

Arousal or Not? The Effects of Scarcity Messages on Online Impulsive Purchase

Junpeng Guo, Liwei Xin, and Yi Wu^(✉)

College of Management and Economics, Tianjin University, Tianjin, China
{guojp,yiwu}@tju.edu.cn, xinliwei1992@126.com

Abstract. With the proliferation of e-commerce, online promotion strategy of limited quantity and limited-time is widely used by online retailers to entice consumers' purchases. However, few research has investigated the exact effects of such a promotion strategy on consumers' online impulsive purchase. Based on the environmental psychology view, this study focuses on the mediating role of arousal in explaining the influences of scarcity messages in aspects of limited-quantity and limited-time on impulsive purchase. By building an online shop for an actual offline milk tea shop at taobao.com, an experiment with 182 participants was conducted to test our research model. The results provide strong evidence that both the limited-quantity and the limited-time scarcity messages positively influence consumers' perceived arousal, leading ultimately to impulsive purchases. Both theoretical and practical implications are discussed.

Keywords: Environmental psychology · Online impulsive purchase · Scarcity message · Arousal

1 Introduction

Singles' Day – symbolized by its single-digit heavy date, 11/11 – began seven years ago, when unattached college kids went online to hunt for bargains. Alibaba, China's largest e-commerce giant, started offering huge discounts to mark the day. Thereafter, this shopping event has grown exponentially, now being a shopping festival globally. For Singles' Day 2015, the company raked in \$5 billion during the first 90 min of the sale, totaling \$14.3 billion in just 24 h largely through its online shopping platforms, Taobao.com and Tmall.com¹. Singles' Day is a shopping carnival for online consumers, and online shops utilized promotion strategy of limited-quantity and limited-time, in which a limited amount of products are on sale within a given time period, to entice impulsive purchases. The scarcity messages about limited-quantity and limited-time provide online shopping environment that might shape consumers' impulsive purchase decision-making.

Specifically, in a limited-quantity scarcity message, the promotional offer is made available for a predefined quantity of the product. In a limited-time scarcity message,

¹ <http://www.businessinsider.com/how-alibaba-made-143-billion-on-singles-day-2015-11>, accessed at May 8, 2016.

the offer is available for a predefined period, after which the offer becomes unavailable. Scarcity seems to create a sense of urgency among buyers that results in increased quantities purchased, shorter searches, and greater satisfaction with the purchased products, therefore, accompanying impulse buying. Prior research has shown that purchase restrictions are used as informational cues by customers to evaluate promotion strategies [1]. Although, amply studies have emphasized the influences of scarcity messages on impulsive purchases in the offline contexts, scant research has been devoted to the online shopping environment.

Comparing to the offline shopping environment, the two types of scarcity messages are more visible and timely updated. Online consumers are able to view the timely changes of decreasing supply amount and feel the time pressure by counting down the available shopping time. Patterns of manifestation of scarcity message are different in online versus offline environment. IT could easily be designed to manipulate perceptions of scarcity that could be potentially more difficult to manipulate offline. Scarcity messages create a sense of urgency and constitute the dominant stimuli in online environment. Scarcity messages manipulated by IT provide online shopping environment that might shape consumers' impulsive purchase decision-making. Therefore, to bridge the gap, this study aims to elaborate how limited-quantity information and limited-time information to online shopping environment influence the consumers' impulsive purchase.

Consumers often act impulsively when making online purchase decisions, triggered by easy access to products, easy purchasing (e.g., 1-Click ordering), lack of social pressures, and absence of delivery efforts [2]. The marketing and IS literatures show that impulse purchase can be studied from the state of mind created by the online shopping environment [3]. Prior literature has demonstrated the irrationality of impulse purchase decision-making from the online shopping environment perspective. Verhagen and van Dolen [4] suggested that the irrational decision-making of online impulsive purchase occurs without a thoughtful consideration of why and for what reason one needs the product. Specifically, there are two core elements characterizing this irrational impulse buying decision-making. First, the process is unplanned and lacks cognitive deliberation. Second, emotions dominate the impulse buying process [4]. Therefore, this study draws on the environmental psychology view and posits that arousal stimulated by online shopping environment (i.e., limited-quantity scarcity message, limited-time scarcity message) affects consumers' impulsive purchase.

