

Consumers' Perceptions of Different Scarcity Cues on E-commerce Websites

Short Paper

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Abstract

Many companies deploy scarcity cues, such as limited-time scarcity or limited-quantity scarcity cues, on their e-commerce websites to stimulate consumers' purchase decisions. Despite increasing practical relevance, research has not yet investigated how consumers perceive scarcity cues and how these perceptions differ between limited-time and limited-quantity cues. Moreover, interaction effects with product characteristics, such as product attractiveness, have not been considered in prior studies. This paper proposes a novel research model that allows investigating the perception of informativeness, credibility, entertainment, and irritation of scarcity cues. We intend to test our research model using an experimental study. Based on the insights gained, we expect our research to offer guidance for companies to effectively use and design such cues.

Keywords: Scarcity cues, limited time, limited quantity, product attractiveness, electronic commerce

Introduction

Given the evermore competitive online environment, companies employ various persuasion strategies in order to keep consumers on their commercial websites and stimulate them to complete transactions. One prominent and frequently applied persuasion strategy is the deployment of so-called *scarcity cues* (Gierl and Huettl 2010; Jang et al. 2015). In general, scarcity cues refer to displayed information on the limited availability of a product (Aggarwal et al. 2011; Gierl et al. 2008). The effectiveness of scarcity cues is based on the principle that people typically associate an object that is scarce with a higher value than an object that is abundant (Gierl and Huettl 2010). By deploying purchase pressure cues related to scarcity on their websites (e.g., by offering products for a limited time frame only), companies also take advantage of human's loss aversion (Kahneman and Tversky 2013) and anticipated regret of not buying (Coulter and Roggeveen 2012). Consequently, scarcity cues are considered to play a significant role in the consumers' decision-making on e-commerce websites (Eisenbeiss et al. 2015).

Two types of scarcity cues are commonly employed in practice: limited-time scarcity (LTS) and limited-quantity scarcity (LQS) cues (Aggarwal et al. 2011; Jang et al. 2015). In the case of LTS cues, a product offer is made available for a predefined time after which the offer becomes unavailable. In the case of LQS cues, consumers are informed that only a limited number of products are left for purchase. While both types of scarcity cues are used on many e-commerce websites, it is interesting that there is still a lack of knowledge about the effects of these cues in online settings (Amirpur and Benlian 2015). In case of low stock inventory, companies for instance need to know about potential effects of scarcity cues, to decide whether to display such cues or hide them. So far, existing studies have mainly focused on investigating either LTS or LQS cues on its own (Chang and Chen 2015; Eisenbeiss et al. 2015; Godinho et al. 2016; Jeong and Kwon 2012; Mou and Shin 2018), and only few works have compared these cues (e.g., Amirpur and Benlian 2015). Moreover,

the effects of these cues have mostly been examined from a product and/or outcome-oriented perspective, such as how these cues affect the consumers' product quality perception or purchase intention (Amirpur and Benlian 2015; Coulter and Roggeveen 2012; Gierl et al. 2008; Jang et al. 2015). However, the causal pathways through which these effects are generated have not yet been investigated systematically. In particular, it has not been examined how consumers perceive LTS and LQS cues on e-commerce websites and how these perceptions differ between both types of cues. Investigating the differential effects of these cues is important because it aids researchers and practitioners in developing an understanding why some cues might be more effective in a certain situation than others. Considering the lack of empirical evidence about the differential effects of LTS and LQS cues on consumers' perceptions, the paper addresses the research question: (1) *How do consumers perceive LTS cues in comparison to LQS cues on an e-commerce website?* For instance, do consumers perceive LTS or LQS cues as more credible?

