What makes deal-of-the-day promotions really effective? The interplay of discount and time constraint with product type

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ABSTRACT

Deal-of-the-day (DoD) promotions are nowadays very popular. As a special form of a price promotion, they allow firms to offer products at substantial price discounts, usually at or above 50%, for a very limited period of time, usually between one and seven days. Conventional wisdom suggests that both characteristics, high discount levels and tight time constraints, should make DoDs an effective form of a price promotion. However, the two characteristics do not necessarily combine to increase DoD effectiveness. In particular, the authors propose that depending on the type of a promoted product (utilitarian vs. hedonic), the attention that consumers pay to the discount level relative to the time constraint varies, which leads to differences in promotional effectiveness. Two studies, a lab experiment and a field study using data from the DoD platform Groupon, mostly confirm these hypotheses: the time constraint increases promotional effectiveness more for hedonic than for utilitarian products, whereas the discount level increases promotional effectiveness for utilitarian more than for hedonic products. In the Groupon data, very high discount levels actually decrease promotional effectiveness for hedonic products. The results suggest that designers of DoD promotions should consider the type of a promoted product when choosing appropriate time constraints and discount levels.

1. Introduction

The popularity of deal-of-the-day (DoD) promotions has increased substantially in recent years. New Internet startups use DoD promotions as stand-alone business models (e.g., dealadaysites.com), and traditional retailers and large incumbents integrate these models into their online shops (e.g., Walmart's "Value of the Day," Amazon's "Gold Box," eBay's "Daily Deal").

Conceptually, DoD promotions differ from other price promotions in two main ways. First, they offer products (goods or services) to consumers at substantial price discounts, usually at or above 50%. Second, they are valid only for a limited time, usually between one and seven days. As consumers typically enjoy saving money when purchasing products, the discount level (i.e., amount of savings) should enhance the appeal of an offer and increase purchase likelihood (e.g., Chandon, Wansink, & Laurent, 2000). This positive discount level effect is a well-established finding (e.g., Sethuraman, 1996; Srinivasan, Popkowski-Leszczyc, & Bass, 2000). Some indications (albeit fewer than the findings related to discount levels) suggest that a time constraint increases purchase likelihood too (e.g., Inman, Peter, & Raghubir, 1997), because consumers interpret it as a signal of a good deal. Consequently, the combination of these two characteristics—high discount levels and tight time constraints—should make DoDs an especially effective form of price promotion.

Yet in practice, benefiting from DoD promotions remains a challenge. Among Dholakia's (2011a,b, 2012) multiple studies on the topic, a survey of 150 businesses reveals that one-third suffered unprofitable DoD initiatives (Dholakia, 2011a). In another study with 324 businesses, Dholakia (2011b) indicates that 26.6% lost money. For businesses offering promotions through Groupon, a prime example of DoD websites, approximately 40% emerged as unprofitable (Dholakia, 2012). Initial research in this context implicitly points toward too high discounts as a potential reason for this finding (Dholakia & Kimes, 2011; Kumar & Rajan, 2012; Ong, 2015).

In view of the conflict between the promise and the outcomes of DoD promotions, we aim to provide a better theoretical understanding and empirical support to identify whether and in which conditions the high discount levels and tight time constraints of a DoD promotion contribute to promotional effectiveness. Drawing on information

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processing literature (e.g., Chaiken, 1980; Petty & Cacioppo, 1986), we argue that the evaluation of a DoD promotion by consumers is not only determined by the discount level and the time constraint but also is a function of how consumers process the information that these characteristics provide.

Specifically, depending on the purchase situation and thus the type of the promoted product (utilitarian vs. hedonic), the attention that consumers pay to the discount level *relative* to the time constraint should vary. In a utilitarian purchase situation, consumers are motivated to encode discount information systematically. In a hedonic purchase situation, they instead are more prone to use heuristic (non-price-related) cues, such as time constraints, to evaluate the attractiveness of the DoD promotion. With this reasoning, we offer differentiated predictions about how the type of the promoted product (utilitarian vs. hedonic) interacts with the discount level and the time constraint to determine the effectiveness of a DoD promotion.

We test our interaction hypotheses with both experimental (lab setting) and field (transactional data from Groupon) data. The time constraint increases promotional effectiveness more for hedonic than for utilitarian products. In contrast, the discount level increases promotional effectiveness for utilitarian more than for hedonic products. These results thus confirm that the promotional effectiveness of DoDs differs with the type of the promoted product.

We also find a notable unexpected result: Very high discount levels actually *decrease* promotional effectiveness for hedonic products in the Groupon data, an observation that we obtained by modeling nonlinearities. This result extends prior literature on the (generally positive) discount level effect in price promotions. As an explanation, we propose that the extremely high discount levels that sometimes appear in DoD practice may make consumers skeptical of the deal's value.

In the next section, we discuss how our research adds to existing literature on sales promotions (including DoDs). Then we develop a framework based on information processing literature to develop specific hypotheses about the respective effects of the discount level and time constraint in DoD promotions, depending on the type of the promoted product. We submit these hypotheses to empirical testing in a controlled lab setting (Study 1) and with Groupon data (Study 2). We conclude with a discussion of our findings and some avenues for on-going research.

2. Previous research: discount levels and time constraints in sales promotions

With our focus on the discount level and time constraint of a DoD promotion, our study primarily relates to sales promotion research (including on DoD promotions) that deals explicitly with these characteristics.

2.1. Price discounts in sales promotions

Extant research on price discounts in sales promotions can be categorized into two main streams. The first focuses on how consumers process information included in a price discount. That is, consumers' perceptions of discounts generally increase with increasing discount levels (Berkowitz & Walton, 1980; Della Bitta, Monroe, & McGinnis, 1981; Mobley, Bearden, & Teel, 1988). In addition, consumers actively process and encode the savings that result from a discount, and the subjectively perceived discount level typically differs from the (objectively) advertised discount level (Blair & Landon, 1981; Dholakia & Kimes, 2011; Gupta & Cooper, 1992; Mobley et al., 1988). These findings are crucial for our hypothesis development.

