

# Buying under Pressure: Purchase Pressure Cues and their Effects on Online Buying Decisions

Completed Research Paper

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## Abstract

*Although purchase pressure cues (PPC) that signal limited time (LT) or limited product availability (LPA) are widely used features on e-commerce websites to boost sales, research on whether and why PPCs affect consumers' purchase choice in online settings has remained largely unexplored. Drawing on the Stimulus-Organism-Response (S-O-R) model, consumer decision-making literature, and prospect theory, we conducted a controlled lab experiment with 121 subjects in the context of Deal-of-the-Day (DoD) platforms. We demonstrate that while LT pressure cues significantly increase deal choice, LPA pressure cues have no distinct influence on it. Furthermore, our results show that perceived stress and perceived product value serve as two serial mediators explaining the theoretical mechanism of why LT pressure cues affect deal choice. Complementary to these results, we provide evidence that higher perceived stress is accompanied by significant changes in consumers' physiological arousal. Further theoretical and practical implications of our findings are discussed.*

**Keywords:** Purchase pressure cues, limited time, limited product availability, deal choice, e-commerce, physiological stress, lab experiment

## Introduction

E-commerce websites become an increasingly important channel for commercial transactions (Mukherjee et al. 2012). More than 45% of Internet users in the United States and Europe already purchase goods online (Kollmann et al. 2012; Poncin et al. 2013) and global sales via B2C e-commerce channels increased in 2014 by more than 20% over the last year reaching a new record level of \$1.5 trillion (eMarketer 2014). As competition among online shopping websites for regular and new customers has intensified in the last couple of years, providers employ various strategies to keep customers on their websites and encourage them to complete transactions (Benlian et al. 2012). One pervasively used strategy is the deployment of so-called purchase pressure cues (PPC) which are graphical depictions on websites that attempt to subliminally put customers under pressure to make a transaction and ultimately boost sales (Benlian 2015). Ebay's core feature, for example, is its auction mechanism that is visually depicted via a countdown clock signaling that customers are running out of time to make a deal. Moreover, Deal of the Day (DoD) websites have become one of the latest Internet hype offering discounted deals for a wide range of products and services such as ticketed events or cosmetics (Parsons et al. 2014; Xueming et al. 2014). Groupon, for example, the leading DoD platform with 54 million active customers worldwide and revenues of \$3.2 billion in 2014, has been one of the fastest growing Internet sales businesses in history (Krasnova et al. 2013). Core visual PPCs used on these websites for example signal the limited time available for the deal or whether the deal is available in limited quantities (Byers et al. 2012). Despite the broad use of such PPCs on e-commerce websites, however, it is surprising to find that practical recommendations on the differential impact of such cues are still scarce, leaving practitioners puzzled and without guidance.

Although decision-making under pressure has a long tradition in psychology and marketing research, previous literature has mainly focused on offline contexts such as retail stores (e.g., Byun and

Sternquist 2012). However, several studies show that because of the absence of experiential information in the Internet, there are systematic differences in customer attitudes and behavior for products and services chosen online versus offline that requires investigating PPCs' distinct effects in online contexts, which has also been echoed by several research scholars (Kim and Krishnan 2015; Degeratu et al. 2000; Venkatesh et al. 2003). For example, whereas sensory search attributes (e.g., the fit and feel of clothing) have lower impact on choices online, non-sensory attributes (e.g., factual information about tangible product features) have a relatively higher impact (Degeratu et al. 2000). Moreover, price sensitivity has been found to be higher online than offline and also brand names typically have a stronger impact online than offline (Venkatesh et al. 2003). Finally, a competing offer is just a few clicks away on the Internet, so that customers are likely to find what they are looking for on a competitor's site if an e-tailer fails to satisfy their needs immediately (Harris et al. 2006).

The few existing studies that have examined PPCs in online (i.e., e-commerce) contexts have left inconclusive findings and many open questions about whether and which PPCs effectively influence online customers' buying decision (e.g., Jeong and Kwon 2012). Are limited time (LT) pressure cues, for example, more effective than limited product availability (LPA) cues? Both PPC are well examined in the traditional brick and mortar shopping context and are widely used on e-commerce platforms (Byers et al. 2012). Their proliferation on e-commerce platforms could be explained by vendors' speculations about their effectiveness in both offline and online world. Due to the discussed differences between online and offline environment, however, these speculations cannot simply be accepted without further ado. In fact, the *actual* role of LT and LPA for affecting online customers' buying decisions remains largely unexplored so far. Moreover, to the best of our knowledge, research that explicates the mechanism through which PPCs affect consumers' decision-making behavior in e-commerce is scarce as well. Uncovering the explanatory mechanism linking the effects of PPCs to customers' buying decisions is however important to better understand why some types of PPCs are effective and why others are not. Given the existing research gaps and the missing guidance for practice, research that focuses on *whether* and *why* PPCs affect buying decisions on e-commerce platforms is thus of significant value for researchers as well as practitioners. The objective of our study is therefore to address these gaps guided by the following research question: *Which purchase pressure cues are effective in influencing consumers' online buying decisions and why?*

To answer the research question and to address the identified gaps in research and practice, we conducted a laboratory experiment with one control and two experimental groups exposed to different PPCs (i.e., LT and LPA pressure cues). We used a self-programmed, simulated version of the Groupon website as experimental setting in order to increase the ecological validity of our experiment. We found that LT pressure cues—but not LPA pressure cues—were effective in influencing consumers' purchase decisions. Furthermore, we could demonstrate that neither perceived stress, nor perceived product value alone provided an empirically validated explanation for the positive effect of LT pressure cues on consumers' deal choice. Only when considered together and in consecutive order, perceived stress and perceived product value could be shown to represent a valid explanatory mechanism.

Our study offers potentially useful contributions to both research and practice. First, it contributes to existing literature related to decision-making under pressure—which is widely advanced in the offline retail context but largely unexplored in e-commerce research (e.g., Eckhardt et al. 2013)—by examining the differential effectiveness of PPCs on e-commerce websites. Second, and more broadly, our study significantly adds to IS research by disentangling the explanatory mechanism through which IT-based pressure cues impact individual decision-making, which goes beyond previous studies that treated the relationship between such cues and decision-making behaviors largely as a black box (e.g., Ahituv et al. 1998). Third, by examining how and why different PPCs affect consumers' buying decisions on commercial websites, this study provides practitioners with specific recommendations on how to design sales-efficient e-commerce websites that enhance online consumers' likelihood to complete a deal.

We begin by reviewing previous literature on decision-making under pressure and purchase pressure cues in offline and online contexts, representing the theoretical foundations of this paper. Then, we present our research model and develop hypotheses on direct and indirect relationships between PPCs and consumers' buying decisions. Further, we outline the design and report the results of a lab experiment with 121 subjects. After discussing the main findings of our study, the paper highlights implications for research and practice and concludes by pointing out promising areas for future research.