In addition, prior research suggests that differences in product characteristics are highly relevant when studying the effectiveness of scarcity cues (Amirpur and Benlian 2015; Jeong and Kwon 2012). Given that the product portfolio of many companies consists of several more or less attractive products (King et al. 2016), it is of particular interest for these companies to understand how the consumers' cue perceptions might vary when LTS or LQS cues are placed on attractive or less attractive products. Attractiveness is especially interesting because "incongruity between the value inferred from scarcity cue and the worth derived from product message" (Shen 2011, p. 20) may lead to cognitive dissonance and differences in how the scarcity cues are perceived. Yet, no rigorous empirical evaluation has taken product attractiveness into account. Prior work has only looked at product attractiveness as an outcome variable and/or focused on other product-related characteristics, such as the product type (e.g., experience vs. search goods) or the assortment size (e.g., large vs. small assortment) (Gierl and Huettl 2010; Gierl et al. 2008; Godinho et al. 2016; Jang et al. 2015). Consequently, it is currently not clear how the effects of LTS and LQS cues might vary when placed on products with differing attractiveness. Given the lack of knowledge about possible interaction effects, we examine a second research question: (2) *Which role does the level of product attractiveness play in consumers' perceptions of scarcity cues?*

To answer these questions, we first develop a research model and advance hypotheses how consumers perceive different scarcity cues and how product attractiveness affects these perceptions. We plan to test our hypotheses in a controlled experiment, in which participants will use and report on several variants of an e-commerce website, which will differ only with respect to the employed scarcity cues (i.e., LTS or LQS cues) and the products on which these cues are placed (i.e., products with high or low attractiveness).

Theoretical Background

From a theoretical standpoint, scarcity cues on e-commerce websites can be viewed as stimuli which may trigger a desired response in the consumer, such as a high purchase intention (Aggarwal et al. 2011; Amirpur and Benlian 2015). To examine the effects of scarcity cues systematically, we adopt the stimulus-organism-response (S-O-R) model as a foundational structure for our research model (Mehrabian and Russell 1974). Rooted in the field of behavioral psychology, the S-O-R model suggests that certain signals in the environment (stimuli) can directly affect the cognitive and affective states of an individual (organism), and thereby influence the individual's behaviors (response). With respect to scarcity cues, Chang and Chen (2015), for instance, used the S-O-R model to examine how LTS cues can affect consumers' utilitarian and hedonic motivations and how these motivations can affect impulsive bidding behavior. In addition, Amirpur and Benlian (2015) have built on the S-O-R model to study how LTS and LQS cues influence consumers' purchase decisions through the factors perceived stress and perceived value. Judging from the findings of these studies, the S-O-R model is a well-suited framework for explaining how certain stimuli (in our context different scarcity cues placed on products with varying attractiveness) affect the state of an organism (in our context consumers' cue perceptions) and how these states influence a response (in our context consumers' purchase intention).

Scarcity Cues and Products as Stimuli (S)

To signal the remaining time for a product offer, LTS cues typically consist of textual and/or graphical messages that are designed as countdown timers (e.g., "offer ends in 00h:10m:05s"). Prominent platforms that use LTS cues are Groupon.com (i.e., daily deal website), Ebay.com (i.e., auction website), and Amazon.com (i.e., traditional e-commerce website) (Amirpur and Benlian 2015). LQS cues, in turn,

typically inform consumers that only a limited number of products are available for purchase with textual and/or graphical messages. Prominent message examples of LQS cues are “only 3 left in stock” (Amazon.com), “1 ticket left at this price” (Expedia.com), or “only 4 deals left” (Groupon.com) (Jeong and Kwon 2012). Figure 1 illustrates the use of LTS and LQS cues on popular e-commerce platforms.



Figure 1. Use of Scarcity Cues on Popular E-commerce Platforms

Besides LTS and LQS cues, we consider products (with varying attractiveness) as stimuli in our research model. According to King et al. (2016), product attractiveness can be considered a function of product quality, product pricing, and product customization.