The second stream seeks to estimate the impact of the discount level on various effectiveness measures, such as sales or market share. Consensus exists that increasing discount levels enhance effectiveness, at least short-term (e.g., Sethuraman, 1996; Srinivasan et al., 2000). In the specific context of DoD promotions, only a few studies estimate a

discount effect and indicate a relatively small (Byers, Mitzenmacher, & Zervas, 2011; Dholakia & Kimes, 2011) or even no (Park & Chung, 2012) effect. These researchers posit that discounts in DoD promotions may be already so high that any further increases have only relatively small impacts on demand. This reasoning is consistent with other studies that analyze the functional form of the discount level effect in sales promotions and note that the effect is subject to certain nonlinearities, especially saturation at particularly high discount levels (Van Heerde, Leeflang, & Wittink, 2001; Wisniewski & Blattberg, 1983).[4]

However, no prior studies explicitly control for the type of promoted product (utilitarian vs. hedonic), which we propose as an alternative explanation of small discount level effects. Moreover, in a DoD promotion, the low price elasticity could result from time constraints, which provide informational stimuli beyond the discount level. To disentangle these two effects, it is necessary to investigate both key characteristics simultaneously.

2.2. Time constraints in sales promotions

Time constraints have received some attention in sales promotion research, though far less than price discounts have. The related literature can be categorized in the same way we classified price discounts. A first stream focuses on how consumers process information provided by a time constraint stimulus, and the existing studies show that consumers use constraints (e.g., purchase constraint, time constraint) as heuristic cues to evaluate a promotion. These studies also argue that a time constraint improves consumers' evaluation of a promotion, by signaling that an object is valuable or desirable (Inman et al., 1997). Shen (2013) refines these results, showing that consumers use a tight time constraint to develop direct, positive product evaluations only if the advertising message confirms the positive signal exerted by the cue (i.e., when the message is strong). Again, insights from this research stream are crucial for our hypothesis development.

The second stream pertains to studies that concentrate on the impact of a time constraint on various promotional effectiveness measures. These studies provide empirical evidence that the presence of a time constraint accelerates purchases, decreases the likelihood of searching for better deals, leads to greater willingness to buy, as well as to a more favorable attitude toward the deal (Aggarwal & Vaidyanathan, 2003; Inman et al., 1997).[5] In the specific context of DoDs, only one study focuses explicitly on estimating a time constraint effect; Dholakia (2011a) shows that the number of days a deal is offered decreases the number of deals sold. However, this study does not explicitly control for different discount levels, which, as discussed before, also likely influence promotional effectiveness.

2.3. Contributions

Taken together, existing literature on price discounts and time constraints provide several valuable insights that can be applied to the specific context of a DoD promotion. But prior studies also are limited in their ability to understand and evaluate the precise, respective effects of the discount level and the time constraint on promotional effectiveness. With this study, we therefore contribute to existing research in four ways. First, no prior study has considered the time constraint in combination with the *high* discount levels that characterize DoD

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[4] Some researchers also find that "too high" discount levels may harm promotional effectiveness (e.g., Krishna, Briesch, Lehmann, & Yuan, 2002), possibly because consumers interpret a too-high discount level as a signal of a lack of quality (e.g., Völckner & Hofmann, 2007).

[5] Inman et al. (1997) refine this view by showing that whether a time constraint increases purchase likelihood depends on the discount level of the promotion, such that the positive constraint effect is active only at high but not at low discount levels (these authors use 20% and 5% discounts). Because DoD promotions generally include high discount levels, such an interaction effect is unlikely to occur in a DoD context.

promotions (see Sections 2.1 and 2.2; Inman et al.'s (1997) use of 5% and 20% discounts). By studying the effects of price discounts and time constraints simultaneously, we can disentangle their respective influences on the effectiveness of a DoD promotion.

Second, we investigate whether the discount level effect and the time constraint effect interact with the purchase situation or the type of promoted product (utilitarian vs. hedonic). Even in the broader context of sales promotions, insights into which factors alter the effect of discount characteristics on effectiveness remain limited (e.g., Bolton (1989) demonstrates that promotional price elasticities vary across market and environmental characteristics such as brand market share or display activity). Therefore, we add to research on sales promotions, both generally and in reference to DoD promotions (Section 2.1).

Third, by allowing for possible nonlinearities in our modeling approach in Study 2, we can determine if differences in discount level effects are due to the type of the promoted product, as suggested by our framework, or to the rather general existence of saturation effects in price discounts, as indicated in previous literature (Section 2.1).

Fourth, with the exception of Shen (2013), no studies vary the degree of time constraint in a DoD promotion context and instead address the presence versus absence of a time constraint (Section 2.2). However, the time constraint is a key parameter for firms to design a DoD promotion. We allow for variation in time constraints, in both our lab experiment (Study 1) and the analysis of our field data (Study 2).

3. Conceptual framework and hypotheses

3.1. Framework

To predict how the discount level and time constraint—the two key characteristics of any DoD promotion that consumers can use as sources of information—combine to establish promotional effectiveness, we build on the framework in Fig. 1. With this framework, we assert that predictions of promotional effectiveness should depend on the type of product being promoted (utilitarian vs. hedonic). We explain the underlying logic of the framework (including its components) in greater detail next, before detailing our research hypotheses.

Information processing literature has demonstrated that consumers can develop different perceptions of the same external stimuli (i.e., discount level and time constraint), depending on the type of information they emphasize and how they integrate that information (Anderson, 1974; Hamilton & Chernev, 2013). These differences imply that the evaluation of a DoD promotion by consumers is not only determined by the discount level and the time constraint but also is a function of how consumers process the information that these characteristics provide.

Previous research proposes so-called duality models to distinguish two modes of information processing (Chaiken, 1980; Petty & Cacioppo, 1986). A systematic mode is guided by analytical thought and cognition. Consumers process information in a thorough, methodical way, which results in a reflective and time-consuming evaluation. In a heuristic mode, in contrast, consumers rely primarily on short-cut decision-making rules that serve as heuristics for processing information. Note that the two modes do not necessarily operate in isolation but instead can be activated simultaneously, though to different degrees (Chaiken, 1980).

