questions presented in the study, such as perceived desirability, are to a greater or lesser extent dependent on the personal preferences and previous associations that particular individuals might have with certain shapes or colors. It is thus not unlikely that the answers we have received could be based on those personal preferences more than on any of the tested variables such as brand or scarcity message. We have tried to minimize that risk by presenting each of the products with different combinations of brands and messages across the groups, but we are aware that some bias may still exist within the collected data.

In addition, we have placed our focus on a relatively specific group of consumers (i.e. young adults who are active on social media), seeking to limit the number of variables influencing our data. However, because the results and their implications are based only on this particular group, their applicability to the general consumer base or to other groups might be limited. We also acknowledge the results of the same study conducted among participants of a different demographic profile (age group, level of education, or average income) could potentially lead to different conclusions.

Moreover, because of the remote form of the study we had to forego some of the control over the conditions in which it was completed. Having the survey be completed online, we could not oversee such factors as how long our respondents would look at the product template or whether there were any disturbances from their situated environment while answering the questions. We did advise to complete the study in a neutral, uninterrupted setting but could not control whether that was in fact the case.

Furthermore, we did specifically search for products of neutral design and made sure that each of the tested ones had a similar equivalent in other Danish shopping chains (i.e. *Magasin, Illums Bolighus, Kop og Kande,* etc.). However, we are aware that there was still a risk of some of our participants recognizing the product they were exposed to as one offered specifically by *Flying Tiger*. While it would not pose much of a difficulty if that product was presented to them as a *Flying Tiger* product, it might have had an influence on their answers if it was presented under a different brand. In our survey design we did not test for familiarity with, and attitude towards, the brands presented. If participants had strong opinions about one of the brands, that would have been relevant to know, as it likely could influence their answers.

Finally, we are subject to the same issue most of the similar studies are struggling with. Although we try to recreate the scenario as close to an authentic shopping situation as possible by using various tools that visually reflect an actual shipping website, the position in which study participants find themselves is still not identical to a real webshop experience. That is partially because the respondents do not decide which products to view and have no intention of spending their money. Without the constraint of limited financial resources, they might be more liberal in assessing the value or utility of presented products. In addition, they can only look at one product at the time, without the possibility of comparing it to similar commodities and evaluating them relative to each other. As a result, their responses regarding the product evaluation could potentially have been sufficiently arbitrary to skew the data, but without being irregular enough to be identified as outliers for exclusion.

5. Data Analysis

The survey was open for responses over the course of 14 days. During this time, a total of 430 responses were recorded. 320 of these were not assessed, as they were either registered as attempts to enter via mobile or identified as repeated spam attempts and had to be cleaned from the data set. The remaining 110 participants that behaved according to the research design were subject for analysis. The one hundred and ten participants were aged 18-55 (*M* = 24.84, *median* = 24.0) and 57.27% were female. 92.7% had a University degree or High-school diploma equivalent and while only 49.1% originated from Denmark, 91.8% of all participants had been living in the country for more than a year. 89.1% reported that they shopped online somewhere between several times a year to at least once per week.

In exchange for contributing to the study, the first 100 participants were offered a DKK 100 gift card to an undisclosed online webshop. Participants were randomly assigned to one of six stimuli-groups in an evenly distributed fashion. Due to the large amount of 'spam attempts' entering the survey, the distribution of real respondents became slightly uneven among the groups, ranging between 17 and 21 completed entries pr. group (median = 18,33). While unfortunate, this does not greatly affect the study design as the distribution across groups is still quite uniform and all groups consist of more than 15 subjects, which is deemed the minimum necessary amount of subjects pr. cross-level interaction in the study.

5.1. Descriptive statistics.

With 110 subjects across 12 observations, the total sample size was 1320 observations for each of the three dependent variables. The initial descriptive statistics for each of the three dependent variables are presented in Table 2. We now proceed to test the assumption of normality in the distribution of each of our dependent variables: *Quality*, *Value* and *Purchase Intention*. We find that *Purchase Intention* must be adjusted for outliers to fit normality in the following, why we will introduce the new variable, *Purchase Intention (non_extreme)*.

Dependent variable	Sample size	Mean	Standard deviation	Skewness
Quality	1320	4.02	1.38	-.253
Value	1320	3.95	1.39	-.288
Purchase Intention	1320	3.67	1.71	.033
Purchase Intention (non_extreme)*	1152	3.86	1.47	-.042
*: This dependent variable has been adjusted for outliers to fit the normality assumption.				

Table 2. Descriptive Statistics

Normal distribution - Histograms.

The three dependent variables *Quality, Value* and *Purchase Intention* are plotted on histograms with normal distribution curves in (see figures 5-7). From a visual inspection of these distributions, we find skewness in the acceptable range, which was also confirmed in the descriptive statistics Table 2. For *Purchase Intention* however, there are visible outliers that we have to consider. These are also reflected in the relatively high standard deviation of the variable (*SD* = 1.71). The histogram for *Purchase Intention* in Figure 7 has a polarized expression, which is not congruent with a normal distribution. In order to focus on more nuanced answers to purchase intention, we argue for the exclusion of the extreme-most answer-value in each end of the measurement scale to remove outliers. For this reason, we proceed to analyze Purchase intention on the scale 1.1–6.9 with the new variable *PurchaseIntention_non_extreme*. While exclusion of outliers reduces the number of subjects ($\Delta n = 1152 - 1320 = -168$), it also raises the mean ($\Delta M = 3.86 - 3.67 = 0.19$) and, more importantly, reduces the standard deviation ($\Delta SD = 1.466 - 1.711 = -0.245$) by quite a substantial amount for this dependent variable (see Table 2.). The distribution of *PurchaseIntention_non_extreme* is presented in Figure 8 alongside the other dependent variable histogram.