Cognitive and Affective Perceptions as Internal States (O)

To represent the internal cognitive and affective states (of the organism), we draw on a set of perception-related factors that we have derived from literature on web advertising (Gvili and Levy 2016; Kim et al. 2010; Kim and Han 2014). According to the web advertising model developed by Brackett and Carr (2001), which is an extension of the model of Ducoffe (1996), the effectiveness of an online advertisement can be predicted by four different cognitive and affective perceptions. With respect to cognitive perceptions, the web advertising model proposes that the perceived informativeness and perceived credibility are relevant influence variables. Perceived informativeness refers to the extent to which an advertising message includes supportive informational content. Perceived credibility, in turn, characterizes the truthfulness and believability of an advertising message. With respect to affective perceptions, the web advertising model incorporates perceived entertainment and perceived irritation. Perceived entertainment denotes the ability of an advertising message to fulfill the consumers' needs for escapism, diversion, aesthetic enjoyment, or emotional release. Perceived irritation refers to the extent to which an advertising message is annoying, irritating, and confusing for consumers. In this study, we decided to focus on these four cognitive and affective perceptions because they have been found to represent important determinants of the consumers' purchase behavior (Brajnik and Gabrielli 2010; Kim et al. 2010; Kim and Han 2014). Moreover, literature provides initial indications that LTS and LSQ cues might have different effects on these perceptions (Amirpur and Benlian 2015; Jeong and Kwon 2012).

To theorize how scarcity cues are cognitively and affectively perceived, we further draw on the elaboration likelihood model, a prominent dual processing model in consumer decision-making (Samson and Voyer 2012), which gives hints on how scarcity cues might in general affect the organism. A central point of this theory is the elaboration continuum: consumers either process product-relevant information with high cognitive effort at the high end of the continuum, carefully considering arguments or they process information less thoughtfully at the low end, relying on peripheral cues (Petty and Wegener 1999). Scarcity cues embedded in a product choice setting can influence consumers' decision-making by four mechanism, which will be reflected in their conscious perception: “(1) by serving as an argument, (2) by serving as a cue, (3) by determining the extent of elaboration, and (4) by producing a bias in elaboration” (Petty and Wegener

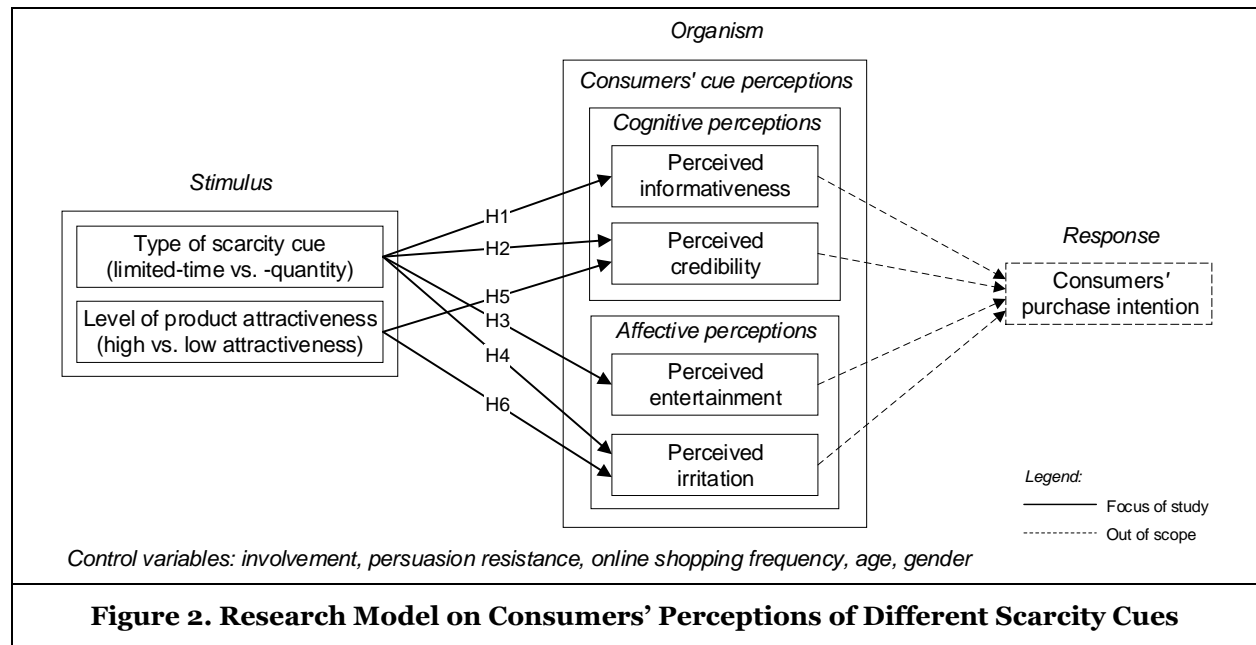
1999, p. 51). If consumers use the information provided by a scarcity cue as an argument (e.g., low stock information as an indicator for high demand), they would therefore likely judge informativeness higher. If LTS cues for instance lead to higher arousal, less attention and lower elaboration (Zhu and Ratner 2015), users might perceive them as irritating.