## Theoretical Foundations

### ***Decision-Making under Pressure and Purchase Pressure Cues***

It is widely acknowledged that consumer decisions are complex activities that are influenced by situational and environmental conditions (Payne 1982; Zakay 1993). Such conditions can for example be resource constraints like time, money and information, which can have a systematic and significant influence on human decision-making (Böckenholt and Kroeger 1993). Psychology and marketing research have quite a long tradition of studying decision-making under restrictive conditions (e.g., Easterbrook 1959; Edland 1985; Kerstholt 1994; Svenson 1985; Svenson et al. 1985; Wright 1974) and have provided valuable contributions to research on decision-making under pressure in areas such as judgment (e.g., Edland 1985), negotiation and mediation (e.g., Carnevale and Lawler 1986), creativity research (e.g., Mandler 1984), health (e.g., Henry and Stephens 1977), and aviation (e.g., Yates and Curley 1985). Wright (1974) for example found that under high environmental pressure conditions, subjects changed their strategies, used more negative evidence and drew on fewer decision attributes than in non-constraint conditions when making their judgments. Furthermore, several scholars (e.g., Svenson et al. 1985; Kerstholt 1994; Easterbrook) could uncover and validate the human tendency to focus on central and salient rather than on peripheral information under experienced psychological stress, thus applying different rules of thumb when making a decision (Svenson and Maule 1993).

The potential of pressure situations to influence consumers' decision-making process has also been recognized in the retail and commerce sector for decades to deliberately nudge consumers to a positive purchase decision (e.g., Dawar and Parker 1994; Inman et al. 1990; Lynn 1991; Zhu et al. 2012). These practices often take place through the use of pressure cues, also called "persuasion claims" (Jeong and Kwon 2012), which refer to signals used by marketers to persuade people to buy. Several pressure cues have been examined in the marketing literature ranging from warranties to information on product popularity with much of the emphasis being at studies on PPCs that contain a time or scarcity component such as time pressure or product availability pressure cues (e.g., Dhar and Nowlis 1999; Suri et al. 2007; Suri and Monroe 2003).

This stream of research has accumulated valuable insights about the effects of different pressure cues on human reactions over the last two decades with a primary focus on stimuli located in individual's physical environment (Byun and Sternquist 2012). Little attention, however, has been paid to study pressure cues and their effect mechanisms in *online* contexts, even though several scholars have recently called for more closely investigating this fundamental phenomenon that is part of many people's daily lives (Aggarwal and Vaidyanathan 2003; Byun and Sternquist 2012). Specifically, IS research has paid little attention to study pressure cues (e.g., as embedded in IT artifacts such as commercial websites) and, to the best of our knowledge, there are as yet only few papers that have specifically addressed their effects on human decision-making. Benbasat and Dexter (1986) were among the first to investigate the effectiveness of color and graphical cues used in information systems under varying time constraints independent of any particular context. Other scholars investigated the effects of time pressure on decision-making in the context of decision support systems (e.g., Ahituv et al. 1998; Adya and Phillips-Wren 2009; Marsden et al. 2006), crisis management systems (Sniezek et al. 2002) and private IS usage (Eckhardt et al. 2013).

In summary, despite the long history in studying human decision-making under pressure in various disciplines, previous studies have mostly examined single types of (purchase) pressure cues in isolation (i.e., without comparing different kinds of pressure cues), predominantly in the offline context (i.e., stimuli embedded in consumers' physical environment) and as a black box (i.e., without unveiling the explanatory mechanism through which pressure cues affect consumers' decision-making). As such, while this research has unquestionably yielded a wealth of knowledge, the fact remains that fundamental questions on *the relative effectiveness of purchase pressure cues*—as part of an IT artifact—and their *underlying effect mechanisms* on consumer decision-making, especially in the context of e-commerce, have remained relatively unexplored.

### ***Purchase Pressure Cues as Environmental Signals***

With the aim of examining the effects of PPCs on users' product choice behavior on commercial website, we draw on the Stimuli-Organism-Response (S-O-R) model in environmental psychology (Mehrabian and Russell 1974). The S-O-R model posits that the various stimuli within a shopping environment together influence a consumer's cognitive and/or affective processes (organism), which in turn determine the consumer's responses. Stimuli are contextual cues external to the consumer that attract his or her attention (Belk 1975). Stimuli may manifest themselves in various forms, for example, as a price tag, a product display or a store's visual design (Jacoby 2002). In the context of

commercial websites, stimuli pertain to the design features of websites with which consumers interact, such as website quality signals (Wells et al. 2011) or a web-based recommendation system's trade-off transparency (Xu et al. 2014). The organism refers to the intervening processes (e.g., cognitive and emotive systems) between the stimuli and the reaction of the consumer. Response refers to behavioral responses, such as the acquisition of products, or internal responses that may be expressed, such as perceptions and/or behavioral intentions (Mehrabian and Russell 1974). Past psychology and marketing research have widely adopted the S-O-R model with promising results to model the impact of environmental stimuli on consumer responses in both offline and online shopping contexts (e.g., Eroglu et al. 2001; Eroglu et al. 2003; Fiore and Kim 2007). Several IS studies also drew on the S-O-R paradigm as a theoretical framework to explain how website features may affect consumers' internal preferential choice processes and their resulting choice behaviors (Parboteeah et al. 2009; Xu et al. 2014), with their findings supporting its applicability.

As such, the S-O-R model serves as an appropriate foundation for our own research model (Figure 1). Following the logic of the S-O-R paradigm, this study operationalizes limited time and limited product availability cues on websites as environmental stimuli, which are two pervasively used purchase pressure cues embedded in e-commerce websites; organism as the user's physiological and cognitive reactions to the stimuli; and response as the user's product choice behavior on the commercial website. We elaborate on the stimuli (i.e., limited time and limited product availability cues) and their conceptual underpinnings in the next two subsections, and theorize on the intervening process (organism) and users' responses in the hypotheses development section.