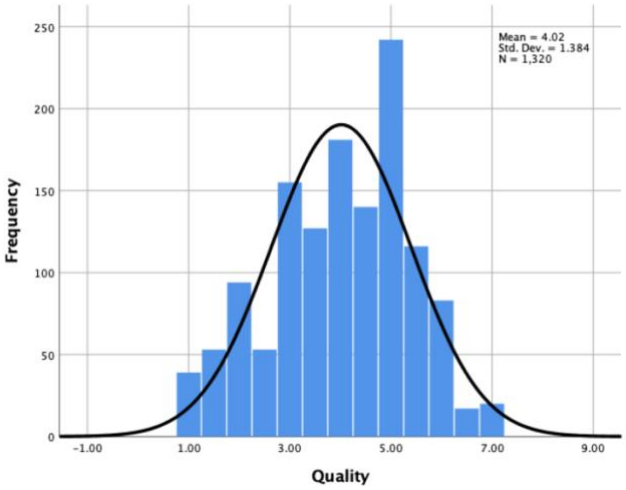

Figure 5. Histogram of Quality

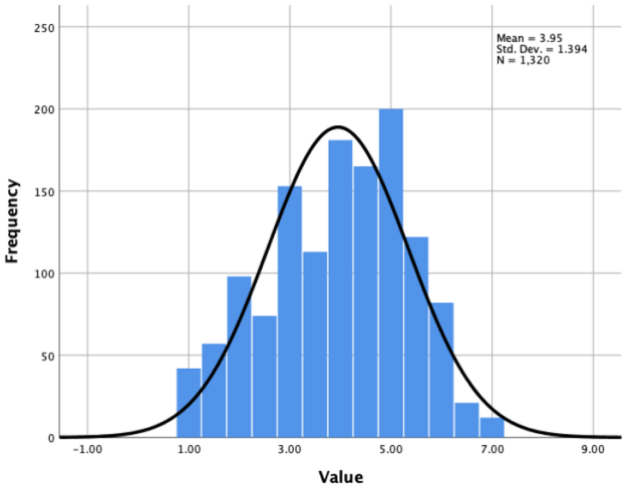

Figure 6. Histogram of Value

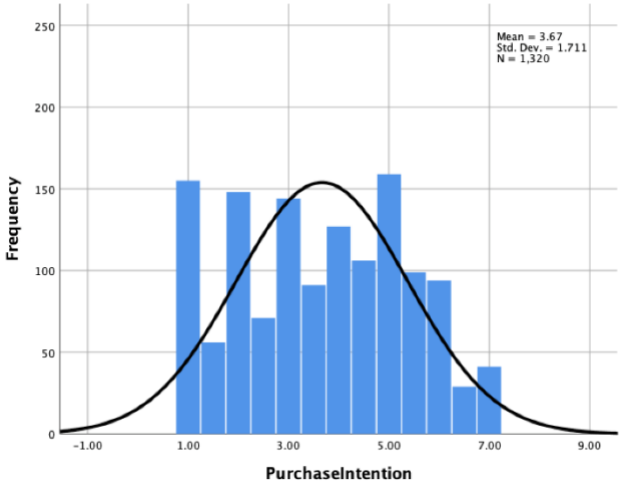

Figure 7. Histogram of Purchase Intention

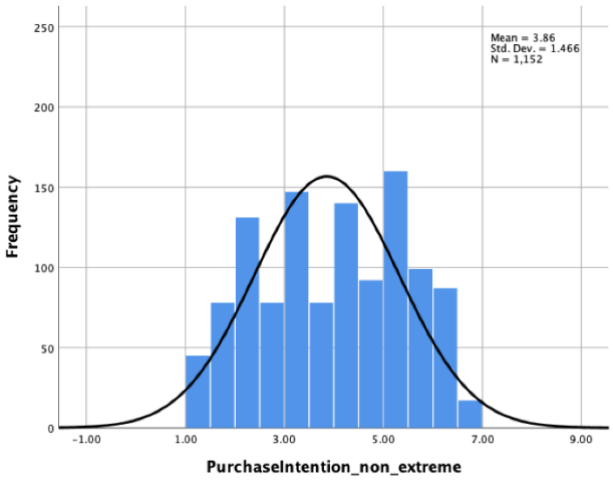

Figure 8. Histogram of Purchase Intention (non_extreme)

To enhance our understanding of the outliers, present for *Purchase Intention* in Figure 7, we split the distribution of this dependent variable into the six brand*scarcity factor interactions in Figure 9. In this figure we observe a substantial bias towards the outmost extremes of the measurement scale, i.e. '1' (130 observations) and '7' (38 observations) – especially in the low-end level of the *brand* factor. Figure 10 shows the distribution of each brand*scarcity factor interaction in the newly adjusted dependent variable, *PurchaseIntention_non_extreme*. When comparing these two figures, we see how the exclusion of extremes, i.e. outliers, in *PurchaseIntention_non_extreme* makes the curve more bell shaped, i.e. normally distributed, across each brand*scarcity factor interaction.