Consumers' Purchase Intention as a Response (R)

Since the deployment of scarcity cues is driven by the aim to increase sales volumes (Amirpur and Benlian 2015), we consider consumers' purchase intention as the intended response to the stimuli. According to the literature on web advertising, evidence suggests that each of the cognitive and affective perceptions can affect purchase intentions (Brajnik and Gabrielli 2010; Kim et al. 2010; Kim and Han 2014).

Research Model and Hypotheses Development

Building upon the before-mentioned theoretical background, we propose in Figure 2 a research model that suggests that different scarcity cues and levels of product attractiveness on which these cues are placed influence the consumers' cognitive and affective perceptions, and as a consequence, purchase intention. Note that we consider "level of product attractiveness" as an independent variable, which might interact with the effects of LTS and LQS cues. Following advice from literature, we intend to control for individual characteristics, which might have significant effects on the consumers' cue perceptions, namely involvement, persuasion resistance, online shopping frequency, age, and gender (Godinho et al. 2016; Gvili and Levy 2016; Jang et al. 2015; Kim et al. 2010).



Expected Perceptions of LTS and LQS Cues

Following Figure 2, we now discuss anticipated effects of LTS and LQS cues on perceived informativeness, credibility, entertainment, and irritation.

With respect to perceived informativeness, research in the context of web advertising has shown that when advertising messages are both informative and relevant to the target group, consumers are likely to increase their purchasing intentions (Liu et al. 2012). Accordingly, we need to consider how relevant the information of each type of scarcity cue is for the decision-making of consumers on an e-commerce website. The information provided through LTS cues typically sets consumers under a time pressure. Time pressure likely restricts the extent to which individuals process information (Maule et al. 2000). Individuals tend to react to such restrictions by spending less time scanning the information and by filtering part of the available information (Pieters and Warlop 1999). Consequently, restrictions in time can lead consumers to

poor purchase decisions. Considering that the information provided through LTS cues is mainly used to restrict consumers' decision-making, we assume that consumers will associate these cues with a lower level of informativeness. While LTS cues are set by vendors as part of their marketing strategy, LQS cues provide information on low stock (Gierl et al. 2008), which might for instance also reflect external supply bottlenecks outside the control of a vendor. As stock inventory is typically saved in an internal database of a vendor, consumers might appreciate the additional effort of vendors to make such information publicly available. Research in the e-commerce domain has shown that the provisioning of stock information can increase the information quality of a commercial website, leading to higher customer satisfaction and purchase intention (Song et al. 2012). Given that consumers may interpret LQS cues as relevant information for their decision-making (e.g., as hints for product demand and popularity) (Lynn 1992), we assume that consumers will perceive LQS cues more informative than LTS cues. Based on these considerations, we hypothesize:

H1: Consumers perceive LQS cues to have a higher informativeness than LTS cues.