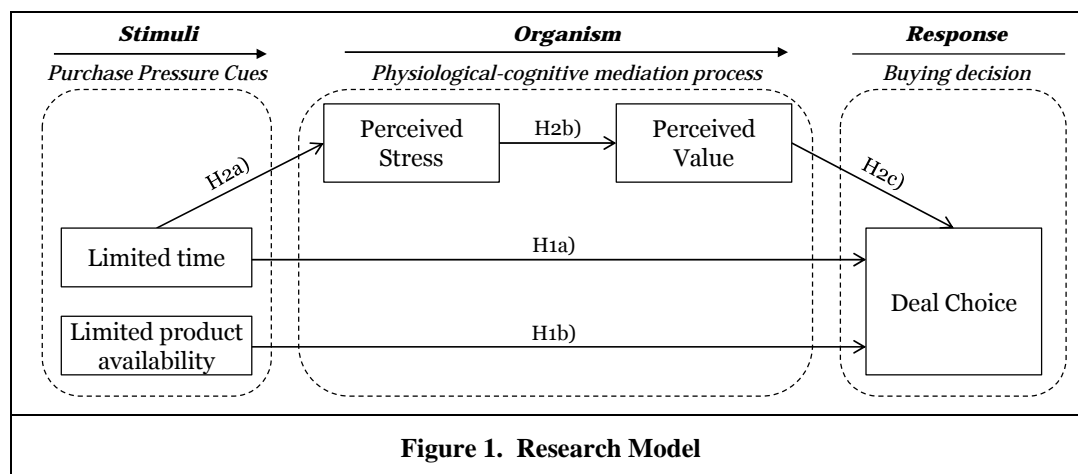


Figure 1. Research Model

### Limited Time (LT) Pressure Cues

Limited time (LT) or simply time pressure has been defined as the perceived constriction of the time available for an individual to perform a given task and as a form of stress expressed in the perception of being hurried or rushed (Ackerman and Gross 2003; Iyer 1989). In these definitions, emphasis is placed on humans' *perceptions* of time pressure, since that is what will alter an individual's information processing mode (Ordonez and Benson 1997). LT pressure cues have been studied as environmental signals predominantly in the marketing field (e.g., time-limited sales promotions, discounts, or coupons) with most attention being paid to the offline retail context. Suri and Monroe (2003), for example, found in a consumer electronics setting that when low time pressure is signaled, individuals are likely to process information for product assessment and adoption decisions systematically. An increase in time pressure from this low level, however, results in a decrease in systematic information processing, thereby increasing the likelihood of heuristic processing to simplify the cognitive task. As described by Simon (1990, p.11), heuristics are "methods for arriving at satisfactory solutions with modest amounts of computation." Heuristics are sometimes also referred to as rules of thumb. Similarly, Byun and Sternquist (2012) argue that the strategy used by several fast fashion retailers such as H&M and ZARA to offer products just for a limited time creates a perception of perishability and scarcity, which in turn affects consumers' anticipated gains and losses of buying alternatives, thus leading to in-store hoarding and purchase acceleration. What is more, this study and others indicate that decision makers under time pressure use fewer but more important attributes, less complex decision rules, weight negative aspects more heavily, take fewer risks, and reduce their information searching and processing (Ahituv et al. 1998).

LT pressure cues are also a widespread phenomenon in the online retail context. Not only DoD platforms are using such cues on their websites (e.g., *groupon.com*, *livingsocial.com*, *dailydeal.com*), but also auction websites like *Ebay* (*ebay.com*) or *QuiBids* (*quibids.com*), as well as e-commerce companies like *Amazon* (*amazon.com*). Despite their prevalence on commercial websites, only few studies in IS research have investigated time pressure cues on human decision-making. Those few studies, however, have focused on user reactions in non-commercial environments (Eckhardt et al. 2013; Marsden et al. 2006). As such, to the best of our knowledge, there is still a lack of research on the role of LT pressure cues for affecting consumers' buying decisions on e-commerce websites.

### **Limited Product Availability (LPA) Pressure Cues**

Limited product availability (LPA) pressure cues refer to written statements or visual icons attached to products that inform consumers that only a limited number of products remain in stock and are thus available for purchase. In the e-commerce context, for example, typical displays are “only 3 left in stock. Order soon” (*amazon.com*), “1 ticket left at this price” (*expedia.com*), “sell out risk high!” (*overstock.com*), and “only 4 deals left” (*groupon.de*) (Jeong and Kwon 2012).

Significant effects of LPA pressure cues on consumers' purchase intentions could be demonstrated in several studies for the offline, in-store context (e.g., Suri et al. 2007; Verhallen and Robben 1994). For example, Suri et al. (2007) found that under LPA pressure, consumers' perceptions of quality and monetary sacrifice exhibit different response patterns, depending on the relative price level and consumers' motivation to process information, which, in turn, affects purchase intention. In contrast, the few findings that exist for the online retail environment have been inconsistent and sometimes contradictory to those of the offline context. Jeong and Kwon (2012), for example, could not confirm a significant relationship between the presentation of LPA pressure cues and consumers' purchase intentions. They conjectured that this was primarily due to low message credibility of the LPA cues. In other words, when persuasion claims such as LPA cues are not perceived as credible information, consumers do not infer product quality from the claim. Because the assessment of product availability is more restricted in online shopping environments, the authors argued that consumers may consider limited availability claims rather as a marketer's manipulative tactic to stimulate sales. Such suspicion about firms' ultimate motives or deceptive intent may then lead to resistance among consumers that attenuates purchase intentions (Cheung et al. 2012). Given that their argumentation was mainly based on speculation, Jeong and Kwon (2012) strongly advised researchers to further their inquiry into the (lack of) effectiveness of LPA pressure cues and the potential reasons thereof.

## **Hypotheses Development**

We derive our hypotheses by adopting a two-step approach which is commonly used when applying the S-O-R paradigm (MacKinnon 2008): First, and based on a simplified S-R logic (excluding the 'O'), we hypothesize the direct effects (i.e., the *relative effectiveness*) of LT and LPA pressure cues (stimuli) on consumers' deal choice (response) on e-commerce websites. Second, introducing the 'organism' component of the S-O-R framework, we investigate the indirect effects and thus the explanatory mechanism through which PPCs affect consumers' deal choice.

### **Direct Effects of LT and LPA Pressure Cues on Deal Choice**

Previous research on decision-making under time pressure has found that requiring individuals to make decisions within a limited time frame usually evokes pressure and higher stress (e.g., Ahituv et al. 1998; Edland and Svenson 1993). Ackerman and Gross (2003) furthermore reported that time pressure may change the level of arousal which, in turn, induces perception of psychological stress. It is this change in the level of physiological arousal—also referred to as *core affect* (Ortiz de Guinea and Webster 2013; Russell 2003)—that triggers and directs subsequent heuristic cognitive processing wherein individuals use fewer but more salient attributes, apply less complex decision rules, and reduce their information searching and processing (Simon 1959). Based on this notion of heuristic information processing, we argue that the provision of LT pressure cues—as salient signals in consumers' visual field—will influence consumers' decision-making such that they are likely to push them to increasingly consider buying the presented product (i.e., make a deal), resulting in rapid-fire reasoning (Malhotra 2010). In line with this reasoning, we propose that in e-commerce contexts, the presence of LT pressure cues on a product webpage will cause consumers to have a higher tendency to buy the presented product and thus lead to a higher proportion of consumers completing the deal:

**H1a:** *Websites with LT pressure cues will cause higher deal choice shares than websites without LT pressure cues.*

In contrast to LT pressure cues, we argue that LPA pressure cues will not be effective in increasing consumers' deal choice shares compared to situations without LPA pressure cues because of two countervailing effects that cancel each other out. On the one hand, according to commodity theory and scarcity effects, scarce products are typically perceived to be more valuable and desirable (Brock 1968; Lynn 1991). In this regard, LPA pressure cues on websites may convey a scarcity signal reducing one's freedom to possess the product, and subsequently inducing psychological reactance in the consumer's mind. Once the consumer perceives the limited availability claim as a threat to his or her freedom of ownership, the consumer is likely to develop an intention to purchase the product in order to reestablish the threatened freedom (Brehm and Brehm 1981). Thus, based on these arguments, one should expect that LPA pressure cues would increase the likelihood of purchasing products. On the other hand, however, signaling product availability to consumers in e-commerce contexts has been shown to be perceived as fake and deceptive such that consumers do not infer product quality from these claims (Jeong and Kwon 2012). In contrast to LT pressure cues whose inner workings can be reconstructed and validated by consumers even in online environments (e.g., consumers can follow the deal over time and recognize whether deal time has been manipulated or not), LPA pressure cues are based on information (i.e., stock-keeping unit/warehousing data) that are at the exclusive disposal of the provider such that consumers are not able to validate this information before or after a transaction (Jeong and Kwon 2012). Given these contrasting explanations for the effects of LPA cues on consumers' decision-making, we cautiously posit that the presence of a LPA pressure cue on a product webpage will *not* cause consumers to have a higher tendency to buy the presented product and complete the deal. We thus hypothesize:

**H1b:** *Websites with LPA pressure cues will not cause higher deal choice shares than websites without LPA pressure cues.*

After hypothesizing the proposed direct effects of LT and LPA pressure cues on consumers' deal choice in e-commerce, we proceed to explore the explanatory mechanism (i.e., the 'O' component of the S-O-R framework) through which the expected effect of LT pressure cues may operate. We thereby focus on LT pressure cues, because, as hypothesized above, we argue (and later also demonstrate) that LPA pressure cues won't be effective in influencing consumers' deal choice.