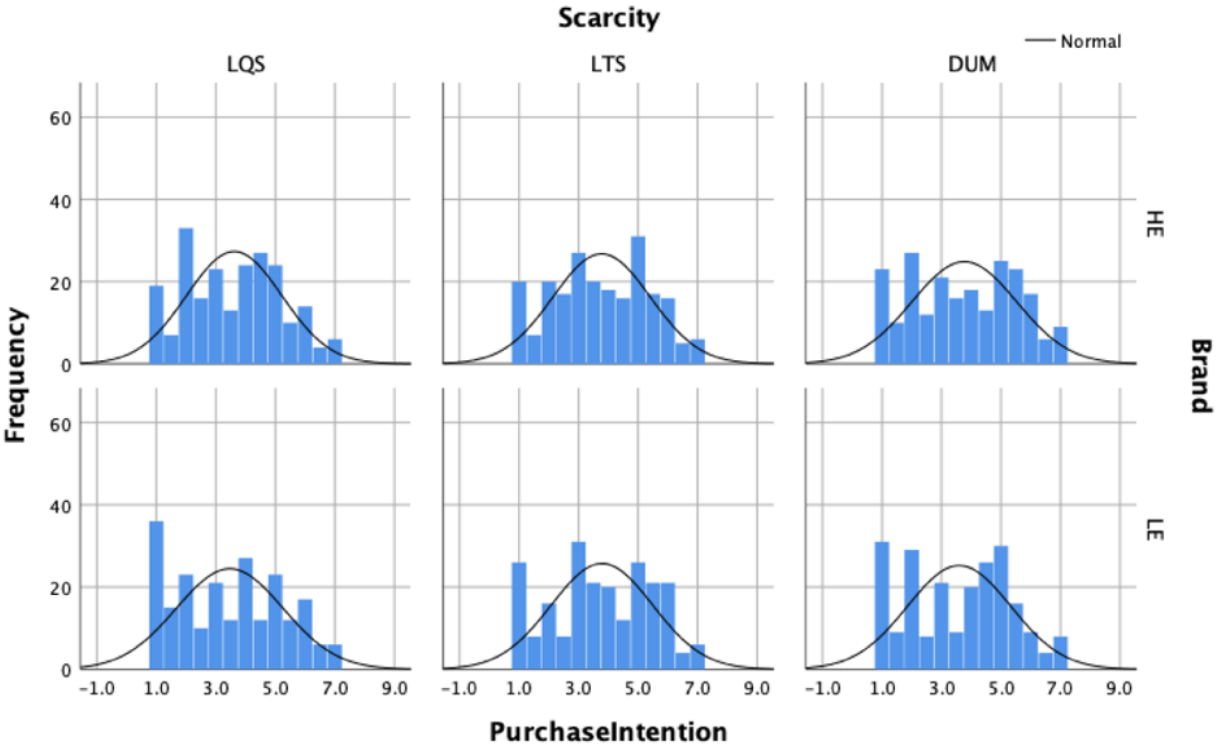

Figure 9. Histograms of Purchase intention on factor interactions

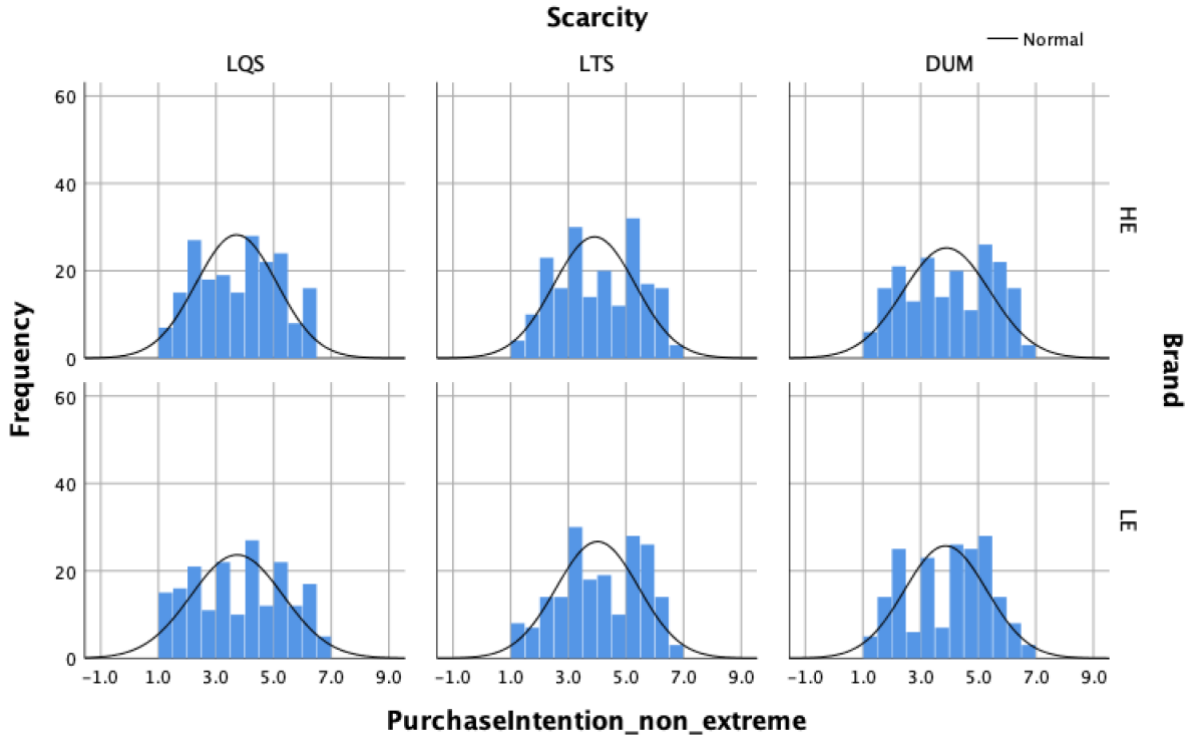

Figure 10. Histograms of Purchase Intention (non_extreme) on factor interactions

The box-plot in Figure 11 compares the distribution of all the dependent variables, where *Purchase Intention* is displayed including outliers as comparison.

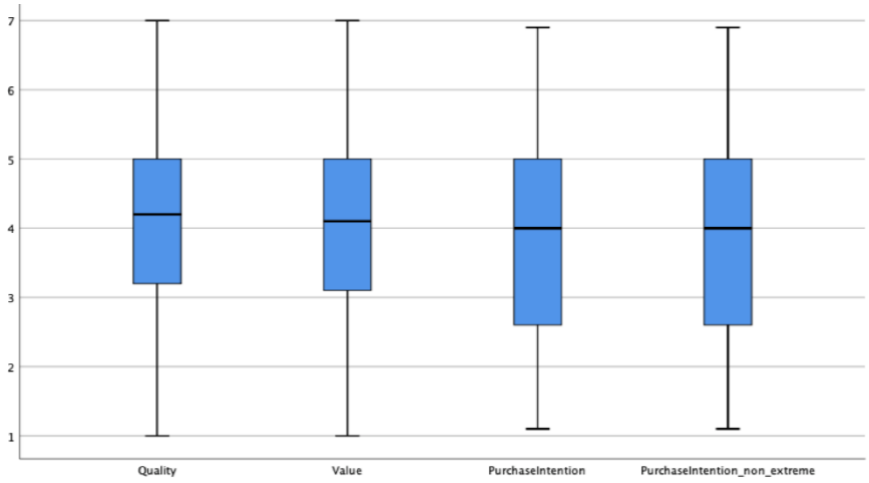

Figure 11. Boxplot of dependent variable distribution.

Overall, the exclusion of outliers in *Purchase Intention* leads to a lower standard deviation and a better visual interpretation of normality. With this in mind, we now proceed to the statistical test for normality in the distributions of our dependent variables, *Quality*, *Value*, and *PurchaseIntention (non_extreme)*.

Normal distribution – Statistics.

We statistically tested the normality for each of the dependent variables. The results from Shapiro-Wilk tests of normality are summarized in Table 3. We find that all are significant, why we have to look at the distribution of their residuals in the linear mixed effects model analysis in order to determine normality.

	Shapiro-Wilk		
Dependent Variable	Statistic	df	Sig.
Quality	.977	1320	.000
Value	.977	1320	.000
Purchase Intention	.958	1320	.000
Purchase Intention (non_extreme)*	.965	1152	.000

*: This dependent variable has been adjusted for outliers to fit the normality assumption.

Table 3. Test of Normality

All dependent variables turned out significant, i.e. they are not normally distributed. However, as each dependent variable is measured across 72 different stimuli (six factor interactions across 12 products), we expect there to be normal distributions of the dependent variables within each stimulus, but not necessarily across all stimuli. We enhance the test of normality by testing the dependent variables in each of the 72 different stimuli combinations (see Appendices E – G). Here we find that out of the 72 stimulus distributions, only 12 were significant for quality and there were only 8 significant for value. With 60 distributions being normally distributed for quality and 64 for value, we see these dependent variables as robust enough for further analysis. For purchase intention (non_extreme), we observed only three of the 72 cases as significant, down from 10 significant cases in the original purchase intention dependent variable that included outliers (see Appendices G – H). This serves as an important indication of how the removal of outliers has made the dependent variable more normally distributed and robust for analysis.

Although the Shapiro-Wilk test of normality found the overall dependent variables to be non-normally distributed, we find the histogram bell curves to indicate near-normality in the observations. As our statistical tests of normal distribution at the brand*scarcity*product level for each dependent variable indicates normality assumption being satisfactory, we move on to the Linear Mixed Model procedure to control for normality in the residuals before proceeding to test our hypotheses.

5.2.Linear Mixed Effects Model

For each of the three dependent variables, we ran a within-subject, multilevel mixed model with random effects and repeated measures, where both of our independent variables served as fixed effect factors.

The within-subject, fixed effect consists of our two factors *Brand* and *Scarcity* as well as the interaction between them, i.e. *Brand * Scarcity*. We have specified *SubjectID* as random effect with an identity structure that is independent across subjects. Furthermore, we have set *Product* as repeated effect with a first-order factor analytic covariance structure (FA1), which is applied independently to all 110 subjects. Type III Tests of Fixed effects are shown in tables 4 – 6 and the estimated marginal means per dependent variable are presented in figures 12-14.

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Brand	1	590.927	187.630	.000
Scarcity	2	764.181	.653	.521
Brand * Scarcity	2	769.533	3.086	.046

a. Dependent Variable: Quality.

Table 4. Type III Tests for Quality

Univariate Tests[a]

Numerator df	Denominator df	F	Sig.
2	764.170	.653	.521

The F tests the effect of Scarcity. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: Quality.

Table 7. Univariate test for Quality

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Brand	1	621.570	169.870	.000
Scarcity	2	796.099	1.016	.362
Brand * Scarcity	2	835.360	2.722	.066

a. Dependent Variable: Value.

Table 5. Type III Tests for Value

Univariate Tests[a]

Numerator df	Denominator df	F	Sig.
2	796.103	1.016	.362

The F tests the effect of Scarcity. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: Value.

Table 8. Univariate test for Value

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Brand	1	516.194	.000	.991
Scarcity	2	937.052	3.543	.029
Brand * Scarcity	2	648.995	.193	.824

a. Dependent Variable: PurchaseIntention_non_extreme.

Table 6. Type III Tests for PurchaseIntention_non_extreme

Univariate Tests[a]

Numerator df	Denominator df	F	Sig.
2	937.071	3.543	.029

The F tests the effect of Scarcity. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: PurchaseIntention_non_extreme.

Table 9. Univariate test for PurchaseIntention_non_extreme

Pairwise Comparisons[a]

(I) Scarcity	(J) Scarcity	Mean Difference (I-J)	Std. Error	df	Sig.[c]	95% Confidence Interval for Difference[c] Lower Bound	Upper Bound
LQS	LTS	-.239*	.092	933.060	.029	-.461	-.018
	DUM	-.168	.093	944.145	.216	-.391	.056
LTS	LQS	.239*	.092	933.060	.029	.018	.461
	DUM	.072	.093	933.829	1.000	-.152	.295
DUM	LQS	.168	.093	944.145	.216	-.056	.391
	LTS	-.072	.093	933.829	1.000	-.295	.152

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Dependent Variable: PurchaseIntention_non_extreme.

c. Adjustment for multiple comparisons: Bonferroni.