Several factors can prompt consumers to use primarily (but not necessarily exclusively) systematic or heuristic processing, such as consumers' knowledge and expertise, their cognitive capacities, or their level of arousal (for an extended list, see Samson and Voyer (2012), p. 60). Another condition, of particular relevance for the current study, pertains to consumers' underlying consumption motives (Ratchford, 1987). Product consumption might aim to achieve a specific instrumental purpose, or it might be for mere pleasure. A common distinction of products consumed according to one of these two motives refers to utilitarian and hedonic products (e.g., Kim, Brünner, Skiera, & Natter, 2014).

Utilitarian products are predominantly instrumental, and their consumption is motivated by functional aspects (Khan, Dhar, & Wertenbroch, 2005). The performance demands for functions or attributes of utilitarian products are particularly high (Myers & Shocker, 1981), so consumers are inclined to process information about these products in a more consistent, systematic, and, ultimately, more effortful way (Hirschman & Holbrook, 1982; Ratchford, 1987; Thompson & Hamilton, 2005). Hedonic products instead are multisensory and provide fun, pleasure, and excitement. Therefore, information about hedonic products tends to be processed and evaluated less systematically and in a more holistic, heuristic way (Ratchford, 1987).

Taken together, the type of promoted product therefore should determine the predominant mode of information processing, which could be more systematic or more heuristic. In our research context pertaining to DoD promotions, these observations imply that the effectiveness of DoD depends on whether the promoted product is utilitarian (favoring systematic processing) or hedonic (favoring heuristic processing) in nature.

3.2. Hypotheses

Our framework leads us to derive differentiated predictions regarding the respective effects of (1) the discount level and (2) the time constraint on the effectiveness of DoD promotions, depending on the type of the promoted product. That is, the type of the promoted product affects the consumer's preferred information processing mode
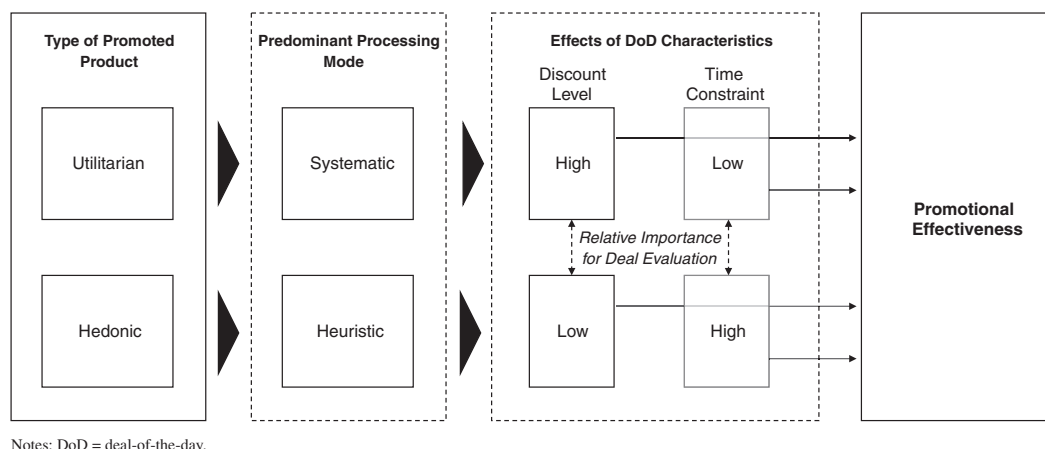

Fig. 1. Theoretical framework.

Notes: DoD = deal-of-the-day.

(Section 3.1), and this preferred mode varies the importance of one key characteristic (discount level) *relative* to the other (time constraint). Similarly, Inman et al. (1997, p. 72) state that "the use of a particular source of information is inversely related to the availability and diagnosticity of alternative sources of information."

3.2.1. Discount level

Regarding the discount level, evaluating price or discount information typically requires some systematic processing (Grewal, Marmorstein, & Sharma, 1996; Hamilton & Chernev, 2013). As is true of any other price-related stimuli, consumers do not rely on or simply adopt information from the advertised discount itself (i.e., percentage off); what matters is their individual perception of that information (Della Bitta et al., 1981; Gupta & Cooper, 1992). Therefore, consumers "encode" information contained in a stimulus, such as a discount.

In pricing literature, encoding refers to the subjective interpretation of objective prices and price discounts (Monroe, 1984; Jocoby & Olsen, 1977; Zeithaml, 1984). Gupta and Cooper (1992, p. 402) define a perceived discount as "the expected savings from a consumer's internal reference price," which represents an established view among researchers (e.g., Gijsbrechts, 1993; Krishna et al., 2002). Consumers thus encode an advertised discount stimulus to evaluate the savings offered by the discount, relative to their internal reference price (i.e., perceived discount), and this encoding requires at least some cognitive effort and systematic processing. Findings that show that consumers' perceptions of discounts typically are not identical to (but rather are smaller than) advertised discounts (Blair & Landon, 1981; Gupta & Cooper, 1992; Mobley et al., 1988) support the idea that consumers invest cognitive effort to "translate" an advertised discount into their subjective perception of that discount.

Consequently, information from the discount level in a DoD promotion should be more likely to influence a consumer's deal evaluation of utilitarian products (which invoke systematic processing as the predominant mode) than of hedonic products (which prompt heuristic processing as the predominant mode). This conclusion aligns with Grewal, Roggeveen, and Lindsey-Mullikin's (2014) argument that consumers who evaluate a product with a utilitarian goal in mind are more likely to thoroughly process price information than are consumers with a hedonic consumption goal. Therefore, building on the general premise that increased discount levels increase promotional effectiveness (see Section 2), we postulate:

H1. Product type (hedonic vs. utilitarian) moderates the positive influence of discount level on promotional effectiveness, such that the effect is stronger for utilitarian than for hedonic products.

3.2.2. Time constraints

A second key characteristic of a DoD promotion, the time constraint, represents a special type of sale restriction. A sale restriction limits an offer's availability (e.g., time, location, and number of units available). According to commodity theory (Brock, 1968) and unavailability theory (Folger, 1992; Inman et al., 1997; Lynn, 1991), consumers typically use unavailability or limited availability as a heuristic cue that the object is valuable and desirable. A DoD promotion, for example, offers a special opportunity to buy a promoted product at a substantially reduced price with limited availability. Because a tighter time constraint increases this limited availability, a consumer's evaluation of a DoD offer should improve with the extent of the time constraint. Previous psychological research similarly suggests that "people find objects and opportunities more attractive to the degree that they are scarce, rare, or dwindling in availability" (Cialdini, 1999, p. 92).