To fill the above research gaps, this study aims to address the following research questions:

- (1) What are the impacts of limited-quantity scarcity message and limited-time scarcity message on online consumers' arousal toward impulsive purchase?
- (2) How does consumers' arousal lead to online impulsive purchase?

By answering these research questions, this study provides the following theoretical contributions. First, this proposal examines the mechanism through which online scarcity messages influence consumer impulsive responses and investigates the impacts of scarcity messages on online impulsive purchase. Second, this study enriches the irrational decision-making literature of impulsive purchase from the perspective of arousal.

In addition, this study is with its practical contributions. On one hand, it provides design guidelines on successful use of limited-quantity and limited-time promotion strategy. On the other hand, this proposal also suggests that online consumers should pay close attention on their emotional responses toward the online promotion strategy.

2 Literature Review

2.1 Online Impulsive Purchase

Impulsive purchase is defined as “a purchase that is unplanned, the result of an exposure to a stimulus, and decided on the spot” [5]. The stimulus in the definition can be an actual product, service, or the extrinsic attributes of the product, such as the shopping environment or atmosphere. On the one hand, when exposed to a stimulus, an individual experiences a sudden, spontaneous urge or desire to buy the stimulus, regardless of the impetus (e.g., individual trait or environmental cue) [6]. On the other hand, the impulsive purchase occurs only after the individual first experiences the urge to purchase impulsively [6].

Impulsive purchase is distinguished from unplanned purchase. Unplanned purchase is “the purchase of a product that was not planned prior to entering the store” [7]. The term “impulse buying” refers to a narrower and more specific range of phenomena than “unplanned purchasing” does. More importantly, it identifies a psychologically distinctive type of behavior that differs dramatically from contemplative modes of consumer choice [6]. This study focuses on impulse buying, which occurs when a consumer experiences a sudden, often powerful and persistent urge to buy something immediately.

The urge to buy impulsively (UBI) is defined as “the state of desire that is experienced upon encountering an object in the environment” [8], it is a qualified and reasonable proxy for actual impulsive purchase [9–11]. Additionally, it is suggested that not all impulsive urges are acted upon, and the greater the number of urges experienced, the higher is the likelihood that an impulse purchase will occur [8]. Although it is a qualified and reasonable proxy for actual impulsive purchase, the urge to buy impulsively, which can be restricted by many factors (e.g., money, time, product availability), is not equivalent to actual buying. Therefore, this study focuses on consumers’ actual impulsive purchases as the research outcome.

Ample studies have investigated the role of environmental cues on online impulsive purchase, mainly from the perspective of website quality characteristics [e.g., 4, 9, 11–13]. With the advances of e-commerce, a new type of promotion strategy, i.e., limited-quantity and limited-time offer, is widely used by online retailers to entice consumers’ impulsive purchases. For instance, Alibaba, China’s largest e-commerce giant, holds sale-events utilized this limited-quantity and limited-time offer on Singles’ day. The success of the limited-quantity and limited-time offer relies on e-commerce websites’ capabilities in timely updating the information of quantity and time for online consumers. The information of limited-quantity and information of limited-time are viewed as scarcity messages [14], and these two types of information constitute of the online informational environment for consumers.