Table 10. Scarcity Pairwise Comparisons for PI_non_extreme

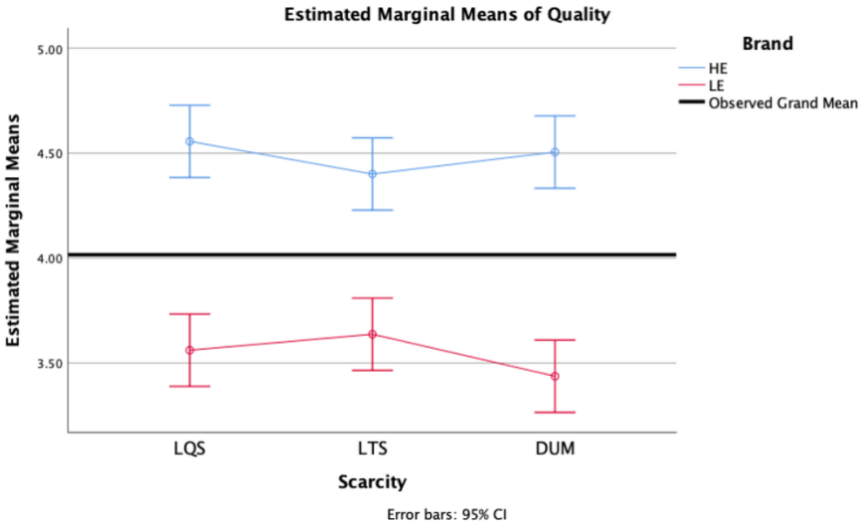

Figure 12. Estimated Marginal Means of Quality

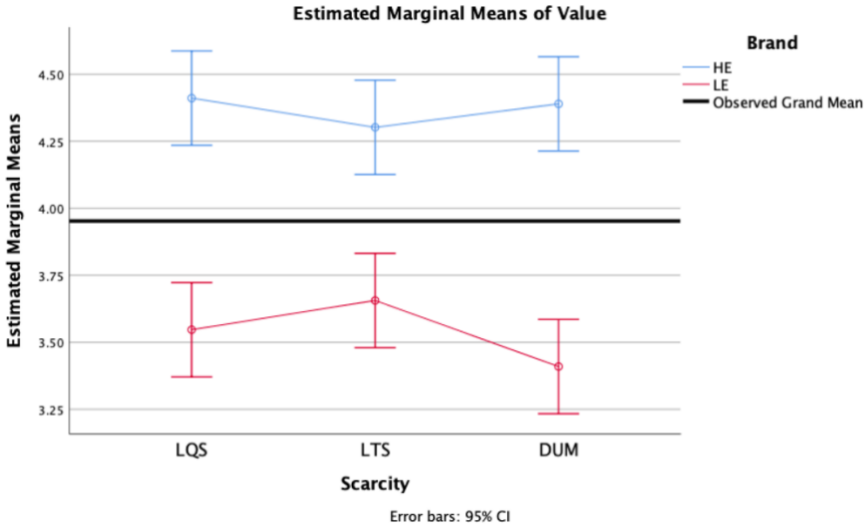

Figure 13. Estimated Marginal Means of Value

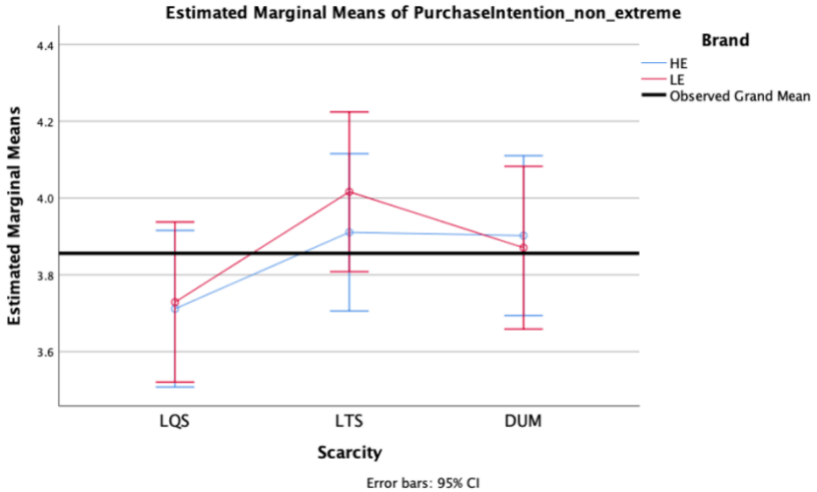

Figure 14. Estimated Marginal Means of PurchaseIntention_non_extreme

Normality in residuals of dependent variables

We find normality in the distribution of residuals, which makes the model quite robust to minor violations (see figures 15-18). The reduction of standard deviation in PurchaseIntention_non_extreme from excluding outliers also indicates a more central distribution of the dependent variable (see figure 18). With normality determined for the three dependent variables, we can proceed to our hypothesis testing.

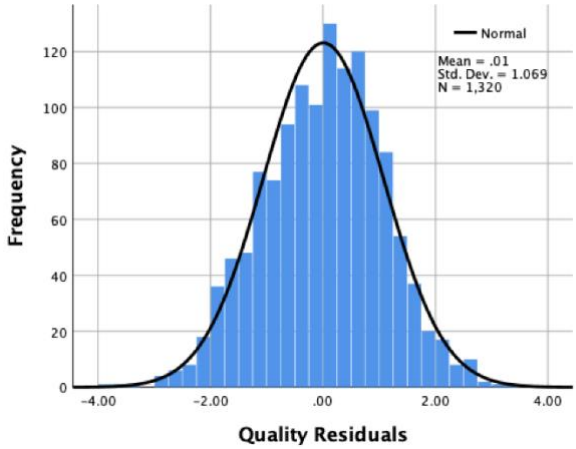

Figure 15. Quality Residuals with normal distribution curve

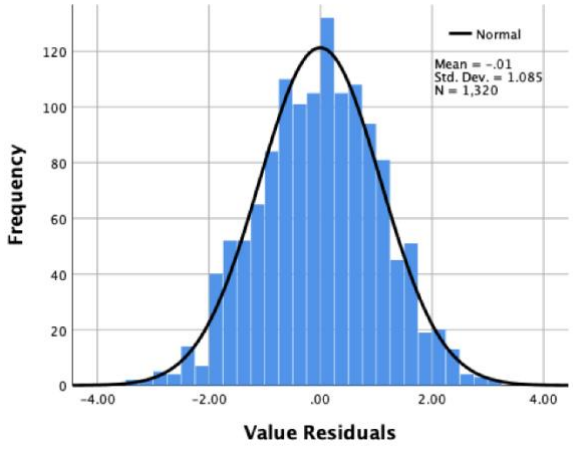

Figure 16. Value Residuals with normal distribution curve

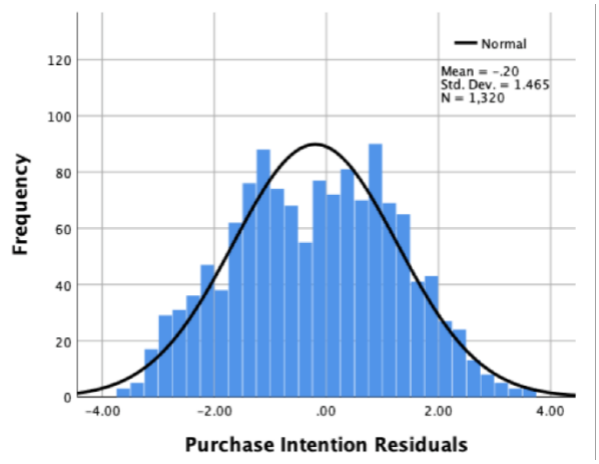

Figure 17. Purchase Intention Residuals with normal distribution curve

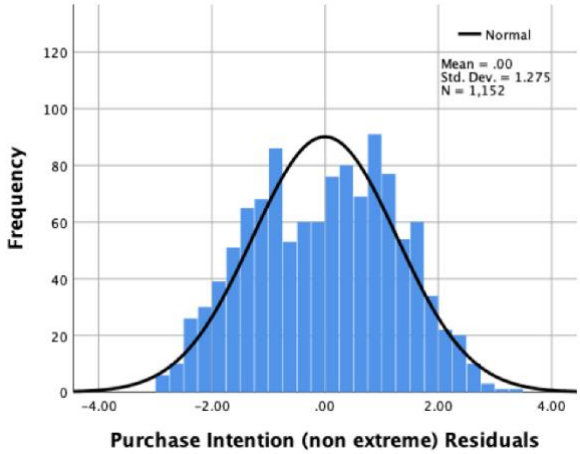

Figure 18. Purchase Intention (non extreme) Residuals with normal distribution curve