According to Jeong and Kwon (2012), credibility is a necessary precondition for the effectiveness of any persuasion claim, particularly in online contexts. We consider the effects of LTS and LQS cues on perceived credibility through the lens of the information adoption model (Sussman and Siegal 2003). Following the information adoption model, source credibility is an important determinant affecting the usefulness and credibility of a persuasion message. In our context, the source refers to the company behind the website. When a consumer will find the source credible, it is more likely that he/she will associate the message with a higher credibility. According to research on consumer trust, source credibility can be considered as a combination of trusting beliefs (i.e., competence, benevolence, and integrity) about the company behind the website (McKnight et al. 2002). Building upon this theoretical foundation, we argue that when a company uses LTS cues to generate time pressure, consumers will likely respond to such a strategy by having lower trusting beliefs towards the company. In other words, when consumers are faced with a time pressure restricting their decision-making to a specific time slot, they might suspect that the company behind the website is not acting in their best interest. According to the information adoption model, a lower source credibility will lead to a lower message credibility. Therefore, we assume that consumers will associate LTS cues with lower credibility. In contrast, providing stock information through LQS cues can signal consumers that the company acts in their best interest by warning them of a supply shortfall, which would be reflected in higher trusting beliefs towards the company. Consequently, we assume that LQS cues will be associated with a higher level of credibility. Based on this argumentation, we suggest:

H2: Consumers perceive LQS cues to have a higher credibility than LTS cues.

From the web advertising perspective, entertainment represents the likeability of an advertisement as well as the pleasure and enjoyment consumers derive from an advertisement (Zhou and Bao 2002). Entertaining messages can establish an emotional link between consumers and a company, resulting in an increased purchase intention (Kim et al. 2010; Liu et al. 2012). With respect to LTS cues, research provides hints that time constraints can result in an increased level of enjoyment (Adam et al. 2012). The source of higher enjoyment can be traced back to generated pleasant stress called eustress. According to Simmons and Nelson (2001, p. 9), eustress is defined as "a positive psychological response to a stressor, as indicated by the presence of positive psychological states such as feeling enthusiastic, excited, active and alert". When consumers face time pressure on an e-commerce website, they have a general tendency to rely on affect, which in turn is accompanied by increased arousal and enjoyment levels (Adam et al. 2012). Since LTS cues are designed to generate time pressure, we assume that consumers will associate these cues with a higher level of entertainment. Since LQS cues are typically not considered to generate such a time pressure (Amirpur and Benlian 2015), we assume that consumers will associate these cues with a lower level of entertainment. Therefore, we have:

H3: Consumers perceive LTS cues to have a higher entertainment value than LQS cues.

According to Aaker and Bruzzone (1985), irritating advertisements can lead to a general reduction of the advertising effectiveness. The more irritating an advertisement message is, the higher is the likelihood that a user will avoid the message (Li et al. 2002). Drawing on the utility theory, McCoy et al. (2012) argue that a user will perceive an online advertisement message to be intrusive if the marginal utility of viewing the message is lower than the distraction the message affords. According to their theoretical model, perceived intrusiveness is directly related to the perceived irritation of an online advertisement. While LQS might be

related to an increased demand of other consumers or a supply shortfall, LTS cues are typically set by the company itself. Therefore, LQS cues are more likely to be perceived as providing decision-relevant information than LTS cues (and thus offering higher utility, e.g., low stock information could also be interpreted as an indication of high popularity of a product). Moreover, LTS cues often contain dynamic elements (e.g., dynamic countdown timers) that might be more distracting to consumers than static elements as they are more attention-grabbing (Yoo et al. 2004). Consequently, it can be argued that consumers more likely perceive LTS cues as intrusive, resulting in a higher level of irritation. In contrast, LQS cues provide higher utility and oftentimes only consist of static elements, which are less distracting. Therefore, it is likely that consumers will perceive LQS cues as less irritating. Following this reasoning, we hypothesize:

H4: Consumers perceive LTS cues to have a higher irritation value than LQS cues.