Combining these aspects with consumers' active use of cues in heuristic information processing modes, we posit that information provided by the time constraint in a DoD promotion is more likely to influence a consumer's deal evaluation of hedonic products (which prompt heuristic processing as the predominant mode) than of utilitarian products (which invoke systematic processing as the predominant mode). This conclusion aligns with Inman, McAlister, and Hoyer (1990) who find that consumers with a low need for cognition rely on non-price promotional signals, even when those signals do not offer any actual discount. Building on the general premise that a tighter time constraint increases promotional effectiveness (see Section 2), we postulate:

H2. Product type (hedonic vs. utilitarian) moderates the positive influence of time constraints on promotional effectiveness, such that the effect is stronger for hedonic than for utilitarian products.

4. Empirical studies

We report the results of two studies testing our hypotheses. Study 1 manipulates the time constraint and discount level in a controlled lab setting and compares their relative effects on promotional effectiveness for a (predominantly) hedonic and a (predominantly) utilitarian product type, respectively. Study 2 uses transaction data gathered from Groupon and seeks convergent evidence in a real-world setting.

4.1. Study 1

4.1.1. Selection of products

To select products for our hypothesis tests, we first conducted a focus group with five conveniently determined participants, who had already purchased a DoD promotion. After familiarizing the participants with the general difference between utilitarian and hedonic product types, we discussed which products typically sold in a DoD setting might be good representatives for either product type. From the identified products, we selected a "dinner in the dark" to represent the hedonic product category and "bicycle tune-up" to represent the utilitarian product category; these products also are typically offered in the same price range.

We then ran a pretest among 108 undergraduate students to confirm our selection, using a single, semantic differential item (1 = "hedonic," and 7 = "utilitarian"), which followed a short definition of hedonic and utilitarian product types in general ("Hedonic products/ services are primarily consumed for pleasure-oriented reasons. They are associated with providing fun and excitement. Utilitarian products are primarily consumed for functional aspects. They are associated with helping to reach a goal or accomplish a task."). The mean for the hedonic (utilitarian) product was significantly lower (higher) than the scale mean (hedonic $M = 1.58$, $T = -16.82$, $N = 55$; utilitarian $M = 5.23$, $T = 4.87$, $N = 53$), so the chosen products appropriately represent the two product types.

4.1.2. Sample and study procedures

We then conducted a laboratory experiment. To manipulate product type (dinner in the dark or bicycle tune-up), we used typical pictures of the respective products, along with brief descriptions of their characteristics and an advertising summary of benefits. To manipulate the time constraint of a promotion, we used duration levels of one day or seven days.[6] Finally, the discount level was either 50% or 70%. In combination, these variations produced a 2 (product category: hedonic vs. utilitarian) × 2 (time constraint: one vs. seven days) × 2 (discount level: 50% vs. 70%) between-subjects design. The sample was recruited from a European university. We excluded participants who had never heard of DoD promotions, which led to a final sample of 126 participants (69.6% female, average age: 23.5 years) who were randomly assigned to one of the eight conditions.

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[6] Duration relates inversely to time constraint; a relatively low duration of one day corresponds to a tight time constraint, whereas a relatively high duration of seven days corresponds to a loose time constraint.

The cover story indicated that the survey was about DoD promotions and briefly described the type of promotion behind this term. The story continued with a request that the participants imagine being generally interested in either a dinner in the dark or a bicycle tune-up and then carefully consider the DoD product promotion shown on the subsequent page.

In addition to the picture of the promoted product and its description, the displayed promotional stimuli contained "Buy!" wording and two directly adjacent graphic elements of equal size. In both product type conditions, the first element depicted the price discount in absolute ("25 € instead of 50 €" or "15 € instead of 50 €") and relative ("50%" or "70%") terms, and the second element illustrated the time constraint ("Available only one day" or "Available only seven days"; see the Appendix for examples). The questionnaire concluded with measures to evaluate the offer, manipulation checks, covariates, and demographics.

4.1.3. Manipulation checks

We assessed whether participants viewed the appeals as primarily hedonic or utilitarian with the same single, semantic differential item (1 = "hedonic," and 7 = "utilitarian") as in the pretest. Again, the mean for the hedonic (utilitarian) product was significantly lower (higher) than the scale mean (hedonic $M = 1.49$, T = 19.58, N = 61; utilitarian $M = 6.23$, T = 65.59, N = 65). We assessed the manipulation of time constraint with one item ("The remaining time of the offer was…") on a seven-point scale (1 = "very low," and 7 = "very high"). The perceived difference between the one-day and seven-day constraint was significant ($M = 2.37$ vs. 4.32, F = 113.18, $p < .001$, $\eta = .48$). Finally, we measured perceptions regarding the two discount levels with the item: "The discount was…" (1 = "very low," and 7 = "very high"). The difference in perceptions between the 50% and 70% discount conditions was also significant ($M = 5.09$ vs. 6.09, F = 31.30, $p < .001$, $\eta = .23$). Thus, all post-experimental checks confirmed the intended directions of our manipulations.

4.1.4. Measures

We used deal attractiveness as our measure of promotional effectiveness and employed the scales that Chandon et al. (2000) propose (alpha = .78). We also measured deal proneness (Lichtenstein, Ridgway, & Netemeyer, 1993), using seven-point Likert scales, which we included as a covariate in our model to control for participant-specific differences in innate tendencies to respond to sales promotions (alpha = .86).[7]

4.1.5. Results

We applied an analysis of covariance, with deal attractiveness as the dependent variable; product category, time constraint, and discount level as independent variables; and deal proneness as a covariate. To formally test our hypotheses, we included an interaction between product type and discount level (to test H1) and between product type and time constraint (to test H2). Table 1 summarizes the results.

In H1, we propose that the positive effect of discount level on promotional effectiveness is stronger for utilitarian than for hedonic products. We found a main effect of discount level on deal attractiveness (F = 11.73, $p < .01$, $\eta = .09$), with 70% discount levels resulting in higher levels of attractiveness ($M = 4.46$) than 50% discount levels ($M = 3.79$). However, we did not find a significant interaction effect between product category and discount level (F = .27, $p > .30$, $\eta = .002$). Thus, we cannot confirm H1 at this stage.