Test of Hypothesis 3 – Brand

The Brand affects the subject's overall product evaluation irrespective of Scarcity Message.

The main effect of brand on quality was significant ($F(1, 590.927) = 187.630$, $p < .0005$) such that a product with high-end branding was rated .891 higher than one with low-end branding (see Table 4).

The main effect of brand on value was significant ($F(1, 621.570) = 169.870$, $p < .0005$) such that a product with high-end branding was rated .845 higher than one with low-end branding (see Table 5).

However, the main effect of brand on purchase intention was not significant ($F(1, 516.194) = .000$, $p = .991$) and the difference between means of high-end branding and low-end branding is almost none (.001) (see Table 6).

The main effects of brand on quality and value provides statistical significance for the suggestion that a product of a high-end brand is perceived to have a higher quality (.891) and value (.845), which partially supports our H3.

Test of Hypothesis 1 and 2 – Scarcity

H1: Scarcity messages have an effect on the overall product evaluation irrespective of the Brand

H2: A Scarcity message indicating Limited Quantity has a significantly greater effect on the overall product evaluation than a scarcity message indicating Limited Time has, irrespective of the Brand.

The main effect of scarcity on quality was not significant ($F(2, 764.170) = .653$, $p = .521$) (see table 7).

The main effect of scarcity on value was not significant ($F(2, 796.099) = 1.016$, $p = .362$) (see table 8).

However, the main effect of scarcity on purchase intention was significant ($F(2, 937.071) = 3.543$, $p = .029$) (see table 9) such that a product with a limited time message ($M = 3.942$) was rated

significantly higher than a product with a limited quantity message (M = 3.703) at the difference of .239 (see table 10). Interestingly enough, the mean of a product with the dummy message (M = 3.871) lies between the means of these two scarcity messages, although its mean differences were not significant from the two 'limited' messages (see table 10).

In H2 it was proposed, that a limited quantity message would be more effective than a limited time message on product evaluation, irrespective of brand. Since there were no significant main effects of scarcity on quality and value, our findings cannot support this hypothesis. The only significant simple main effect of scarcity on purchase intention, was that a limited time message was more effective than a limited quantity message. As this is the exact opposite of our H2, this finding does not support our H2 either. Therefore, we have to reject the H2 and accept the null hypothesis.

In H1 it was proposed that scarcity messages have a main effect on the product evaluation, irrespective of brand. Since there was no significant main effect of scarcity message on quality or value, we do not find support for H1 on these dependent variables. While there is some support from the significant main effect of scarcity message on purchase intention, the simple main effect is the opposite of what we expected in H2, and we do not find this effect sufficient to accept the H1 as it is stated. We therefore reject the H1 and accept the null hypothesis instead.

In the testing of both H1 and H2, the brand is entirely disregarded. From H3 we know that brand has a significant main effect on product evaluation. In the following two hypotheses, we take a closer look at both brand and scarcity to test how the interaction between them affects product evaluation.

Univariate Tests[a]

Brand	Numerator df	Denominator df	F	Sig.
HE	2	1128.708	1.626	.197
LE	2	1111.790	2.044	.130

Each F tests the simple effects of Scarcity within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: Quality.

Table 11. Univariate Tests of Brand*Scarcity for Quality

Univariate Tests[a]

Brand	Numerator df	Denominator df	F	Sig.
HE	2	1086.667	.441	.643
LE	2	1097.720	3.255	.039

Each F tests the simple effects of Scarcity within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: Value.

Table 12. Univariate Tests of Brand*Scarcity for Value

Univariate Tests[a]

Brand	Numerator df	Denominator df	F	Sig.
HE	2	851.972	1.425	.241
LE	2	866.470	2.206	.111

Each F tests the simple effects of Scarcity within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.[a]

a. Dependent Variable: PurchaseIntention_non_extreme.

Table 13. Univariate Tests of Brand*Scarcity for PurchaseIntention_non_extreme

Pairwise Comparisons[a]

Brand	(I) Scarcity	(J) Scarcity	Mean Difference (I–J)	Std. Error	df	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
HE	LQS	LTS	.179	.104	1111.366	.258	-.071	.430
		DUM	.048	.109	1032.217	1.000	-.213	.310
	LTS	LQS	-.179	.104	1111.366	.258	-.430	.071
		DUM	-.131	.104	1164.310	.619	-.381	.118
	DUM	LQS	-.048	.109	1032.217	1.000	-.310	.213
		LTS	.131	.104	1164.310	.619	-.118	.381
LE	LQS	LTS	-.093	.104	1162.201	1.000	-.342	.156
		DUM	.118	.108	1018.416	.835	-.142	.378
	LTS	LQS	.093	.104	1162.201	1.000	-.156	.342
		DUM	.211	.104	1133.446	.130	-.039	.461
	DUM	LQS	-.118	.108	1018.416	.835	-.378	.142
		LTS	-.211	.104	1133.446	.130	-.461	.039

Based on estimated marginal means

a. Dependent Variable: Quality.

b. Adjustment for multiple comparisons: Bonferroni.

Table 14. Pairwise Comparisons of Brand*Scarcity for Quality

Pairwise Comparisons[a]

Brand	(I) Scarcity	(J) Scarcity	Mean Difference (I–J)	Std. Error	df	Sig.[c]	95% Confidence Interval for Difference[c] Lower Bound	Upper Bound
HE	LQS	LTS	.094	.106	1093.334	1.000	-.161	.348
		DUM	.020	.109	1001.252	1.000	-.241	.281
	LTS	LQS	-.094	.106	1093.334	1.000	-.348	.161
		DUM	-.074	.105	1130.395	1.000	-.326	.179
	DUM	LQS	-.020	.109	1001.252	1.000	-.281	.241
		LTS	.074	.105	1130.395	1.000	-.179	.326
LE	LQS	LTS	-.125	.105	1129.458	.705	-.378	.127
		DUM	.145	.109	1005.688	.553	-.117	.406
	LTS	LQS	.125	.105	1129.458	.705	-.127	.378
		DUM	.270*	.106	1114.126	.033	.016	.524
	DUM	LQS	-.145	.109	1005.688	.553	-.406	.117
		LTS	-.270*	.106	1114.126	.033	-.524	-.016

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Dependent Variable: Value.

c. Adjustment for multiple comparisons: Bonferroni.