2.2 The Environmental Psychology View of Online Scarcity Message

The environmental psychology view proposes that environmental stimuli are linked to behavioral responses by the primary emotional responses of arousal, pleasure, and dominance [15]. Environmental psychology has been used when investigating online impulsive purchase, which extend our knowledge of online environment and impulsive purchase [12]. Environment factors (e.g., scarcity messages) influence people's affective responses to the environment, which in turn induce people to approach or avoid the environment [15]. Emotion of affective response can be classified based on three independent and bipolar dimensions: pleasantness, arousal, and dominance [16]. Subsequent research has found that pleasantness and arousal explain most of the variance in affect and behavior, and arousal is the most critical type of emotional state [17, 18]. However, few research has confirmed the connection between scarcity messages and pleasantness. Literature has also presented that there is no significant differences of pleasantness among individuals in response to scarcity condition [19]. Therefore, this study focuses on arousal as the consumers' emotional state from the online informational environment.

Arousal is defined as the neurophysiological basis underlying all processes in the human organism, ranging from sleep to excitement with intermediate states of drowsiness to alertness [16]. It is the basis of emotions, motivation, information processing, and behavioral reactions [20]. Donovan and Rossiter [18] showed that arousal-nonarousal dimension taps the degree to which a person feels alert, excited, stimulated or active in the situation. In particular, there are two types of arousal: excited arousal and competitive arousal. On one hand, excited arousal is feelings of excitement reflecting high levels of arousal combined with high levels of pleasure and joy, where environmental cues (e.g., warm color, fast music tempo, scent) would activate excited arousal [21]. On the other hand, competitive arousal is an adrenaline-laden emotional state that can arise during competitive interactions [22], where arousal based on rivalry, time pressure, and audience effects can trigger the desire to win [23].

Prior research has theorized potential theoretical connections between scarcity messages and arousal [14, 24]. Research on activation and attention explicates that arousal is typically produced by input changes to which an organism is unaccustomed, particularly when the input is scarce, surprising, and novel [24]. According to Cialdini [14], when something that people like is less available, they become physically agitated, such that their focus narrows, emotions rise, and cognitive processes are often suppressed by "brain-clouding arousal". Zhu and Ratner [19] examined the underlying mechanisms of scarcity polarizes preferences, demonstrating that the effect of scarcity salience on choices is mediated by consumers' perceived arousal.

3 Research Model and Hypotheses

The research model is presented in Fig. 1.

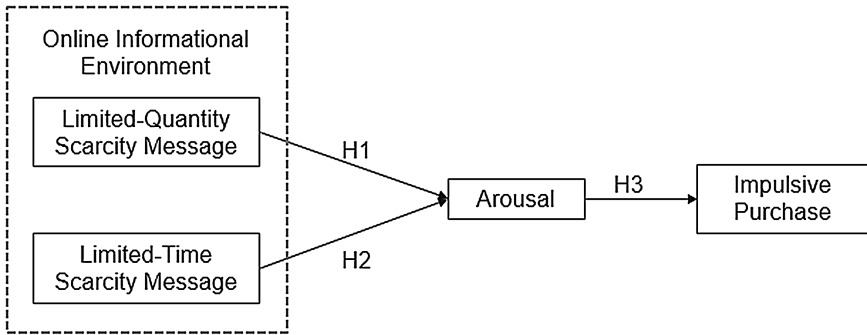


Fig. 1. Research model

3.1 Effects of Scarcity Messages on Arousal

A limited-quantity scarcity message (LQS) offer is restricted to a set number of units. Units are limited, often administered on a first-come, first-served basis, and run until sell out. This creates a sense of time pressure and uncertainty for an LQS deal. Combining to the retail auctions, consumer under time pressure are believed to elicit an excited arousal [25] and research has shown that time pressure increases arousal [26].

Furthermore, consumers compete for the advantageous inequity that accrues to the recipient of promotions [27]. The promotion of LQS, companying with time pressure and rivalry, makes a consumer feel that him- or herself in direct competition with other consumers. Such a situation will stimulate the consumer and result in competitive arousal. Prior studies show that time pressure, rivalry and audience effects increase competitive arousal that a consumer experiences [23]. As well as the similar situation in the auctions, the object is limited and bidding under time pressure with rival, which significantly stimulates competitive arousal and affects the consequences [22, 25]. Therefore, we propose that:

H1: High LQS leads to higher perceived arousal of consumers than low LQS.