### ***The Mediation Process between LT Pressure Cues and Deal Choice***

Overall, we argue that LT pressure cues will have an impact on deal choice by first increasing consumers' stress level (i.e., psychophysiological effects) which then translates into higher perceived product value (i.e., cognitive evaluations). This serial effect chain of physiological arousal and cognitive product assessment will finally affect deal choice.

Previous literature on consumer decision-making has found that LT pressure cues are usually perceived as environmental stressors that limit individuals' information processing capabilities and increase feelings of unease and discomfort (Edland and Svenson 1993). Individuals feel more constrained when they have not enough time to gather all relevant information and to evaluate alternative decision options because of the fear that their decision might be wrong or lead to negative consequences (Dhar and Nowlis 1999; Huber and Kunz 2007). In this regard, it has been shown that the first step in the emotional registration of stimuli "*is attention—not necessarily conscious attention but literally that the actor's sensory organs are oriented to take in the stimulus*" (Elfenbein 2007, p. 322). Although somewhat counterintuitive but empirically validated in previous studies (Obrist 1981; Ortiz de Guinea and Webster 2013), such emotional responses to attention-evocative stimuli (such as pressure cues) typically involve a *decrease* in physiological arousal reflected in lower heart rates or skin conductance. Applied to our research context, buying under time pressure may thus trigger participants to automatically pay attention to specific attributes of the purchase environment reducing bodily activity such as heart rate (Beauchaine 2001; Porges 1995), while simultaneously increasing consumers' stress level. In line with these arguments, we posit that online consumers who encounter an interface including LT pressure cues will experience higher perceived stress<sup>1</sup> as compared to individuals who interact with an interface that lacks such cues. Thus, we suggest that:

**H2a:** *Websites with LT pressure cues will increase online consumers' perceived stress.*

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<sup>1</sup> In this study, we hypothesize that LT pressure cues affect consumers' *perceptions* of stress. As a validation check for our results, however, we will also test whether LT pressure cues influence consumers' *physiological* stress reactions, expecting a decrease in arousal levels (i.e., heart rate) by subjects who were exposed to LT pressure cues.

As mentioned earlier, previous studies on decision-making under pressure have shown that consumers use cognitive shortcuts and draw on specific heuristics to reduce the cognitive complexity of the task. When faced with time constraints that trigger higher stress levels, they for example tend to filter information more selectively such that they focus on more important and/or more salient attributes, as well as on negative information (Dhar and Nowlis 1999). In the case of e-commerce websites that include salient LT pressure cues (e.g., a clock display counting down time), consumers have the tendency to regularly pay attention to such cues to check how much time is left to be still eligible for buying the presented product. Such perceptions of “running out of time” have been shown to evoke relatively greater feelings of loss or regret about a potentially missed opportunity of making a good deal (Aggarwal and Vaidyanathan 2003). This basic human reaction is rooted in prospect theory that predicts that because of individuals’ loss aversion propensity, they associate greater psychological discomfort with losses than pleasure with gains (Kahneman and Tversky 1979). Along the same lines, consumers under time pressure react to perceived limited time by weighing the anticipated gains of buying and anticipated losses of not buying a product, ultimately responding, however, more strongly to anticipated losses than to anticipated gains. Inman and McAlister (1994), for example, found that as the expiration time of a possible product deal nears, initially perceived gains from time-limited promotions are reframed as losses, because the possibility of losing the opportunity to take advantage of the deal increases. Due to such increasing feelings of missing a favorable opportunity (e.g., buying a discounted product) with increasing time scarcity, the product under consideration is likely to become relatively more attractive to consumers—hence, consumers’ appreciation of a product’s value (i.e., their overall assessment of the utility of a product or service) increases (Suri and Monroe 2003). In the light of human beings’ tendency to feelings of loss aversion and based on previous empirical findings, we propose that consumers with higher stress levels (that were evoked by LT pressure cues) will be more likely to perceive the presented product as being more valuable, all else being equal. Thus, we hypothesize that:

**H2b:** *Online consumers with higher perceived stress levels will have higher value perceptions of a product presented on an e-commerce website.*

Finally, consumer decision-making as well as IS research has shown that when consumers perceive a product as being more valuable, they are usually more inclined to think that they can draw a higher utility out of a product’s consumption (Kim et al. 2007; Sweeney and Soutar 2001). Likewise, utility theory suggests that higher product utility increases the likelihood of consumers to buy a product, all else being equal (Varian and Repcheck 2010). Consistent with this logic, we hypothesize that consumers with higher value perceptions of a product will be more likely to buy this product and complete a deal than consumers with lower value perceptions:

**H2c:** *Online consumers with higher value perceptions of a product presented on an e-commerce website will be more likely to buy the product.*

In summary, considering H2a-H2c together, we thus expect that LT pressure cues will affect consumers’ deal choice through a serial, physiological-cognitive mediation process with perceived stress and perceived product value being key explanatory constructs.

### **Control Variables**

We controlled for several other factors in our experiment. Perceived product quality, susceptibility to interpersonal influence, consumer impulsiveness, experience with/attitudes toward online shopping and perceived information credibility have also been shown to influence consumers’ deal choice (Bearden et al. 1989; Chen 2008; De Valck et al. 2009; Flanagin and Metzger 2000; Konradt et al. 2012; Madhavaram and Laverie 2004; Puri 1996; Soopramanien and Robertson 2007). We included these variables as well as the demographics of the subjects to isolate the effects of the manipulated variables.

## **Research Methodology**

### **Experimental Design and Product Selection**

The proposed hypotheses were tested based on a laboratory experiment. We employed a 3 x 1 between-subjects design with one control group and two experimental groups exposed to different PPCs (i.e., LT and LPA pressure cues). Against the background of our research question, we preferred a between-subjects design to avoid practice and fatigue effects that can plague within-subjects designs and to lower the chances of participants working out the aims of the experiment and thus skewing the results

(Kirk 2012). We used a self-programmed, simulated version of the Groupon website as experimental setting in order to increase the ecological validity of our experiment.