Table 15. Pairwise Comparisons of Brand*Scarcity for Quality

Pairwise Comparisons[a]

Brand	(I) Scarcity	(J) Scarcity	Mean Difference (I–J)	Std. Error	df	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
HE	LQS	LTS	-.199	.131	897.120	.385	-.513	.115
		DUM	-.185	.133	713.489	.495	-.504	.134
	LTS	LQS	.199	.131	897.120	.385	-.115	.513
		DUM	.014	.132	908.487	1.000	-.303	.331
	DUM	LQS	.185	.133	713.489	.495	-.134	.504
		LTS	-.014	.132	908.487	1.000	-.331	.303
LE	LQS	LTS	-.280	.133	903.245	.108	-.599	.040
		DUM	-.151	.135	737.961	.796	-.475	.174
	LTS	LQS	.280	.133	903.245	.108	-.040	.599
		DUM	.129	.134	896.931	1.000	-.193	.452
	DUM	LQS	.151	.135	737.961	.796	-.174	.475
		LTS	-.129	.134	896.931	1.000	-.452	.193

Based on estimated marginal means

a. Dependent Variable: PurchaseIntention_non_extreme.

b. Adjustment for multiple comparisons: Bonferroni.

Table 16. Pairwise Comparisons of Brand*Scarcity for Quality

Test of Hypothesis 4 and 5 – Brand * Scarcity interaction

H4: When compared to the control message, the effect Scarcity messages have on the overall product evaluation is significantly greater when coupled with a high-end Brand, than when coupled with a low-end Brand.

H5: Scarcity message of Limited Quantity is more effective than Limited Time at affecting the overall product evaluation in each level of Brand.

Quality

The type III tests of fixed effects found there to be a significant interaction between brand and scarcity message on quality ($F(2, 769.533) = 3.086$, $p = .046$) (see table 4).

For a product with high-end branding, the scarcity messages had no effect on quality ($F(2, 1128.708) = 1.626$, $p = .197$) (see table 11).

For a product with low-end branding, the scarcity messages had no effect on quality ($F(2, 1111.790) = 2.044$, $p = .130$) (see table 11). Although, within low-end brands, the results suggest a trend in difference between scarcity messages, as limited time scarcity ($M = 3.67$) could lead to a higher rating of quality than the dummy message does ($M = 3.46$), but this difference of .211 was not significant at alpha = .05 ($p = .130$) (see table 14).

Value

The type III tests of fixed effects found there to be a trend in the interaction between brand and scarcity message on value ($F(2, 835.360) = 2.722$, $p = .066$), although this was not significant (see table 5).

For a product with high-end branding, the scarcity messages had no effect on value ($F(2, 1086.667) = .441$, $p = .643$) (see table 12).

For a product with low-end branding, the scarcity messages had a significant effect on value ($F(2, 1097.720) = 3.255$, $p = .039$) (see table 12) such that a product with a limited time message ($M = 3.668$) was rated significantly higher on value than a product with a dummy message ($M = 3.398$) at a difference of .270 ($p = .033$) (see table 15). Within low-end branding, there were no other

significant effects between scarcity message levels on value, i.e. limited quantity message versus dummy message (p = .553), nor limited quantity message versus limited time message (p = .705).

Purchase Intention

The type III tests of fixed effects found no interaction between brand and scarcity message on purchase intention (F(2, 648.995) = .193, p = .824) (see table 6).

For a product with high-end branding, the scarcity messages had no effect on purchase intention (F(2, 851.972) = 1.425, p = .241) (see table 13).

For a product with low-end branding, the scarcity messages had no effect on purchase intention (F(2, 866.470) = 2.206, p = .111) (see table 13). Although, within low-end brands, the results suggest a trend in difference between scarcity messages, as limited time scarcity (M = 3.974) could lead to a higher rating of purchase intention than the limited quantity scarcity message does (M = 3.695), but this mean difference of .280 was not significant at alpha = .05 (p = .108) (see table 16).

Test conclusion for Hypothesis 4

In H4 it was proposed that scarcity messages would be more effective in high-end branding than in low-end branding. With the rejection of H1 we established that scarcity messages do not have an effect on overall product evaluation. Building on this, there are not many findings to compare across the high-end and low-end levels of brand in H4 either. Within high-end branding, there are no effects of scarcity messages to be found whatsoever, which does not support our H4. Within low-end brands however, we observe that scarcity messages have trends on two dependent variables and have a significant effect on a third dependent variable. Both of the trends are found in the scarcity message level of limited time, where this trended higher than dummy messages on quality, and trended higher than limited quantity on purchase intention.

The only significant interaction effect is found between low-end branding and the scarcity message's effect on value (F(2, 1097.720) = 3.255, p = .039), where limited time scarcity leads to a higher rating of value by .270 when compared to the dummy message. As there were no significant effects in high-end branding, and the significant effect along with the two trends on limited time scarcity in low-end branding do not support our H4, we have to reject the hypothesis

and accept the null hypothesis instead. Nevertheless, the findings in low-end branding still indicate that limited time scarcity is worth keeping an eye on.

Test conclusion for Hypothesis 5

In H5 it was proposed that a scarcity message of limited quantity should be more effective at increasing product evaluation than a scarcity of limited time. All comparisons of limited quantity and other scarcity message levels are presented in table 17. There was found no significance for the difference between limited quantity and limited time, nor between limited quantity and dummy message, on any of the three dependent variables. The interaction that is closest to being significant is in the low-end brand, where a limited quantity message trended towards a lower purchase intention than a limited time message ($F(2, 866.470) = 2.206$, $p = .111$), where the difference would be -0.280. As we do not find any support for H5, and the aforementioned trend actually contradicts the hypothesis' proposal, we have to reject H5 and accept the null hypothesis instead. That is, the limited quantity message is not significantly greater than the limited time message, or dummy message, at effecting product evaluation for a product in each level of brand.

Dependent Variable	Brand	(I) Scarcity	(J) Scarcity	Mean Difference (I-J)	Sig.[b]
Quality	High-end	LQS	LTS	.179	.258
			DUM	.048	1.000
	Low-end	LQS	LTS	-.093	1.000
			DUM	.118	.835
Value	High-end	LQS	LTS	.094	1.000
			DUM	.020	1.000
	Low-end	LQS	LTS	.105	.705
			DUM	.109	.553
PurchaseIntention_non_extreme	High-end	LQS	LTS	-.199	.385
			DUM	-.185	.495
	Low-end	LQS	LTS	-.280	.108
			DUM	-.151	.796

Based on estimated marginal means

[b] Adjustments for multiple comparisons: Bonferroni

Table 17. Pairwise Comparisons for Scarcity levels across brand levels for each dependent variable.

6. Discussion & Conclusion

The objective of our study was to contribute to the field of knowledge on scarcity messages and their effectiveness across different settings and product groups. We believe it is relevant, as this form of advertisement is quite widespread and has the potential to be incredibly effective, as it can influence consumers' product evaluation and purchasing behavior on a subconscious level.

The research question we aimed to answer with this study was:

To what extent do scarcity messages have an effect on consumer product evaluation (expressed through perceived quality, value and purchase intention) in an online shopping setting, and is this effect impacted by an associated brand?

In this section of the paper we discuss the previously presented results and some of their possible explanations, contrast them with the hypotheses that we sought to verify and the findings of existing literature and review some limitations that might have emerged from our specific research design that we had not accounted for previously. We list the ways in which we think our conclusions contribute to the existing body of research and what implications they might have for practitioners in real life situations. Finally, we suggest possible avenues for further research that could enhance our understanding of both the causes and the consequences of the differentiating effects different settings or groups of products have on the effectiveness of scarcity messages.

6.1. Results

Throughout the process of testing our hypothesis, we have observed several tendencies and phenomena that we consider to be of potential value. First of all, we have found that while the dependent variables of perceived quality and value behaved very similarly to each other across different conditions, the dependent variable of purchase intention did not follow the same tendencies. For that reason, we will discuss general product evaluation (expressed through perceived quality and value) and purchase intention separately.