In the case of limited-time scarcity message (LTS), consumers can buy the product at any moment within a period of time, and the supply is abundant but time is scarce. Consumers only have to complete the deals before the deadline. Even the consumers know the existence of vast others, there is no conflict of interest between each other and competitive arousal in consumers. However, obtaining a bargain becomes more like “winning” a bargain, where the bargain provides both utilitarian as well as hedonic fulfillment [28]. Scarce products on sale open a gate to obtain the bargain and stimulate the emotion, consumers feel excited or joy because of the utilitarian satisfaction. In addition, a festival’s programme content can affect both attendees’ emotions and hedonism [29]. LTS is the core feature of the online promotion strategy and motivates consumers’ purchase intention as attending the event is outside the daily routine. Furthermore, scarcity appeal plays an important strategic role to create an excitement around promotions [30]. Research on activation and attention explicates that arousal is

typically produced by input changes to which an organism is unaccustomed, particularly when the input is scarce, surprising, and novel [24]. Therefore, we hypothesize that:

H2: High LTS leads to higher perceived arousal of consumers than low LTS.

3.2 Effects of Arousal on Urge to Buy Impulsively

The affective reactions to the environment will determine an individual's response, e.g., urge to buy impulsively [15]. In a traditional shopping context, a positive relationship has been found between positive affective reactions (i.e., enjoyment) and UBI [8]. In the online context, perceived enjoyment will have a positive effect on the impulsive urge to buy [9, 31]. Moreover, we focus specifically on time pressure and the inherent social competition under online promotion strategy, as these factors are considered to be the main drivers for so-called competitive arousal. In auctions, such competitive arousal may ultimately lead to auction fever [22, 23]. With respect to auction fever, competitive arousal theory suggests that arousal can impair the bidders' decision-making, and push them to bid past their limits [23]. Adam, Krämer [25] showed that affective processes have a definite influence on human decision making when bidders compete with human opponents. In addition, excitement has a positive effect on desire to stay at the mall and increases patronage intentions [32]. Therefore, we posit that:

H3: Arousal is positively related to consumers' urge to buy impulsively.

4 Research Methodology

4.1 Experimental Design

A lab experiment with a 2 (i.e., limited-quantity: high vs. low) \times 2 (i.e., limited-time: high vs. low) factorial design was conducted to test the proposed hypotheses. LQS and LTS were shown on a real online retailer webpage by manipulating the number of restricted products and time of discounts. We selected milk tea coupons as our product category due to their popularity among Chinese college students and product affordability. Particularly, all products are on sale and discount settled according to the actual situation of Tmall.com on Singles' Day. Accordingly, in our manipulation, we set the number of deals to 200 to present low scarcity in terms of quantity, and the number of promotional deals to 20 to present high scarcity in terms of quantity. Discount time was set to 1 h and 10 min on the webpage.

4.2 Sample and Experimental Procedures

Participants in this experiment were students at a large public university. Prior to the experiment, participants were asked to provide information about demographics and online shopping experience. 182 participants were recruited to take part in the experiment. Participants were randomly assigned to four experimental conditions. The random assignment was performed once for every participants. They were presented an

experimental website with different experimental treatments in which they can browse the product information. Participants were told to imagine that the scenario is real and browse the website carefully. Afterwards, participants were instructed to complete a questionnaire that contained measurement items of the research variables (shown in Appendix). The measures utilized a 7-point Likert-type scale anchored by 1 (Strongly Disagree) and 7 (Strongly Agree). Finally, participants were debriefed and thanked.

5 Data Analysis and Results

5.1 Subject Demographics and Background Analysis

Among the 182 valid participants, 109 were female. The age of the participants ranged from 18 to 23, with the average online shopping experience being 3.51 years. No significant differences were found among participants assigned randomly to each of the four experimental conditions with respect to age, gender, online shopping experience, and daily plan for buying beverages, indicating that participants' demographics were quite homogeneous across different conditions.