Table 1
ANCOVA results (Study 1).

Treatment	F-value	η
Discount level	11.73 ***	.09
Time constraint	4.08 **	.03
Product type	.57	.00
Discount level × Product type	.27	.00
Time constraint × Product type	3.01 **	.03
Covariates		
Deal proneness	8.22 ***	.06

$*p < .1.**p < .05. ***p < .01$. *P*-values are based on one-sided tests for treatment factors. N = 126.

In H2, we suggest that the positive effect of a time constraint on promotional effectiveness is stronger for hedonic than for utilitarian products. We found a significant main effect of time constraint (F = 4.08, $p < .05$, $\eta = .03$), qualified by a significant product category × time constraint interaction (F = 3.01, $p < .05$, $\eta = .03$). As Fig. 2 illustrates, the time constraint effect is positive and it is even stronger for hedonic than for utilitarian products, in support of H2.

The weak interaction between discount level and product type could be attributed to a general limitation of lab experiments, namely, the limited variation of included factors (here, discount level). Discount levels in DoD promotions regularly vary over a broad range, so this limitation might be highly relevant. To overcome this limitation and analyze the suggested interaction effects on promotional effectiveness in greater depth, we therefore conducted a second study using field data from real-world DoD promotions.

4.2. Study 2

For Study 2, we used transaction data from Groupon, one of the best known and, in terms of earnings, successful DoD platforms, with $4.192 billion in revenue and a net operating income of $253 million in 2014 (Groupon, 2015). We monitored all deals offered by the North American Groupon website (groupon.com) between September 3, 2009, and July 17, 2011. Each deal was characterized by its starting and expiration date, deal description, unit sales, regular price, and actual (deal) price.

4.2.1. Selection of categories

We selected six product categories (different from Study 1), three representing predominantly hedonic products (bowling, boat trips, and massage/body treatments) and three representing predominantly utilitarian products (car wash, dental exams, and carpet cleaning). The selection was supported by a pretest, in which students from a major European university (N = 1,190) were randomly assigned to one of the six categories. After reading brief general definitions of hedonic
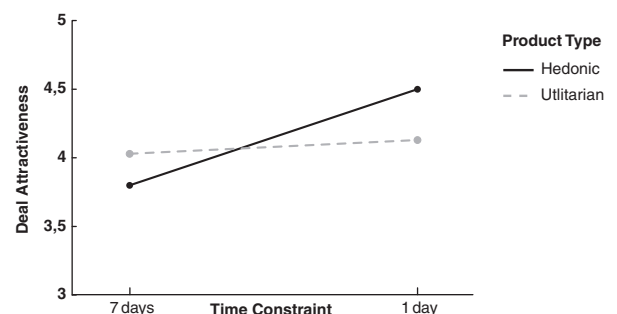
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[7] The composite-based reliabilities for deal attractiveness (.88) and deal proneness (.89) exceeded the required threshold of .6 (Bagozzi and Yi, 1988), and the average variance extracted (AVE) for deal attractiveness (.70) and deal proneness (.52) exceeded the required threshold of .5 (Fornell and Larcker, 1981). On the item level, factor loadings were between .8 and .88 for deal attractiveness, and between .47 and .81 for deal proneness. All loadings were significantly different from zero (Bagozzi, Yi, & Phillips, 1991).

Fig. 2. Effect of time constraint on deal attractiveness by product category (Study 1).

Table 2
Summary statistics of the Groupon data (Study 2).

	Mean	SD	5th Percentile	95th Percentile	Observations
Bowling (HED)					
Unit sales	833.40	1,729.48	20	3,028	620
Regular price	51.77	101.40	11.00	100.95	620
Deal price	17.43	15.71	5.00	35.00	620
Discount (in percent)	.59	.09	50.00	71.00	620
Duration (in days)	2.95	8.18	.71	9.08	513
Massage/body treatment (HED)					
Unit sales	497.10	746.84	41	1,518	3,180
Regular price	111.50	82.55	45.00	259.90	3,180
Deal price	44.59	27.46	20.00	83.90	3,180
Discount (in percent)	.56	.09	.50	.80	3,180
Duration (in days)	3.11	8.31	.38	10.89	2,572
Boat trip (HED)					
Unit sales	992.40	2,185.60	7	3,936	370
Regular price	193.10	451.21	12.00	1,124.45	370
Deal price	90.41	199.26	6.00	534.45	370
Discount (in percent)	.52	.05	.44	.63	370
Duration (in days)	2.60	2.06	.42	5.90	315
Carwash (UT)					
Unit sales	862.50	1,131.39	56	2,773	479
Regular price	49.97	50.83	10.00	130.00	479
Deal price	22.11	22.43	5.00	60.00	479
Discount (in percent)	.52	.06	.50	.67	479
Duration (in days)	2.42	2.86	.67	7.37	382
Dental exam (UT)					
Unit sales	254.00	330.42	22	958	554
Regular price	367.10	315.32	188.00	657.75	554
Deal price	71.44	142.82	35.00	102.25	554
Discount (in percent)	.80	.08	.66	.90	554
Duration (in days)	2.64	3.08	.45	8.29	443
Carpet cleaning (UT)					
Unit sales	183.10	200.91	23	557	495
Regular price	143.50	81.96	70.00	250.00	495
Deal price	60.35	25.87	30.00	99.00	495
Discount (in percent)	.56	.07	.50	.73	495
Duration (in days)	3.22	3.81	.67	9.35	418

Notes: HED = hedonic category; UT = utilitarian category.

and utilitarian categories, they classified the assigned service category with respect to its hedonic versus utilitarian appeal on the previously described semantic differential scale (1 = "hedonic," and 7 = "utilitarian"). The means for bowling ($M = 1.49$, $T = -36.21$, $N = 167$), boat trips ($M = 2.19$, $T = -23.16$, $N = 193$), and massage/body treatments ($M = 2.50$, $T = -17.74$, $N = 238$) were significantly smaller than the scale mean of 4, whereas the values were significantly larger for the car wash ($M = 4.51$, $T = 4.46$, $N = 219$), dental exams ($M = 4.64$, $T = 5.23$, $N = 177$), and carpet cleaning ($M = 5.75$, $T = 16.33$, $N = 196$). Table 2 provides the descriptive statistics of the Groupon data by product category.