We chose energy drinks—featured as a brand new product launch in the market—as main deal product because of two main reasons. First, according to Kirmani and Rao (2000), experience goods whose quality is unknown or difficult to assess before consumption are particularly useful for examining the effects of purchase pressure cues. Second, given that we conducted a lab experiment with students as subjects, we had to find a product that fitted the basic needs of students (in this case the need for concentration and endurance during exam preparations), while being affordable at the same time. As such, we created a new brand for an energy drink called “Star Energy” with unique product characteristics and also designed distinct product pictures for our experimental website. As a validation procedure, we conducted a pretest (n=19) to verify the acceptance of this product among students. 16 out of 19 students clearly expressed that they found this new product appealing and that they could imagine buying this new product from DoD websites such as Groupon<sup>2</sup>. In sum, the pretest confirmed the adequacy of a newly created energy drink as main deal product for our lab experiment.

### ***Manipulated Stimuli***

Ordenez and Benson (1997) claim that setting a time constraint is not enough to ensure that subjects feel time pressure. Time constraint exists whenever there is a time deadline, even if the person is able to complete the task in less time. Time pressure indicates that the time constraint induces some feeling of stress and creates a need to cope with the limited time. Thus, it is possible to have a time constraint without exerting time pressure (Noda et al. 2007). Consequently and as already highlighted in the definitions of LT and LPA, it is the *perception* of a product being scarce (LPA) and available only for a limited time (LT) that induces psychological stress. By carefully selecting and testing the characteristics of our two PPCs, we took two rigorous measures to increase the likelihood that the subjects were going to perceive the PPCs on the experimental website as intended.

First, to determine how much remaining time and how many remaining products were respectively inducing adequate perceptions of psychological stress, we conducted a second pretest (n=17) employing a within-subjects design using a similar scenario as in the main experiment. 10 variants of LT pressure cues (i.e., from 30 seconds to 5 minutes, in 30 seconds increments) and 10 variants of LPA pressure cues (i.e., from 4 to 104 available products, in 10 product increments) were each incorporated into a Groupon website presenting the Star Energy deal. These different DoD website versions were then randomly presented to the subjects who were asked to evaluate how much pressure they felt on this website (on a 7-point Likert scale anchored at 1=low to 7=high). Each subject was therefore exposed to 10 LT and 10 LPA pressure cues in a randomized order. Based on subjects’ responses, we selected one LT pressure cue (i.e., 1 minute as remaining time for making a deal as subjects would enter the experimental webpage) and one LPA pressure cue (i.e., “only 4 deals left”) to be used in the main experiment. Second, to ensure that our treatments would be recognized as typical PPCs on websites, we chose a dynamic implementation for both LT and LPA pressure cues such that the remaining time to make a deal and the remaining amount of deals on the website were decremented evenly over the time frame of the subjects’ exposure to the experimental website. Figure 2 depicts characteristic displays of the three conditions in our experiment.

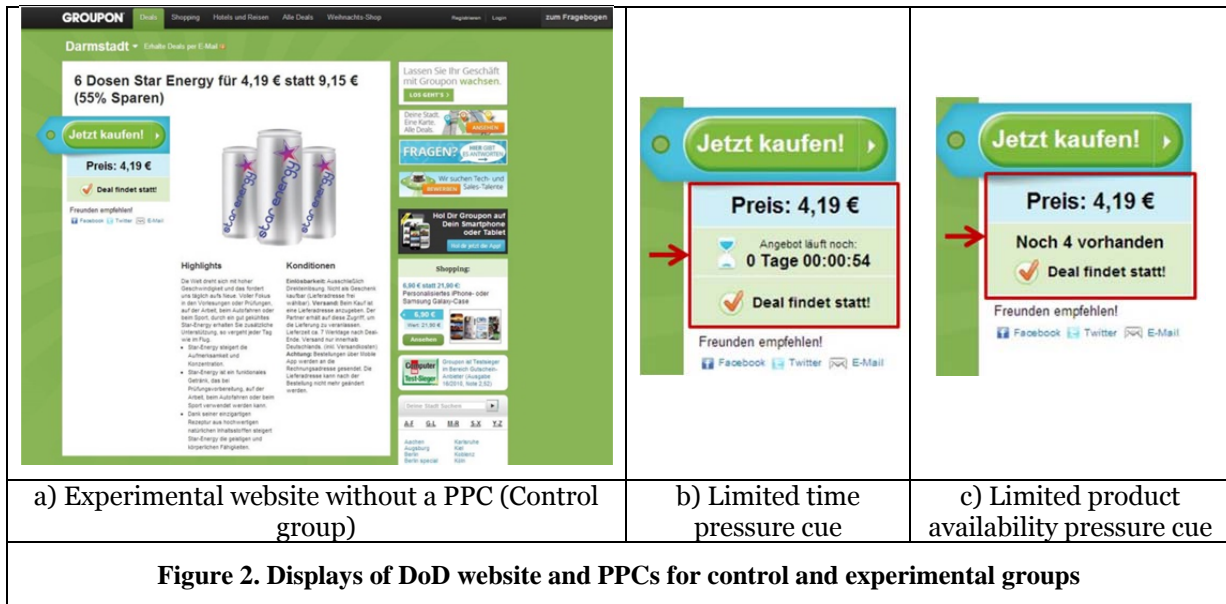
### ***Measured Variables and Measurement Validation***

For the central dependent variable of our study, consumers’ deal choice, we used *actual deal choice* instead of *intention to complete the deal* (Morrison 1979) to capture a more objective outcome variable. In our experiment, participants were instructed that they can freely choose to buy (by clicking on the “buy”-button) or not to buy the product (by proceeding to the questionnaire). For the measurement of perceived value, we adopted an established scale from Suri and Monroe (2003), consisting of the following three items (Cronbach’s alpha=0.85; Average Variance Extracted=0.77): 1. *I think that given the attributes of Star Energy, it is a good value for money*; 2. *At the advertised price, I feel that I am getting a good quality energy drink for a reasonable price*; 3. *If I bought Star Energy at the advertised price, I feel I would be getting my money’s worth*. All items were measured on a seven-point Likert scale anchored at 1= strongly disagree and 7 = strongly agree.

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<sup>2</sup> We used the wording “DoD websites such as Groupon” in order to pretest the overall acceptance of DoD websites.





Perceived psychological stress was measured by a single item (Bergkvist and Rossiter 2007; Svenson et al. 1990): “*I feel stressed*”, before and directly after the deal choice. To substantiate the results of this self-reported variable, we additionally captured subjects’ heart rate as a direct and objective physiological measurement for the duration of the experiment. Pulse signals (Heart Rate Variability, HRV) were continuously recorded with an Electrocardiographic (ECG) recording device using a lead 1 method with electrodes placed on the middle three fingers of the left or right hand (Andreassi 2007). The HRV-sensor of the device measures the volume of blood in the finger. The handling of the heart rate data followed a conservative design. This conservative method consisted of standardizing the heart rate data with a baseline level by subtracting the pre-task baseline levels from the heart rate data after completing the task, and dividing these deviations by the baseline level (Schneider 2008). The measure for the heart rate thus indicated a proportional deviation from baseline levels in actual units. Following common practices in the measurement and analysis of heart rate data in experimental research (Ortiz de Guinea and Webster 2013), we used the time interval of 30 seconds before and after subjects’ exposure to our treatments to evaluate the recorded data.