5.2 Manipulation and Measurement

Scarcity manipulation was checked for with the questions "How available do you think are the limited-quantity products?" and "How available do you think are the limited-time products?," and the responses were based on a seven-point scale from "extremely sufficient" to "extremely insufficient" [33]. Participants in the low-quantity condition reported a mean value of 4.37 for the extent of perceived scarcity (standard deviation, 1.510), and participants in the high-quantity condition reported a mean value of 3.37 for the extent of perceived scarcity (standard deviation, 1.692). The difference was significant ($t = -4.221$, $p < 0.001$), and hence, manipulation for LQS worked as anticipated. On a seven-point Likert scale, participants in the low-time condition reported a mean value of 4.47 for the extent of perceived scarcity (standard deviation, 1.592), and participants in the high-time condition reported a mean value of 3.17 for the extent of perceived scarcity (standard deviation, 1.554). The difference was significant ($t = -5.591$, $p < 0.001$), and hence, the manipulation for LTS worked as anticipated.

Four items were adapted to measure arousal from Russell and Mehrabian [16] (Cronbach's alpha = 0.812; see Appendix). Exploratory factor analysis showed that in general, items loaded well on their intended factors and lightly on the other factor, thus indicating adequate construct validity (see Table 1). Impulsive purchase was measured by the actual number of coupons a participant bought in his/her order. If a participant did not place an order, we coded his/or impulsive purchase as "0". In addition, impulsive purchase was considered effective only if a participant had no plan to buy a beverage on the day of the experiment. If not, impulsive purchase of that participant was adjusted to "0". Data on participants' impulsive purchase was collected from the objective transactions on our Taobao shop. We included in the model several control variates that affect consumers' impulsive purchase. The literature on impulsive purchase suggests that consumers' price consciousness affects their purchase behavior [34]. In addition, gender,

age, and online shopping self-efficacy are governing factors as well. To control for consumers' online shopping self-efficacy, we adapted measurements from Compeau and Higgins [35]. The correlation matrix is reported in Table 2.

Table 1. Results of factor analysis

	Perceived arousal	Price consciousness	Online shopping self-efficacy
arl1	.813	.012	.161
arl2	.811	.024	.002
arl3	.769	-.095	.051
arl4	.791	.120	.022
priCon1	.141	.726	.056
priCon2	.022	.766	-.077
priCon3	-.038	.745	-.002
priCon4	-.073	.809	-.092
onSSE1	.058	-.024	.822
onSSE2	.027	-.072	.907
onSSE3	.016	.067	.867
onSSE4	.118	-.090	.758

Table 2. Variable Correlations Matrix

	M	SD	AVE	CR	CA	Gender	Age	PC	OSSE	PA
Gender	0.599	0.492	–	–	–	–				
Age	20.132	0.850	–	–	–	0.003	–			
PC	3.188	1.043	0.585	0.849	0.768	-0.052	-0.081	0.765		
OSSE	5.631	1.091	0.708	0.906	0.864	0.011	-0.009	-0.083	0.841	
PA	4.089	1.237	0.633	0.873	0.813	-0.023	-0.056	0.012	0.148	0.796
IP	0.918	1.583	–	–	–	-0.092	0.107	-0.147	0.101	0.107

Notes. PC = price consciousness; OSSE = online shopping self-efficacy; PA = perceived arousal; IP = impulsive purchase; M = mean; SD = standard deviation; AVE = average variance extracted; CR = composite reliability; CA = Cronbach's alpha.