4.2.2. Model

We used unit sales as a measure of promotional effectiveness. We calculated the discount level on the basis of information provided in the raw data. We also inferred the duration of a promotion from the raw data by subtracting a deal's starting date from its expiration date and we used it as an inverse measure of time constraint. Note that our raw data set included a few promotions that contained missing values for the starting date, the expiration date or both. We did not find any systematic effects in our deal monitoring process that explain these missing values. We replaced any of these missing values with zero and controlled for these imputations by creating a new dummy variable which indicates a missing (dummy = 1) or an observed value (dummy = 0). Beyond these variables, promotion timing could help determine promotional effectiveness (e.g., Kumar & Leone, 1988). Thus,

we accounted for cyclical and seasonal variation by including yearly and monthly control variables. To account for weekly variation, we also included a dummy variable that distinguished deals offered on a weekday or weekend day. Moreover, we controlled for whether a deal sold out before it expired, because measured unit sales for such deals do not necessarily reflect the actual quantity demanded. Finally, Groupon deals typically feature offerings from local merchants (Dholakia, 2010), so we needed to account for variations in sales across cities in response to heterogeneous customer bases and demand structures. The following model satisfies these criteria:

$$\ln Sales_{ij} = b_0 + b_1 \ln Duration_{ij} + b_2 \ln Discount_{ij} + b_3 Hedonic_{ij} + b_4 \ln Duration_{ij} \times Hedonic_{ij}$$
$$+ b_5 \ln Discount_{ij} \times Hedonic_{ij} + b_6 Soldout_{ij} + b_7 Weekday_{ij} + \sum_{k=1}^{11} b_{7+k} Month_{ijk} + \sum_{l=1}^{2} b_{18+k} Year_{ijl}$$
$$+ b_{21} Missing_{ij} + u_i + r_{ij}, \tag{1}$$

for $i = 1, ..., I$ cities and $j = 1, ..., J_i$ DoD promotions in city i, where

$Sales_{ij}$ sales (in units) of promotion j in city i;
$Discount_{ij}$ percentage price discount of promotion j in city i; expressed as 1 – (actual price/regular price) of the promoted item;
$Duration_{ij}$ duration (in days) of promotion j in city i; inverse measure of time constraint; expressed as expiration date – starting date of the promoted item;
$Hedonic_{ij}$ dummy variable equal to 1 if the product in promotion j in city i belongs to any of the three hedonic product categories, and 0 if it belongs to any of the three utilitarian product categories (reference category);
$Soldout_{ij}$ dummy variable equal to 1 if the promotion j in city i was sold out before the expiration date, and 0 otherwise;
$Weekday_{ij}$ dummy variable equal to 1 if the promotion j in city i was on a weekday, and 0 otherwise;
$Month_{ijk}$ dummy variable equal to 1 if the promotion j in city i was in February ($k = 1$), March ($k = 2$), April ($k = 3$), May ($k = 4$), June ($k = 5$), July ($k = 6$), August ($k = 7$), September ($k = 8$), October ($k = 9$), November ($k = 10$), December ($k = 11$), and 0 otherwise (corresponds to all promotions in January);
$Year_{ijl}$ dummy variable equal to 1 if the promotion j in city i was in 2009 ($l = 1$) or 2010 ($l = 2$) and 0 otherwise (corresponds to all promotions from 2011);
$Missing_{ij}$ dummy variable equal to 1 if the duration information for promotion j in city i was missing, and 0 otherwise;
u_i normally distributed random effect in city i; and
r_{ij} normally distributed error term for promotion j in city i.

We log-transformed all continuous variables in the model so that the corresponding parameter estimates represent elasticities. In addition to directly including ln *Discount* and ln *Duration*, we also included their respective pairwise interaction with the dummy variable *Hedonic*, indicating whether a promotion belongs to a hedonic (*Hedonic* = 1) or utilitarian (*Hedonic* = 0) product category. Thus, estimates for b_1 and b_2 reflect the elasticities of the discount level and the duration of a promotion on sales for utilitarian product categories (reference estimates), while b_4 and b_5 capture differences in these elasticities for hedonic product categories from the respective reference estimates.

Following Van Heerde et al. (2001), we did not include regular prices as separate covariates in our model. Although regular prices might help capture heterogeneous demand across promotions due to price differences across products, we focus on promotions for a limited number of product categories, such that the prices mainly vary across cities (promotions in our data set are nested within a total of 172 cities), not across promotions within cities. We captured these effects in the random intercept that accounts for variations in sales across cities. Thus, excluding

regular prices should not produce any missing variable bias. Moreover, by including the dummy variable *Hedonic* in the model, we controlled for heterogeneity in sales between hedonic and utilitarian products within cities.[8] Finally, given that average discount and duration levels differ across the six product categories in our data set (see Table 2), we group-mean-centered ln *Duration* and ln *Discount* at the level of the six product categories before calculating the interaction terms (Hofmann & Gavin, 1998).

4.2.3. Results

We estimated the model simultaneously for the pooled data set, which included all six categories, using restricted maximum likelihood (Pinheiro & Bates, 2000). Column (1) of Table 3 summarizes the results.

The model revealed a significantly positive main effect of discount level on sales ($b_1 = 2.23$, $p < .01$), qualified by a significant interaction between discount level and product type ($b_4 = -3.05$, $p < .01$). The negative sign of the interaction reveals that the positive discount level effect is weaker for hedonic products than for utilitarian products (reference category). Thus, in a real-world field application with more variation in discount levels and more products than in the lab setting of Study 1, we find clear evidence in support of H1.

However, the model did not show a significant interaction effect between duration (as the inverse measure of time constraint) and product type ($b_5 = -.02$, $p > .34$), so we must reject H2. This finding came as a surprise, in light of the significant interaction of these variables in Study 1. To investigate this inconclusive result, we separately analyzed the product categories and found a substantially significant main effect of duration on sales in the bowling and boat trip categories but no such effect for the massage/body treatment category. As a possible explanation, we note the large size of this massage category, which accounts for more than 55% of all deals in the data set (Table 2). Perhaps consumers have learned that many alternatives for any given deal in that category are or will shortly be available, so the potential ability of a time constraint to signal scarcity is small in this category. Because the massage/body treatment category appears unique in this way, we decided to exclude it from any further analyses.