Regarding our control variables, which were measured on the same scale as perceived value, we adopted established measurements from prior literature. Perceived product quality was measured with 4 items adopted from Kirmani and Zhu (2007). Perceived website credibility was measured using a 3-item scale adopted from Flanagin and Metzger (2000). Susceptibility for interpersonal influence was measured using a 4-item scale from Bearden et al. (1989). We measured consumer impulsiveness with the 12-item scale developed by Puri (1996). Finally, attitudes toward online shopping were measured drawing on a 7-item scale from Soopramanien and Robertson (2007). We found that all self-reported scales in this study had strong psychometric properties. All factor loadings were greater than 0.70, Cronbach’s alpha values were all greater than 0.77, and AVE values were all greater than 0.62<sup>3</sup> (Fornell and Larcker 1981).

Finally, we developed measurement items for perceived LT pressure cues (“*I could recognize a clock next to the Star Energy product picture that depicted the remaining time for this deal*”) and perceived LPA pressure cues (“*I could recognize a visual cue next to the Star Energy product picture that depicted the amount of left deals for this product*”) by following the approach developed by Moore and Benbasat (1991). These two items were applied to check the manipulations of LT pressure cues and LPA pressure cues in the experiment and, thus, to ensure that our treatments worked as intended. Finally, we measured whether the participant were suspicious about the cause of the experiment with a single item (“*I have a clear idea of what the objectives of this experiment are*”).

**Participants, Incentives and Procedures**

A total of 134 college students were recruited for our laboratory experiment from the campus of a large public university in Germany in exchange for a monetary incentive of 5 Euro that they could either

<sup>3</sup> For brevity, we omitted the items for the control variables. They can be obtained from the authors upon request.

keep or spend for the deal. Furthermore, the subjects had the chance to win an iPad Mini in a raffle that was conducted after completion of the entire lab experiment. We deemed the use of a student sample appropriate for this study, because college students are likely to represent typical online consumers on DoD websites and to show similar buying patterns for the offered product category in our experiment compared to non-student samples (Jeong and Kwon 2012). 8 subjects reported inconsistent information while completing the questionnaire and 5 subjects were excluded based on the results of the manipulation checks (4 subjects stated to have a clear idea of the objectives of the experiment). Hence, we used a sample of 121 subjects in our final analysis. Of the 121 subjects, 93 were males and 28 were females. Their average age was 23.54 years ( $\sigma=5.22$ ). The average reported years of experience with online shopping was 3.60 ( $\sigma=1.36$ ) and, on average, subjects bought 4.19 ( $\sigma=2.69$ ) products online in the last month. Almost 60% of the subjects were familiar with Groupon.

The field experiment proceeded in four major steps. First, upon arrival at the lab, all subjects received the abovementioned 5 Euro compensation fee, were randomly assigned to a computer desk (i.e., to either the control or one of the two treatment groups) and then connected to the ECG recording device. Second, before subjects were exposed to the experimental website, they were first asked to fill in a pre-experimental questionnaire containing basic questions on socio-demographic data. Then, all participants were presented with an identical sample Groupon webpage that displayed the main components of this DoD website. This was done to allow participants to establish a common frame of reference in order to ensure that the context and background of their experimental experiences were homogeneous across treatments and the disparities across different treatments were caused only by different treatment stimuli (Helson 1964). Third, after viewing the sample webpage, subjects were instructed to put themselves into the perspective of a student learning hard for her exams and searching online for a (legal) stimulant to improve concentration and learning capabilities. As it happened, the student found a DoD website that featured a brand new energy drink. After the scenario presentation, participants were informed that in the next step they would be redirected to the experimental website where they had to make a deal decision under the varying conditions given. In the case participants made a deal and purchased the energy drink, they had to pay the deal with their own money. In the case they were not willing to make a deal, they waited until the deal ended and a window popped up with a link to proceed. Fourth, after making a deal (or no deal) choice, subjects proceeded to complete a post-experimental questionnaire containing the study's principal variables. Finally, subjects were debriefed and thanked for their participation.

## **Data Analysis and Results**

### ***Control Variables and Manipulation Checks***

To confirm random assignment of subjects to the different experimental conditions and to rule out alternative explanations, we performed several one-way ANOVAs. There were no significant differences in gender ( $F = 1.25, p > 0.05$ ), age ( $F = 0.35, p > 0.05$ ), education ( $F = 0.35, p > 0.05$ ), monthly income ( $F = 0.61, p > 0.05$ ), experience with online shopping ( $F = 0.40, p > 0.05$ ), products bought online ( $F = 0.74, p > 0.05$ ), and experience with Groupon website ( $F = 0.57, p > 0.05$ ). Also, no significant differences could be found regarding attitudes toward online shopping ( $F = 1.08, p > 0.05$ ), consumer impulsiveness ( $F = 0.59, p > 0.05$ ), susceptibility to interpersonal influence ( $F = 0.60, p > 0.05$ ), perceived product quality ( $F = 0.28, p > 0.05$ ), and perceived stress before exposure to an experimental condition ( $F = 0.70, p > 0.05$ ), indicating that these factors were not the cause of differences in users' deal choice.

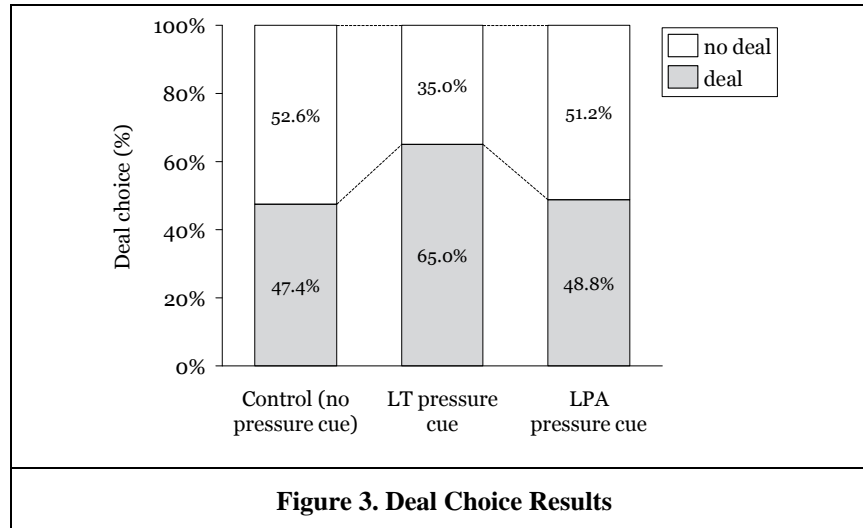
Descriptive statistical analysis of the applied manipulation checks revealed that subjects in the LT pressure cue conditions (except for two persons) clearly recognized a clock next to the Star Energy product picture that depicted the remaining time for this deal, whereas subjects in the LPA pressure cue conditions (except for three persons) clearly recognized a visual cue next to the Star Energy product picture that depicted the amount of remaining deals for this product. One way ANOVAs additionally confirmed these findings (both  $p < 0.05$ ). These results provided strong evidence that the manipulations were successful.