5.3 Results Pertaining to Perceived Arousal

An analysis of variance (ANOVA) was conducted to detect the joint effects of limited-quantity and limited-time on arousal. ANOVA with perceived arousal as the dependent variable revealed the significant effects of the LQS message ($F(1,180) = 41.466, p < 0.01$) and the LTS message ($F(1,180) = 34.797, p < 0.01$). In general, the high-LQS and -LTS conditions led to higher perceived arousal than the low-LQS and -LTS conditions. Hence, H1 and H2 are supported.

5.4 Results Pertaining to Impulsive Purchase

PLS was used to test the proposed structural model. The measurement model was first assessed by examining (1) individual item reliability, (2) internal consistency, and (3) discriminant validity [36]. The measurement items load generally on their respective constructs, thus demonstrating adequate reliability (Table 1). The high composite reliability and Cronbach's alpha scores shown in Table 2 indicate satisfactory consistency.

The diagonal elements in Table 2 represent the square roots of average variance extracted (AVE) of the latent variables, while the off-diagonal elements represent the correlations among latent variables. For adequate discriminant validity, the square root of the AVE of any latent variable should be greater than the correlation between that particular latent variable and other latent variables [36]. The data presented in Table 2 satisfy this requirement. Moreover, in Table 1, the loadings of indicators on their respective latent variables are higher than the loadings of other indicators on these latent variables, and the loadings of these indicators on other latent variables, thus lending further evidence to discriminant validity.

Bootstrap resampling was performed on the structural model to examine path significance. The results indicate that perceived arousal has a significant and positive effect on impulsive purchase, suggesting H3 is supported. To ensure that our findings are not confounded by other variables, we controlled for the potential effects of gender, age, price consciousness, and online shopping self-efficacy. All control variables have significant influences on the dependent variable.

6 Discussion and Conclusion

6.1 Discussion of Key Findings

The results supported all hypotheses. The degree of scarcity in terms of quantity and time was manipulated within an online environment to investigate the influence of scarcity messages on impulsive purchase. The results show that limited-quantity and limited-time scarcity messages positively influence impulsive purchase. In sum, scarcity messages can maximize impulsive behavior when arousal is stimulated through the provision of scarcity messages in terms of limited-quantity and limited-time.

6.2 Implications

Drawing on the online impulse buying literature and the environmental psychology theory, this study proposes a theoretical model to explain the effect of online scarcity messages. Regardless of the website characteristics, this study suggests that context of website plays an important role in the impulsive purchase process. Promotional discounts are effective and limited-quantity scarcity message (LQS) and limited-time scarcity message (LTS) extremely fuel the enthusiasm for the products, which lead to the special emotion: arousal. The study explains the effectiveness of LQS and LTS appeals, and expects to find that different types of scarcity messages have distinct effects on consumer excited arousal and competitive arousal.

In addition, this study is with practical contributions. First, for product managers interested in creating an excitement and competition around their promotions, scarcity appeal has played a considerable strategic role. Managers can draw on LQS (e.g., releasing a new brand) and LTS (e.g., expanding sales) for generating buyer enthusiasm. Secondly, there is one noteworthy emotion for consumers. Arousal unconsciously manipulated by the retailers by using the scarcity messages and aim at promoting consumption. Being care for controlling arousal for consumers is an effective way to avoid impulsive buying.

6.3 Conclusion

Drawing on the online impulse purchase literature and environmental psychology, we proposed and tested a theoretical model to explain the effects of online scarcity messages in the business market. Regardless of website characteristics, our findings suggest that the online informational environment plays an important role in impulsive purchase. Promotional discounts are effective, and specifically, LQS and LTS are extremely instrumental in fueling the enthusiasm for purchasing products by triggering consumers' arousal. This study provides a foundation for understanding how scarcity messages influence their impulsive purchase behaviors. Our results reveals that the limited-quantity and LTS messages generate arousal, which, in turn, influences consumers' impulsive purchase. These results serve as a basis for future theoretical developments in the area of scarcity message and online impulsive purchase to guide practice.