Table 3, Column (2), summarizes the updated parameter estimates for the reduced data set of the remaining five product categories. As expected, the corresponding interaction effect between duration and product type became highly significant ($b_5 = -.22$, $p < .01$). In support of H2, the negative sign revealed that reducing the duration of a promotion for a hedonic product (i.e., increasing the time constraint) prompted a stronger sales increase than a reduction of the same level for a utilitarian product. The corresponding parameter estimates for the main discount level effect for the reference group of utilitarian products ($b_1 = 2.17$, $p < .01$) and the *Discount × Hedonic* interaction ($b_4 = -3.28$, $p < .01$) remained nearly unchanged after excluding the massage/body treatments category. Therefore, H1 still received support. However, when considering the size of the corresponding parameter estimates, we recognized that the discount level effect for hedonic products was not only weaker than that for utilitarian products, but it also grew negative ($2.17 - 3.28 = -1.11$). This unexpected result requires a deeper assessment.

Table 3
Model results (Study 2).

Model terms	Parametric model				Semiparametric model	
	(1)		(2)		(3)	
	Coeff.	SE	Coeff.	SE	Coeff.	SE
Constant	5.15 ***	0.08	5.26 ***	0.13	5.21 ***	0.13
ln *Discount*	2.23 ***	0.28	2.17 ***	0.32		
ln *Duration*	−0.03	0.04	−0.04	0.05	−0.02	0.05
Hedonic	0.20 ***	0.04	0.32 ***	0.06		
ln *Discount* × Hedonic	−3.05 ***	0.31	−3.28 ***	0.49		
ln *Duration* × Hedonic	−0.02	0.05	−0.22 ***	0.08	−0.27 ***	0.08
Soldout	0.44 ***	0.06	0.15	0.17	0.18	0.17
Weekday	−0.03	0.05	−0.11	0.08	−0.11	0.08
Feb	0.01	0.07	−0.11	0.13	−0.11	0.13
Mar	0.10	0.07	0.12	0.13	0.12	0.13
Apr	0.07	0.07	0.05	0.13	0.06	0.13
May	−0.07	0.07	−0.12	0.12	−0.12	0.12
Jun	−0.35 ***	0.07	−0.62 ***	0.12	−0.60 ***	0.12
Jul	−0.37 ***	0.08	−0.57 ***	0.14	−0.53 ***	0.14
Aug	0.04	0.12	−0.20	0.21	−0.18	0.21
Sep	−0.11	0.11	−0.50 **	0.21	−0.46 **	0.20
Oct	−0.22 **	0.11	−0.39 **	0.19	−0.39 **	0.19
Nov	−0.23 **	0.10	−0.02	0.19	0.03	0.19
Dec	−0.37 ***	0.10	−0.27	0.22	−0.27	0.22
2009	0.01	0.12	0.05	0.25	0.06	0.25
2010	0.41 ***	0.06	0.30 **	0.14	0.29	0.14
Missing	0.20 ***	0.04	0.49 ***	0.13	0.40 ***	0.13
					EDF	*p*-value
f(ln *Discount*)					5.10	<0.01
f(ln *Discount*) × Hedonic					2.00	<0.01
Variance components						
σr	1.18		1.33		1.31	
σu	0.40		0.41		0.40	
Sample size						
Number of observations	5,698		2,518		2,518	
Number of groups (cities)	172		171		171	
Model fit						
Log likelihood	−9171.98		−4379.11		−4337.68	
AIC	18,391.96		8,806.22		8,727.37	
BIC	18,551.42		8,945.96		8,878.98	

*$p < .1$. **$p < .05$. ***$p < .01$. *P*-values are based on one-sided tests for main effects of ln *Duration*, ln *Discount* and their respective interactions with *Hedonic*.
Notes: Column (1) reports the estimation results on the basis of the entire data set (including all six product categories), while columns (2) and (3) report the results pertaining to the reduced data set (excluding the massage/body treatment category). AIC = Akaike information criterion, BIC = Bayesian information criterion, EDF = estimated degrees of freedom, which indicate the complexity of the nonparametric function. Technically, EDF can be regarded as a continuous version of the number of parameters used for fitting the function. An EDF of 1 would equal a linear line; larger values indicate more complex functions.

4.2.4. Accounting for nonlinear effects

The negative discount effect identified for hedonic products ran contrary to our intuition, as well as to prior research that has demonstrated that higher discounts usually lead to increased sales (see Section 2.1). However, such research has focused mainly on traditional price promotions, in which discount levels mostly are less than 50%. The high discount levels in DoD promotions could induce unique consumer reactions, beyond the scope of previous research focused on simple price discounts.

Relatedly, we did not account for possible nonlinearities in the discount level effects. For example, the effect of the offered discount on sales may depend on the level of the discount itself. Several phenomena could produce complex nonlinearities in the estimated discount level effects (Van Heerde et al., 2001; see also Section 2.1), including threshold or saturation effects. Consumers only begin to change their purchase intentions when discount levels exceed a certain threshold. Likewise,

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[8] To control for heterogeneity in sales between the six product categories (rather than between hedonic and utilitarian product categories as a whole), we additionally estimated a model that included dummy variables (fixed effects) at the more disaggregate level of the individual product category. Since the results and the parameter estimates of interest remained similar, we decided to proceed with the more parsimonious model specification, using the *Hedonic* dummy variable as a control variable for category-specific heterogeneity.

the incremental effect of the offered discount on promotional effectiveness diminishes with increasing discount levels (Gupta & Cooper, 1992; Van Heerde et al., 2001). Ignoring such potential nonlinearities might produce biased parameter estimates.

Therefore, we generalized the parametric Model 1 to a semiparametric model. We replaced the parametric term of the logtransformed discount variable with a nonparametric function of ln *Discount*, which resulted in a nonparametric main effect $f(\ln Discount)$ and a nonparametric binary-by-continuous interaction of $f(\ln Discount) \times Hedonic$. We retained the parametric representation of the remaining model components (cf. Van Heerde et al., 2001). This model formulation combines the advantages of nonparametric (i.e., flexibility) and parametric (i.e., efficiency) regressions. Because we seek to capture potential nonlinearities in the discount level effect only, we have no need to formulate a fully nonparametric model, which typically results in unstable parameter estimates (Bellman, 1961). In this specification, the nonparametric estimate of $f(\ln Discount)$ reflects the functional form of the main discount effect for the reference group of utilitarian products (i.e., when $Hedonic = 0$), and $f(\ln Discount) \times Hedonic$ captures the functional deviation from the reference estimate for the group of hedonic products (i.e., when $Hedonic = 1$).