For the two dependent variables of perceived quality and perceived value, we can confidently confirm the H3 on differential effect of brand on product evaluation between high-end and low-end brands, regardless of the presence of a scarcity appeal or lack thereof; the perceived quality and value were significantly higher for products presented with the high-end brand logo than for those with a low-end brand logo (see Figure #Results.1 - #Results.2). However, we did not find any significant simple main effect between the presence of scarcity messages and the overall

product evaluation and as such had to reject H1, which indicates that in general the effect of brand on product evaluation is quite prominent on its own. Consequently, we were not able to test H2 that stipulated that the differentiating effect of scarcity messages would be greater for LQS than for LTS, since no significant effect was found when disregarding brand.

Meanwhile, through our type III tests we did find a significant main effect for perceived value, and strong trending main effect for perceived quality for our H4 that referred to the effect the brand has on the relationship between scarcity appeals and overall product evaluation. In terms of simple main effects of the interaction, that quality and value respectively found a strong trend for and significance for, was that limited time scarcity messages led to a higher evaluation rating than the dummy message in case of the low-end brand. No significant effect was, however, found in the case of the high-end brand, why we have to reject the hypothesis statement that a high-end scarcity effect would be more pronounced than a low-end scarcity effect.

Curiously, this effect for low-end brand was the exact opposite to what we have predicted in our H5; that quantity-based scarcity would be significantly more effective for each of the two brands. As such, even though we did have to reject H5 with no significant effect for high-end brand, and inverse from expected effect for low-end brand, this finding poses some interesting implications.

We had hypothesized that limited quantity scarcity should be more effective than limited time scarcity, as our initial focus was on essential products that consumers already would be interested in. However, our results showing the opposite might be of significance in the light of findings presented by Jang and colleagues (2015), who argued that for non-conspicuous products, limited time scarcity might be more effective since the factor of exclusivity, that limited quantity benefits from the most, does not apply to them.

In fact, applying limited quantity scarcity to non-conspicuous products might, in their opinion, even have a detrimental effect on the product evaluation, with consumers feeling that the easily replaceable non-conspicuous product is not worth the extra effort it would require from them to obtain it before it sells out and resulting in frustration that their ability to purchase it is being limited (Jang et al., 2015). In contrast, limited time offers do not impose such restrictions and as such the consumer runs no risk of wasting their resources as long as they make a purchase within the prescribed time frame.

This leads to an interesting interpretation of purchase intention. Even though the brand did not have a main effect on this dependent variable, scarcity message had a significant main effect on purchase intention. We rejected the H2, because the hypothesis stated that a product with a limited quantity message would be rated higher than product with limited time message. The significant simple main effect of scarcity message on purchase intention instead showed that it was the limited time message that led to a higher rating rather than limited quantity.

In addition, we found it rather curious that the variable of purchase intention behaved differently in relation to the independent variables than perceived quality and value of a product. We speculate that this might have been due to the difference in perceived nature of these assessments; estimation of quality and value, although based on one's own idea of what "average" for similar products would be, could be seen as representing a more objective or normative evaluation. Meanwhile purchase intention, i.e. how likely one would be to buy a product for oneself, referred specifically to one's own tastes and preferences, making it a purely subjective assessment.

Therefore, the results on all our dependent variables suggest that there is a trending, and even significant, effect of limited time scarcity on product evaluation – especially in case of the low-end brand. As presented in the analysis section, we have plotted the estimated marginal means showing each of the six brand*scarcity factor interactions with 95% confidence intervals, where there is a separate figure for each dependent variable (see Figures 12 - 14). From these figures, we gather a graphical representation of how the limited time scarcity (LTS) takes departure from the dummy message (DUM). As the significant effects were primarily found in the low-end brand, we shall focus primarily on this level of brand (marked with red in the figures). That being said, it is still interesting to note how, when comparing high-end to low-end, there seems to be an inverse effect on the relationship between LTS and DUM depending on brand level, i.e. LTS seem to move towards the observed grand mean, so pulling down in HE and increasing in LE.

Building on the findings by Aggarwal et al. (2011), we had an expectation that LQS would be more effective than LTS and this would especially be prominent for a high-end branded product. What we had not considered formulating as a hypothesis, is how the converse effect for the opposite situation may also be true, i.e. LTS would be more effective than LQS in a *low-end* branded product. Our findings show a graphically clear and statistically significant effect between the effectiveness of LTS messages coupled with low-end branded products, when compared to LQS or the dummy message.

6.2.Considerations

Significance of results - Type I error from removing outliers?

To ensure that through the exclusion of outliers in the dependent variable Purchase intention we did not create Type I errors in our findings, we also conducted the linear mixed effects model analysis to this variable. We found that there were no additional significant effects to be gathered from excluding the outliers (see appendix D), which strengthens the validity of our findings.

Significance of results - Bonferroni

Our findings could have been more conclusive if we chose a different adjustment for multiple comparisons than the Bonferroni adjustment. As Bonferroni is quite strict, it is likely that several of our trending results would have been significant under a different adjustment for multiple comparisons. Instead, by having employed the Bonferroni adjustment, we can be more certain that our significant results are indeed true and not Type I errors (false positive) from the many repeated comparisons.

6.3.Limitations

Study versus a real-life online shopping situation

We are aware that our employed research design does not exactly replicate a real-life webshop purchasing situation, where one would expect an interactive website with numerous products to choose between during the evaluation process, and the option to complete a purchase. Therefore, the findings based on our research design that uses a webshop layout, but only shows one selected product at a time, has its limitations to real-life applicability. Furthermore, in a situation where customers make use of actual shopping websites with the intention of making a purchase, the influence of encountered stimuli such as scarcity appeals, or brand logos might differ from that reported in a hypothetical situation where no actual money is at stake.

That being said, we believe that the limiting factor of having a non-interactive stimulus layout is counterbalanced by the possibility for participants to take part in the study in the same way they would be shopping online, i.e. on their own computer in their own house. In addition, by ensuring a uniform set of stimuli that all study participants are exposed to, we limit the number of factors that might influence their decisions and that we cannot control for, creating a set of results that are more comparable and thus can be used for drawing general conclusions.

Exclusion of price tags on the products

Additionally, we did not include price tags on any of the products presented in the study in order to avoid a possible bias resulting from some items being priced more "attractively" than others. As a result, the variable of estimated value had to be expressed in terms of being above or below average that could be considered arbitrary, raising the question of how comparable those estimates would be between our respondents.

However, we feared that including a price tag or expressing the value in monetary units would create a bias towards the displayed price in our responses or skew the results if the price presented was considered unrealistic by the participants. In addition, because we wanted to examine the general tendencies associated with the relationship between product evaluation, brand and scarcity, rather than measure their numerical values, we believe that expressing the value relative to what each participant considered average for comparable products was sufficient to track the general effects of our tested variables.

Brand recognition and association

Although we believe that both *Flying Tiger Copenhagen* and *Magasin* are well known and widely recognized among Danish residents and international students living in Copenhagen, we did not include a post-survey check for study participants that would assess their familiarity with the tested brands. As such, we cannot be fully certain that these brands were in fact recognized and regarded as low-end and high-end respectively. However, the results of the experiment have shown that there was a significant main effect on the perceived quality and value of the products when presented with the logo of one brand rather than the other. That indicates that the participants were indeed familiar enough with both brands to be aware of the differences between them.

Inclusion of estimated sustainability

In addition to asking the participants of our study to indicate the perceived quality and value of all the products they were exposed to, as well as how likely they would be to purchase a given product for themselves, our research design also included the question of its perceived sustainability. Even though the question was meant to serve as a distractor and we did not include the responses in our data analysis, there is a risk that it has influenced the reported purchase intention in a way that we had not expected prior to the study.