Expected Perceptions of Product Attractiveness

We assume that the attractiveness of the product, on which either LTS or LQS cues are placed, will also affect the perceived credibility or irritation of a cue. To explain the effects of product attractiveness, we draw on the cognitive dissonance theory. Cognitive dissonance occurs in a situation in which an individual faces conflicting attitudes, beliefs, or behaviors (Cooper 2007). According to the cognitive dissonance theory, individuals strive to restore their internal consistency when confronted with conflicting information (Festinger 1962). In the e-commerce domain, researchers argue that if a website presents conflicting information, consumers tend to resolve the dissonance by changing their attitudes and beliefs about this website and regard it as untrustworthy (Liu et al. 2016). As research has shown, consumers typically associate scarcity cues with higher product value and attractiveness (Coulter and Roggeveen 2012; Gierl and Huettl 2010). Therefore, companies use scarcity cues to signal high product attractiveness in order to stimulate consumers' purchase decisions (Eisenbeiss et al. 2015). In case an e-commerce website employs scarcity cues on products that are in themselves already attractive, it is likely that only little cognitive dissonance will be generated, because the information provided by the scarcity cues corresponds to the actual product characteristics. Consequently, consumers will more likely trust the company and perceive the cues as credible. However, if an e-commerce website places scarcity cues on less attractive products, a considerable amount of cognitive dissonance might be generated because high product attractiveness is signaled but the product characteristics do not match this information. Accordingly, consumers might be more skeptical about the company's intentions, resulting in lower trusting beliefs towards the company. Following the information adoption model, it is likely that consumers will find a message less credible if they have little trust in the source of the persuasion message. Therefore, we suggest:

H5: Consumers perceive scarcity cues (either LTS or LQS) placed on highly attractive products to have a higher credibility than when placed on less attractive products.

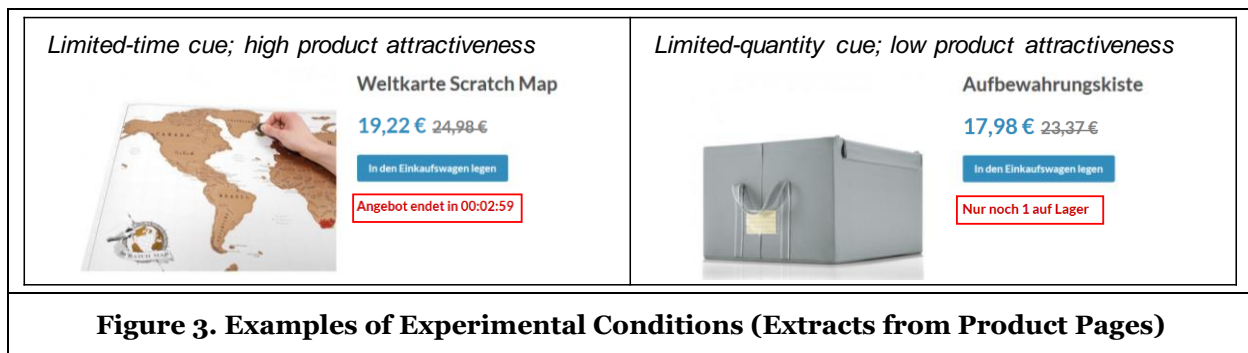
Irritation can be considered as a precondition for the cognitive dissonance effect (Wicklund and Brehm 2013). In the context of web advertising, consumers are likely to perceive irritation when an advertisement message is annoying, offending, insulting, or overly manipulative (Liu et al. 2012). While consumers in general might consider scarcity cues as manipulative (Jeong and Kwon 2012), we assume that their perceived irritation will likely be lower if companies place scarcity cues on highly attractive products. In contrast, when companies place scarcity cues on less attractive products, consumers might perceive this strategy as more manipulative, resulting in a higher level of irritation. We thus hypothesize:

H6: Consumers perceive scarcity cues (either LTS or LQS) placed on highly attractive products to have a lower irritation than when placed on less attractive products.