Appendix A. Measurement Items

Scarcity	[33] (7-point Likert Scale)
Limited quantity	How available do you think the limited-quantity products are? "extremely sufficient" to "extremely insufficient"
Limited time	How available do you think the limited-time products are? "extremely sufficient" to "extremely insufficient"
Arousal	[16] (7-point Likert Scale)
ar1	Relaxed-Stimulated
ar2	Calm-Excited
ar3	Sleepy-Wide awake
ar4	Unaroused-Aroused
Price consciousness	[34] (7-point Likert Scale)
priCon1	I am not willing to go to extra effort to find lower prices
priCon2	I will grocery shop at more than one store to take advantage of low prices
priCon3	The money saved by finding low prices is usually not worth the time and effort
priCon4	I would never shop at more than one store to find low prices
priCon5	The time it takes to find low prices is usually not worth the effort
Online shopping Self-efficacy	[35] (7-point Likert Scale)
onSSE1	I could complete the online shopping if there was no one around to tell me what as I go
onSSE2	I could complete the online shopping if I had never used a shopping website
onSSE3	Wherever an organizational change takes place to a shopping website, I'm sure I can handle it
onSSE4	I could complete the online shopping If I had seen someone else using a shopping website before trying it myself

References

1. Gabler, C.B., Reynolds, K.E.: Buy now or buy later: the effects of scarcity and discounts on purchase decisions. *J. Mark. Theory Pract.* **21**(4), 441–456 (2013)
2. Jeffrey, S.A., Hodge, R.: Factors influencing impulse buying during an online purchase. *Electron. Commer. Res.* **7**(3–4), 367–379 (2007)
3. Koo, D.-M., Ju, S.-H.: The interactional effects of atmospherics and perceptual curiosity on emotions and online shopping intention. *Comput. Hum. Behav.* **26**(3), 377–388 (2010)
4. Verhagen, T., van Dolen, W.: The influence of online store beliefs on consumer online impulse buying: a model and empirical application. *Inf. Manage.* **48**(8), 320–327 (2011)
5. Piron, F.: Defining impulse purchasing. *Adv. Consum. Res.* **18**, 509–514 (1991)
6. Rook, D.W.: The buying impulse. *J. Consum. Res.* **14**(2), 189–199 (1987)
7. Park, C.W., Iyer, E.S., Smith, D.C.: The effects of situational factors on in-store grocery shopping behavior: the role of store environment and time available for shopping. *J. Consum. Res.* **15**(4), 422–433 (1989)
8. Beatty, S.E., Ferrell, M.E.: Impulse buying: modeling its precursors. *J. Retail.* **74**(2), 169–191 (1998)
9. Parboteeah, D.V., Valacich, J.S., Wells, J.D.: The influence of website characteristics on a consumer's urge to buy impulsively. *Inf. Syst. Res.* **20**(1), 60–78 (2009)
10. Xiang, L., et al.: Exploring consumers' impulse buying behavior on social commerce platform: the role of parasocial interaction. *Int. J. Inf. Manage.* **36**(3), 333–347 (2016)
11. Wells, J.D., Parboteeah, V., Valacich, J.S.: Online impulse buying understanding the interplay between consumer impulsiveness and website quality. *J. Assoc. Inf. Syst.* **12**(1), 32–56 (2011)
12. Adelaar, T., et al.: Effects of media formats on emotions and impulse buying intent. *J. Inf. Technol.* **18**(4), 247–266 (2003)
13. Wu, I.-L., Chen, K.-W., Chiu, M.-L.: Defining key drivers of online impulse purchasing: a perspective of both impulse shoppers and system users. *Int. J. Inf. Manage.* **36**(3), 284–296 (2016)
14. Cialdini, R.B.: *Influence: Science and Practice*, vol. 4. Pearson Education, Boston (2009)
15. Mehrabian, A., Russell, J.A.: *An Approach to Environmental Psychology*. The MIT Press, Cambridge (1974)
16. Russell, J.A., Mehrabian, A.: Evidence for a three-factor theory of emotions. *J. Res. Pers.* **11**(3), 273–294 (1977)
17. Russell, J.A., Pratt, G.: A description of the affective quality attributed to environments. *J. Pers. Soc. Psychol.* **38**(2), 311 (1980)
18. Donovan, R.J., Rossiter, J.R.: Store atmosphere: an environmental psychology approach. *J. Retail.* **58**(1), 34–57 (1982)
19. Zhu, M., Ratner, R.K.: Scarcity polarizes preferences: the impact on choice among multiple items in a product class. *J. Mark. Res.* **52**(1), 13–26 (2015)
20. Bagozzi, R.P., Gopinath, M., Nyer, P.U.: The role of emotions in marketing. *J. Acad. Mark. Sci.* **27**(2), 184–206 (1999)
21. Wu, C.-S., Cheng, F.-F., Yen, D.C.: The atmospheric factors of online storefront environment design: an empirical experiment in Taiwan. *Inf. Manage.* **45**(7), 493–498 (2008)
22. Malhotra, D.: The desire to win: the effects of competitive arousal on motivation and behavior. *Organ. Behav. Hum. Decis. Process.* **111**(2), 139–146 (2010)
23. Ku, G., Malhotra, D., Murnighan, J.K.: Towards a competitive arousal model of decision-making: a study of auction fever in live and Internet auctions. *Organ. Behav. Hum. Decis. Process.* **96**(2), 89–103 (2005)
24. Pribram, K.H., McGuinness, D.: Arousal, activation, and effort in the control of attention. *Psychol. Rev.* **82**(2), 116 (1975)