As indicated by research in the field of behavioral economics and heuristics, our decision making is often influenced by the information that we have readily at hand. With that in mind, we are aware that asking our respondents to estimate the sustainability of a product might have caused them to become more inclined to account for environmental concerns in their decisions than they would have been if the question was not present. That could have potentially influenced the indicated desirability of the product, especially in case of the low-end brand, if the respondents associated it with less sustainable business practices.

6.4. Contributions to existing literature

Although some of our hypotheses did not find confirmation in the data obtained in the conducted study and the generalizability of the results is subject to certain limitations resulting from the adopted research design, we nevertheless believe that the results of our testing and conclusions thereof provide a valuable contribution to already existing literature on scarcity messages, branding and product evaluation.

First of all, we expand upon the effect of scarcity messages on conspicuous versus non-conspicuous products by introducing a differentiating effect of the brand, in addition to examining the effects of limited time scarcity. As argued by Gierl and Huettl (2010), the effectiveness of a scarcity message depends not only on the message itself, but also on the type of products the message is applied to. Our findings supplement this products-centered argument with the inclusion of brand level, i.e. brand being high-end and symbolic or low-end and functional. While there is an inherent commonality between symbolic brands and conspicuous products for their status value, and between functional brands and non-conspicuous products for their utility, these have not previously been tied together in the light of scarcity message effectiveness.

Furthermore, our findings suggest that coherence between the product and brand is necessary for scarcity messages to be effective. Our results further the research by Gierl and Huettl (2010) by showing that not only demand induced scarcity can be effective for non-conspicuous products, but limited time scarcity can indeed as well. Furthermore, by drawing a link between our low-end, functionally branded products and their non-conspicuous products, we find ample indication that specifically limited time scarcity could be an effective tool for increasing consumer evaluation of non-conspicuous products, as long as the brand is aligned with the product.

Secondly, our findings are in line with what has already been suggested by Jang and colleagues (2015) who argued that LTS messages, rather than LQS messages, would be more effective in case of non-conspicuous products. We have expanded upon those claims by testing for a moderating effect of high-end versus low-end brand on said products, with the results indicating that the time-based scarcity was indeed more effective, however only in case of the low-end, functional brand. Similarly, the quantity-based scarcity has proven least effective, possibly reflecting the fact that customers did not consider non-conspicuous, low-end products to be worth the extra effort it would require to obtain them in time. As previously explained, no significant effect was found for the high-end brand which brings us back to the conclusion that in order to maximize the effectiveness of scarcity message, the type of message should be aligned not only with the type of product itself, but also with the brand.

Finally, although we did not include any measures of trustworthiness of scarcity messages within the study, it might be worthwhile to consider our findings in the light of the argument posed by Mukherjee and Lee (2016). These authors have shown that the effectiveness of scarcity messages was mediated by how truthful they were believed to be. It is possible that attaching a limited-quantity tag to a product offered by a low-end brand that is expected to mass-produce its products might raise doubts with regards to the truthfulness of such a message. It would be in opposition to a customer's expectation towards the brand and would provide an additional explanation for why particularly LQS messages seem to be ineffective for low-end, non-conspicuous products, although further research would be necessary to support this supposition.

6.5.Managerial implications

As indicated by our data, brand and scarcity messages have an effect on product evaluation in terms of perceived quality and value, as well as purchase intention, although between these two factors, the influence of the brand is more pronounced, showing significance regardless of the presence of scarcity message or lack thereof. While that implies the optimal solution would be to develop a high-end, rather than low-end brand, we recognize that is not always a viable strategy. Developing a brand is a long and often costly process, especially for symbolic brands that need to gradually build up trust and reputation among the customer base.

In these situations, we posit that scarcity messages will have a more immediate effect and are less costly to implement, as these can be created and utilized with few resources and in a short amount

of time. The effects of their implementation are also immediately observable in an online shopping setting, as the key point indicators for a webshop's performance are observed in real time. In addition, scarcity messages can be applied to a variety of different settings and products, making them a relevant option to consider regardless of the type of product one wishes to promote.

However, one thing worth keeping in mind, as indicated by both the literature on the subject and the findings of this study, is that not all kinds of scarcity messages will have the same effect across all product types and categories; if one wants to maximize the effectiveness of a scarcity appeal, it is important to match the advertised product and brand with the appropriate type of message. Previous research has shown that quantity-based scarcity is superior when applied to symbolic brands and conspicuous products, as it highlights the exclusivity that they offer to the consumer, while time-based scarcity is significantly less potent, sometimes having the reverse effect: diluting the rarity that the customers look for in symbolic brands.

Meanwhile the opposite has been proven true in case of functional brands and non-conspicuous products; where exclusivity and status play no role, limited quantity scarcity message seems to be less effective than a neutral message and significantly less effective than limited time scarcity message. This goes to show that choosing an appropriate type of message can be very important, not only for the purpose of maximizing its effectiveness, but also for maintaining a coherent brand image. Conversely, choosing a "wrong" message might in fact impair the brand reputation in the eyes of consumers.

Conclusion for managerial implications

We argue that Scarcity messages, when implemented under the right conditions, are able to generate a larger return on investment because of the low cost and immediate results. This is further important for companies that already have established products and services, as a rebranding would require an entire overhaul of the corporate identity and in most cases require the company to get rid of existing product stock in order to sever its ties to the past identity. However, we stress the need to match the existing brand and product image with a suitable scarcity message in order to avoid reverse effects and dilution of brand image in the long run.

6.6.Further research

Although this study has provided insights into some of the mechanisms guiding the relationship between brand, product type, scarcity messages and product evaluation, we believe there are still many avenues for further research that could assist in furthering our understanding of the causes and consequences of that relationship, as well as possible influence of other factors.

While Likert scale measurements from self-reports may provide an indication of consumers' inner worlds and intentions, this type of measurement very often does not reflect the whole of actual emotions and instinctive reactions that occur within the mind of the individual making a purchasing decision. In order to better understand the effect of scarcity manipulations on the implicit processes guiding our choices, we suggest future research designs employ observational methods that are capable of reliably and accurately measuring the physiological changes that occur in the body and mind of the individual in response to stimuli such as scarcity messages. Neuroscientific methods with biometrics, e.g. mapping blood oxygen levels or electrical activity in the brain, can help elaborate on how we as humans subconsciously react to manipulations that we all face in everyday life. Studies utilizing tools of eye-tracking and brain scanning respectively allow for measurements of visual attention and emotional responses, which self-reported data cannot cover. Technologies such as EEG or fMRI could provide useful insights into levels of arousal and its valence, as well as their effects on the choices made, as depicted in the “circumplex model” (Posner, Russell, & Peterson, 2005). Such metrics are rich in data and can aid in modelling cognitive processes, which is quite useful in relating said processes to the associated behavioral outcomes, i.e. ‘emotional desire’ or ‘approach behavior’.

Another area of research that could further our findings is the inclusion of hedonic vs. utilitarian consumption in a research design like ours. Although there are certainly managerial benefits to be drawn from understanding the connection between the products sold and their associated branding, the effectiveness of scarcity messages could be further increased through gaining a better understanding of the consumer and the motivations that drive their purchase decisions. By shifting the focus from the seller (brand concept and product conspicuousness) to the buyer (consumer purchasing motivation), the concepts of hedonic vs. utilitarian consumption and their underlying motivations could further contribute to the understanding of mechanisms that drive the purchase and display of symbolic branded conspicuous products and the social signaling value or sense of satisfaction that it brings about, as opposed to the acquisition of functionally branded, non-

conspicuous products. Being able to more accurately understand the motivations and expectations customers have towards certain brands and products could in turn allow for a marketing approach that better matched those expectations by increasing the coherence between the brand and the product.

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See Appendices A-H for further references.