Proposed Research Methodology

We intend to evaluate our research model in a controlled experiment as it affords higher internal validity than other methods. Moreover, an experiment enables us to investigate the effects of different scarcity cues in isolation, which are otherwise oftentimes used in various combinations in natural online e-commerce environments. Specifically, our experiment will be based on a 2x2 between-subjects factorial design including two independent variables (i.e., "type of scarcity cue", "level of product attractiveness") with two levels respectively (i.e., "LTS/LQS cue", "high/low attractiveness"). Each experimental group will be given

access to a customized version of a website of a fictitious company that sells unbranded home accessory products. Unbranded home accessory products will be used for three reasons: first, experience goods, such as home accessory products, whose quality is unknown or difficult to assess, are considered as particularly useful for investigating the effects of scarcity cues (Kirmani and Rao 2000). Second, potential branding effects are avoided. Third, both LTS and LQS cues are also used in reality for these products. The websites will only differ with respect to the employed scarcity cues and the products on which these cues are placed. LTS and LQS cues will be designed in a homogenous way following the approach of Amirpur and Benlian (2015). The product portfolio of each website will consist of an identical set of products that vary in their level of attractiveness. We have already determined the attractiveness of these products in a pre-test in which 56 participants (i.e., students and employees from two different universities in Austria and Germany) evaluated these products in an online survey. Based on the survey results, we were able to divide the product portfolio in a set of highly attractive and less attractive products. LTS or LQS cues will be placed on one-half of the product set - either on the highly attractive or on the less attractive products. Figure 3 shows two examples of the different experimental conditions. The websites will be created in German language as we plan to conduct the experiment with participants from German-speaking countries.



The experiment will be conducted online. Participants will first see an overview page, which describes the setting and the task. The instructions in the beginning of the experiment ask participants to purchase a home accessory product online as a present for a house-warming party for a study colleague. Next, the experimental platform randomly forwards participants to one of the four website versions, where they can select and purchase a product of their choice. We intend to set a minimum interaction time with the website (i.e., 3 minutes) to assure sufficient familiarity with the website and the offered products. To control for potential confounding variables as visual placements of products (e.g., central position effect or list position effect, see Orquin and Loose 2013 for an overview), products will be ordered randomly and their position will be recorded. Customer data and payment information will be pre-filled to ease the task and exactly one product has to be purchased. After the shopping task, participants will be asked to complete an online questionnaire that measures the relevant constructs of our research model. Scale items for perceived informativeness, credibility, entertainment, and irritation will be adopted from Ducoffe (1996) and Brackett and Carr (2001) and seven-point Likert scales will be employed. To verify that the participants did notice the employed LTS/LQS cues, we use manipulation checks in the form of yes/no questions (“Did you notice <type of scarcity cue> on this website?”). The data will be analyzed by using techniques such as t-tests and analyses of variance (e.g., ANOVA/MANOVA). Reliability and validity of the questionnaire items will be evaluated through tests such as factor analysis and Cronbach’s alpha.

Expected Contributions and Conclusion

Despite the fact that scarcity cues are employed on many e-commerce websites, surprisingly few studies have examined how consumers perceive LTS and LQS cues and how these perceptions differ. Moreover, to the best of our knowledge, no empirical evaluation of interaction effects of scarcity cues and product attractiveness has so far been undertaken. Aiming to contribute to the closure of this research gap, we have developed a research model that describes the effects of two different scarcity cues on the consumers’ cue perceptions (and their subsequent purchase intentions). The expected results of our planned experiment have implications for academia and practice. For academia, we intend to extend the current body of knowledge, which is not yet able to explain the causal pathways through which scarcity cues affect

consumers' purchase decisions. For practice, it is essential to know how certain scarcity cues can stimulate consumers' purchase decisions. In this regard, we expect the results of our experiment to provide important guidance on how to effectively use and design such cues on e-commerce websites. As our research is still in an early stage, it is subject to several limitations. Given that many e-commerce websites employ both types of cues, combinatory effects might also be relevant. However, we deliberately chose to investigate the effects of LTS and LQS cues in isolation, as we are interested in finding out which of these cues might be more effective in certain scenarios. With respect to the consumers' cue perceptions, we have only focused on a set of cognitive and affective factors derived from the web advertising literature. Hence, our research model could be extended with additional factors, such as product-related factors (e.g., perceived product quality) or situation-related factors (e.g., perceived stress). With our work, we aim to provide an important extension to the literature on scarcity effects on e-commerce websites.

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