### ***Hypothesis Testing***

#### **Direct Effects of Purchase Pressure Cues on Deal Choice**

A marginally significant one-sample chi-square test revealed that the choice shares varied across the three experimental conditions ( $\chi^2[2] = 3.28; p < 0.10$ ). More importantly, the deal choice share patterns were consistent with our predictions that LT pressure cues are effective in increasing deal choice compared to the control group ( $\chi^2[1] = 5.39; p < 0.05$ ), while LPA pressure cues are not ( $\chi^2[1] =$

0.329;  $p > 0.05$ ). Figure 3 shows that 65.0% of subjects in the LT pressure cue condition chose the deal, while only 47.4% and 48.8% of subjects decided to buy the deal in the control and LPA pressure cue conditions respectively. As such, we could support our two main effect hypotheses formulated in H1a and H1b. A post-hoc analysis also revealed that subjects in the LPA group perceived the deal website significantly less credible than subjects in the LT pressure group ( $t = 1.97$ ;  $p < 0.05$ ) and they did not differ in this respect to subjects in the control group ( $t = 0.87$ ;  $p > 0.05$ ), indicating a potential reason why LPA pressure cues were not effective.



Once the effectiveness of LT pressure cues in influencing consumers' deal choice was established, we proceeded to explore the explanatory (i.e., mediation) mechanism through which LT pressure cues impact deal choice.

### The Mediation Process between LT Pressure Cues and Deal Choice

Regarding our mediation hypotheses that focused on the explanatory mechanism through which LT pressure cues affect consumers' deal choice, we argued that an increase in perceived stress (accompanied by physiological reactions) and, subsequently, in perceived value of the deal product (a cognitive-evaluative response) are primary reasons for LT pressure cues' impact on deal choice.

To test our first mediator hypothesis (H2a), we conducted a one-way ANOVA ( $F = 3.028$ ,  $p < .05$ ) with planned contrasts. Results from the contrast analysis revealed that subjects in the LT group felt significantly more stress compared to subjects in the control group<sup>4</sup> ( $t = 2.410$ ,  $p < .01$ ), in support of H2a. These results using self-reported data were additionally substantiated by comparing the change in subjects' heart rate across the experimental conditions. A one-way ANOVA with planned contrasts revealed that under time constraints (LT group), subjects' heart rate changed (decreased) significantly ( $t = 1.985$ ,  $p < .05$ ). This was in contrast to the findings for subjects in the LPA condition that did not differ in their heart rate from the control group ( $p > .05$ ).

To examine perceived stress' impact on perceived value of the deal product (H2b), we ran a linear ordinary least squares regression on a sub-sample that included only the LT and control groups ( $N = 78$ ). The results indicated that, in support of H2b, perceived stress significantly increased subjects' perceived product value ( $\beta = 0.175$ ,  $p < .05$ ), all else being equal. Furthermore, the results of a logistic regression ( $\beta = 0.703$ ,  $\exp(\beta) = 2.021$ ,  $p < 0.001$ ) revealed that high perceived product value also significantly increased the odds that consumers, exposed to LT pressure cues, will make a deal on the experimental DoD website, hence supporting H2c.

Finally, following Hayes' (2013) recommended procedure, we ran a serial multiple mediator analysis—again on a sub-sample that included only the LT and control groups ( $N = 78$ )—with perceived stress and perceived value as mediators, while controlling for all direct and indirect paths between the mediators and deal choice. The results of the serial multiple mediator analysis are depicted in Tables 1 and 2. The results in Table 1 indicate significant effects of LT pressure cues on perceived stress, of perceived stress on perceived product value, and of perceived product value on deal choice, further

<sup>4</sup> As expected, this effect could not be confirmed for participants exposed to LPA pressure cues ( $t = 0.222$ ,  $p > .05$ ).

validating our results from our previous hypothesis testing. Furthermore, the direct effect of LT pressure cues on consumers' deal choice became insignificant after inclusion of perceived stress and perceived product value, suggesting full mediation (Hayes 2013).

**Table 1. Results from Serial Multiple Mediation Analysis (Coefficients and Model Summary Information)**

Antecedent	$M_1$ (Stress)			$M_2$ (Value)			Y (Deal Choice)		
	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>
X (LT pressure cues)	0.857	0.335	0.013	-0.102	0.308	0.742	0.254	0.555	0.124
$M_1$ (Stress)	—	—	—	0.295	0.101	0.005	-0.085	0.194	0.659
$M_2$ (Value)	—	—	—	—	—	—	0.879	0.236	0.000
Constant	2.012	0.534	0.012	3.238	0.513	0.000	-4.287	1.302	0.001
	$R^2 = 0.08$ $F(1, 78) = 6.53, p = 0.01$			$R^2 = 0.10$ $F(2, 78) = 4.37, p = 0.02$			<i>Nagelkerke</i> $R^2 = 0.32$ <i>Model</i> $\chi^2[3] = 21.32, p < 0.01$		

The results from a bootstrapping analysis in Table 2 show that only the indirect effect path (3) from LT pressure cues via perceived stress and perceived product value to deal choice was statistically significant (i.e., the 95% confidence interval did not include 0), while other potential indirect paths were not. Taken together, these results supported our hypothesis that LT pressure cues' effect on consumers' deal choice is carried over via a serial physiological-cognitive mediation process.

**Table 2. Results from Serial Multiple Mediation Analysis (Bootstrapping Results\* for Indirect Paths)**

Indirect effect paths	<i>Effect z</i>	<i>Boot SE</i>	<i>LLCI</i>	<i>ULCI</i>
(1) LT pressure → Stress → Deal Choice	-0.073	0.209	-0.620	0.231
(2) LT pressure → Value → Deal Choice	-0.089	0.305	-0.790	0.496
(3) LT pressure → Stress → Value → Deal Choice	0.222	0.167	0.039	0.678

*Note:* \*We conducted inferential tests for the indirect effect paths based on 1,000 bootstrap samples generating 95% bias-corrected bootstrap confidence intervals (LLCI = Lower Limit / ULCI = Upper Limit of Confidence Interval).

## Discussion

This work sought to achieve two main objectives: (1) to examine the effects of different salient purchase pressure cues on consumers' buying decisions on commercial websites (i.e., *whether* there is an impact), and (2) to investigate the explanatory mechanism through which these effects occur (i.e., *why* there is an impact). To achieve these objectives, we developed a research model that was embedded in the Stimuli-Organism-Response paradigm (Mehrabian and Russell 1974) and we investigated our hypotheses based on a lab experiment in the context of DoD websites. Drawing on the advantages of the experimental method that allows to isolate the effects of manipulated stimuli on user responses from other confounding variables and thus to unveil causal relationships, we found that LT pressure cues—but not LPA pressure cues—were effective in influencing consumers' purchase decisions. Furthermore, we could demonstrate that neither perceived stress, nor perceived product value alone provided an empirically validated explanation for the positive effect of LT pressure cues on consumers' deal choice. Only when considered together and in consecutive order, perceived stress and perceived product value could be shown to represent a valid explanatory mechanism.