25. Adam, M.T.P., Krämer, J., Müller, M.B.: Auction fever! how time pressure and social competition affect bidders' arousal and bids in retail auctions. *J. Retail.* **91**(3), 468–485 (2015)
26. Maule, A.J., Hockey, G.R.J., Bdzola, L.: Effects of time-pressure on decision-making under uncertainty, changes in affective state and information precessing strategy. *Acta Psychol.* **104**, 283–301 (2000)
27. Barone, M.J., Roy, T.: Does exclusivity always pay off? Exclusive price promotions and consumer response. *J. Mark.* **74**(2), 121–132 (2010)
28. Garretson, J.A., Burton, S.: Highly coupon and sale prone consumers: benefits beyond price savings. *J. Advertising Res.* **43**(02), 162–172 (2003)
29. Grappi, S., Montanari, F.: The role of social identification and hedonism in affecting tourist re-patronizing behaviours: the case of an Italian festival. *Tourism Manage.* **32**(5), 1128–1140 (2011)
30. Aggarwal, P., Jun, S.Y., Huh, J.H.: Scarcity messages. *J. Advertising* **40**(3), 19–30 (2011)
31. Chang, H.-J., Yan, R.-N., Eckman, M.: Moderating effects of situational characteristics on impulse buying. *Int. J. Retail Distrib. Manage.* **42**(4), 298–314 (2014)
32. Baker, J., Wakefield, K.L.: How consumer shopping orientation influences perceived crowding, excitement, and stress at the mall. *J. Acad. Mark. Sci.* **40**(6), 791–806 (2011)
33. Eisend, M.: Explaining the impact of scarcity appeals in advertising: the mediating role of perceptions of susceptibility. *J. Advertising* **37**(3), 33–40 (2008)
34. Lichtenstein, D.R., Ridgway, N.M., Netemeyer, R.G.: Price perceptions and consumer shopping behavior: a field study. *J. Mark. Res.* **30**(2), 234–245 (1993)
35. Compeau, D.R., Higgins, C.A.: Computer self-efficacy: development of a measure and initial test. *MIS Q.* **19**(2), 189–211 (1995)
36. Barclay, D., Higgins, C., Thompson, R.: The partial least squares (PLS) approach to causal modeling: Personal computer adoption and use as an illustration. *Technol. Stud.* **2**(2), 285–309 (1995)