Our study offers several theoretical and practical contributions. From a theoretical perspective, this is, to the best of our knowledge, one of the first empirical studies investigating the differential effects of PPCs on consumers' online buying decisions in e-commerce. In particular, a first major contribution of the paper is a more fine-grained understanding of the impact of LT and LPA pressure cues on

consumers' buying decision. Previous studies have predominantly examined single PPCs without comparing their relative effectiveness in the same context and have also focused primarily on stimuli from the physical environment (Aggarwal and Vaidyanathan 2003; Ahituv et al. 1998; Krishnan et al. 2013). The few existing studies that have examined PPCs in e-commerce settings have left partially inconclusive findings about whether and which PPCs effectively influence online customers' buying decisions. Although such previous findings are highly valuable, the e-commerce literature had not yet theorized about how and why PPCs differ in their impact on online consumers' deal choice. By drawing on consumer decision-making literature and prospect theory grounded in the S-O-R logic, this study provides new theoretical perspectives that expand our understanding about the relative effectiveness of PPCs in influencing online consumers' purchase decisions. Notably, this study demonstrated that not all PPCs are equally conducive in affecting deal choice, suggesting the existence of differential effect mechanisms for different PPCs. More specifically, we could demonstrate that LT pressure cues are effective in influencing deal choice, whereas LPA cues are not. This result adds to previous findings that showed that some pressure cues might be effective in the offline context, but lose their effectiveness when transferred to the online world, given that signals exhibit varying information credibility across different settings (Jeong and Kwon 2012).

A second, broader contribution of this study relates to the theoretical mechanisms through which pressure cues affect individuals' choice behavior. While previous studies in IS research have treated the relationship between pressure cues and decision-making behaviors largely as a black box (e.g., Ahituv et al. 1998), our study explicated the intervening mechanism through which PPCs impact individuals' choice behavior. More specifically, we uncovered a serial mediation process that shows that LT pressure cues first influence consumers' physiological arousal and evoke (perceived) psychological stress. Such psychological stress then affects individuals' cognitive evaluations of the presented product. That is, psychological stress leads consumers to process information heuristically rather than systematically and evokes relatively greater feelings of loss or regret about a potentially missed opportunity (of making a good deal). The salient deal offer therefore becomes increasingly attractive (i.e., valuable), leading, in turn, to a higher probability that consumers ultimately complete the deal. Taken together, by unblackboxing this serial mediation mechanism, we contribute to an advanced understanding about *why* LT pressure cues affect consumers' deal choice behavior in the online context.

Considering the pervasive use of purchase pressure cues on e-commerce websites and the scarce empirical evidence on their effectiveness, the findings of rigorous experimental research should be of high practical value as well. First, our results provide useful guidance for online retailers who wish to deploy effective PPCs that nudge (otherwise indecisive) users towards completing a deal—which, in the absence of PPCs, would most likely not occur. As we could show in our study, not all PPCs are equally conducive in affecting consumers' deal choice. Our findings indicate that providing users with LT pressure cues during inspection of (discounted) products online is significantly more effective than not displaying LT pressure with respect to consumers' deal choice. Thus, a DoD website without LT pressure cues seems to be inferior; that is, LT pressure cues have proven capabilities to significantly change physiological arousal and invoke higher perceived product value in users' interaction with the interface, thus altering their deal choice. E-commerce website providers may thus benefit from this study by carefully testing and monitoring the relative effectiveness of different PPCs on their own websites.

Second, after investigating a wide variety of current practices of using PPCs online, we could conclude that most PPCs currently used on e-commerce websites appear to be designed based on designers' introspection and intuition rather than on rigorous and comprehensive design procedures or guidelines, thus leading to irregular patterns and implementation styles. What is more, the existing resources for designing user interfaces (e.g., Palmer 2002; Shneiderman and Plaisant 2010) provide only general recommendations rather than specific guidelines on the deployment and design of PPCs. These observations demonstrate the need to create and validate various PPCs in order to better guide practitioners and derive best practices based on theory and rigorous experimental testing. To the best of our knowledge, this study is one of the first that provides web designers with useful practical implications on which and how PPCs should be used to influence consumers' deal choice decisions.

Finally, our findings on the effectiveness of LT pressure cues to impact consumers' perceived product value and final deal choice should encourage e-business managers and interface designers to spend more effort and resources on choosing and designing PPCs to influence consumers' buying behavior. PPCs should be selected wisely in order to stimulate positive value perceptions, which in turn impact online purchases. By validating the effectiveness of specific PPCs to increase consumers' probability to make transactions on a website, this study confirms that PPCs can be cost-effective solutions to

influence consumers' buying decisions above and beyond costly marketing solutions including search engine optimization, viral campaigns, or traditional promotion programs.

## Limitations, Future Research and Conclusion

Our results should be interpreted cognizant of six limitations. First, although we used Groupon as experimental website for our study in order to increase its ecological validity, and although we controlled for a potential branding effect with statistical means and through randomization, future research may use more unknown websites that should invoke fewer connotations from previous exposures. Second, consistent with previous research arguing that the use of PPCs may be particularly effective in markets for relatively new and low-cost products (Kirmani and Rao 2000), we created a new and affordable product brand ("Star Energy") for our experiment. Future research could extend and complement our findings by studying the impact of PPCs on consumers' deal choice also for well-known and more expensive products. In addition, examining the moderating role of product type (e.g., search vs. experience goods) and user characteristics (e.g., product involvement or personality traits) may be an interesting avenue for future research on the effectiveness of PPCs. Third, in our study, we focused just on two PPCs, namely on LT and LPA pressure cues. Further investigations are needed to explore the role of other PPCs that are also often used on e-commerce platforms, such as "Deal Value" (e.g., \$195), "Discount" (e.g., 65%), "Extent of Savings" (e.g., \$126) or "Product Popularity" (e.g., over 5000 bought), as well as their impact when presented in combination. Fourth, although we empirically validated the mediating effect of perceived stress and value in the relationship between PPC and deal choice and ruled out several alternative explanations, complementary qualitative research would be a fertile avenue for future research to more deeply explore serial, physiological-cognitive mediation processes (e.g., Mahnke et al. 2015). Fifth, based on a pretest study, we used fixed starting values for our pressure cues (i.e., 1 minute for LT pressure cues and 4 items left in stock) to adequately simulate high-pressure decision contexts. We were aware, however, that choosing such values would constrain our experimental setting to situations in which consumers come to a product website by chance or on short notice without having experiences from previous website visits. Therefore, future research may alter these fixed starting values to include less pressure-intensive decision scenarios which are also common in e-commerce. Finally, the use of a student sample may limit the generalizability of our findings. Although we consider the use of students subjects to be appropriate because students frequently use e-commerce websites, and because we are examining basic purchasing decisions that should be similar in a more general population of e-commerce users, future research should replicate our studies to examine whether the results hold for subject groups with different demographics.

Despite the vast proliferation of PPCs on e-commerce websites, previous research in e-commerce has paid little attention towards understanding the differential effectiveness of PPCs in affecting consumers' buying behavior, even though scholars have recurrently called for examining this timely and theoretically interesting topic (Jeong and Kwon 2012). With this study, we made an important first step towards better understanding which PPCs affect consumers' online buying decisions and why. We hope that it will serve as a springboard for future research studies and also aid online retailers and web designers in crafting more sales-effective e-commerce websites. To the extent that researchers may be willing and able to transfer (parts of) our findings to other product domains and usage settings, our work may also serve as a baseline study that makes it much easier to compare and consolidate findings across studies and contexts.

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