To estimate the nonparametric functions, we used Wood's (2006a,b) approach, which builds on the idea of transferring a nonparametric function into a parametric mixed model representation and then using a standard mixed model methodology for its estimation. Thus, as we did previously, we estimated the model for the pooled (five) product categories using restricted maximum likelihood (Pinheiro & Bates, 2000). Table 3, Column (3), presents the estimation diagnostics for the semiparametric model. The reported numbers provide estimates of the parametric model components, as well as of the included nonparametric functions $f(\ln Discount)$ and $f(\ln Discount) \times Hedonic$, both modeled as centered, twice-differentiable, arbitrary, smooth functions of the log discount variable.

First, for the semiparametric model (Column 3) the log-likelihood value is substantively higher, and the Akaike information criterion (AIC) and Schwarz Bayesian information criterion (BIC) are substantively smaller than those for the previous parametric model (Column 2). Consequently, model fit improved considerably when we accounted for nonlinear discount level effects.

Second, in line with the parametric results, for the utilitarian products (reference group), we found a significant effect of the discount level, even after accounting for possible nonlinearities ($p < .01$). Fig. 3,

Panel (A) illustrates the corresponding functional estimate $f(\ln Discount)$. The scale of the x-axis reflects the group-mean-centered values of ln *Discount*, so 0 corresponds to the average discount level, while any negative (positive) values represent below-average (above-average) discount levels in a product category. The functional estimate reveals that though the discount level effect was nonlinear (inverse S-shaped effect curve) for utilitarian products, it remained positive across all discount levels. We also found a significant effect for $f(\ln Discount) \times Hedonic$ ($p < .01$), suggesting that the estimated function of the discount level effect for hedonic products differed from that for utilitarian products. The corresponding functional estimate for hedonic products, illustrated in Fig. 3, Panel (B), reveals that for discount levels below average (i.e., <0), the effect is weakly positive; for discount levels above average, the effect is negative. Thus, contrary to our counterintuitive previous (parametric) results, the discount level effect for hedonic products was not negative per se; instead, it was negative only for particularly high discount levels.

To explain this result, we turn to behavioral pricing literature. Although promotions with large discounts usually are perceived more favorably, consumers tend to view them with some skepticism, because their high levels appear implausible (Liefeld & Heslop, 1985). This skepticism directly reduces the perceived value of the deal (Krishna et al., 2002). Because discount levels in DoD promotions already are large (Table 2), the implausibility associated with the promotion can hurt deal perceptions more than the larger deal percentage help it. Hedonic products imply a higher degree of heuristic processing; particularly high discounts might be used as heuristic cues to question the value of the promotion (similar to the dual role of price; Völckner & Hofmann, 2007). Logically then, consumers may be less likely to buy such promotions, which could explain the negative discount level effect that we observed for above-average discounts.

5. Conclusion

5.1. Summary of key findings and contributions

As an extreme form of a price promotion, DoDs have become increasingly popular. In particular, they allow firms to offer products at substantial price discounts, usually at or above 50%, for a very limited period of time, usually between one and seven days. According to previous research into sales promotions, these high discount levels and tight time constraints should make DoD promotions very effective. Yet in practice, firms often do not benefit from DoD promotions. We propose
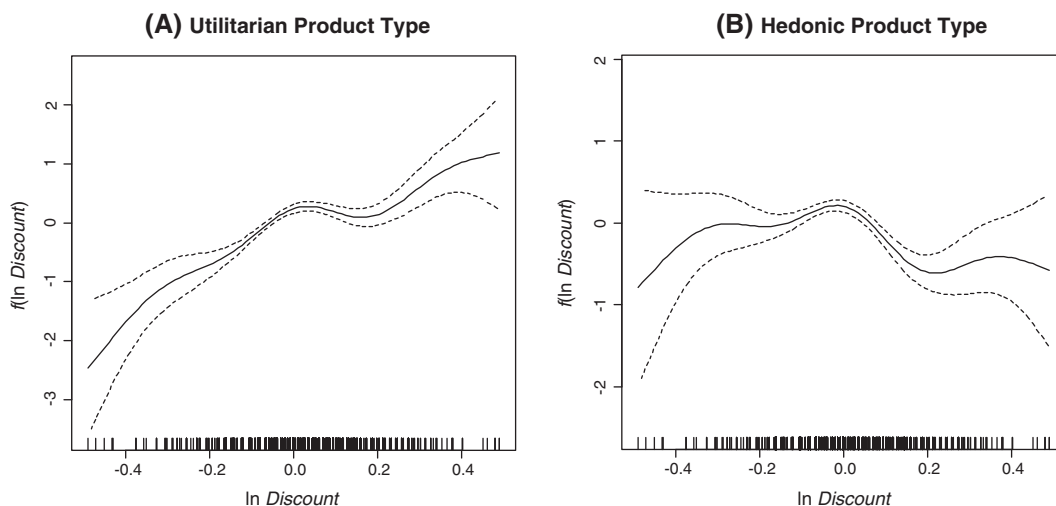

Fig. 3. Estimated discount level effects of the semiparametric model (Study 2). Notes: The dashed lines depict 95% confidence intervals. The scale of the x-axis reflects the group-mean-centered values of ln Discount, so 0 corresponds to the average discount level, while any negative (positive) values represent below-average (above-average) discount levels in a product category.

a theoretical framework and use data from a lab experiment (Study 1) and a field study in the context of the DoD service provider Groupon (Study 2) to investigate whether and in which conditions the high discount levels and tight time constraints of a DoD promotion actually contribute to promotional effectiveness.

Overall, our research suggests that the two key characteristics of a DoD promotion do not necessarily combine to leverage promotional effectiveness. Using information processing literature as our theoretical basis, we argue that consumers pay more attention to the time constraint when considering hedonic instead of utilitarian products, and they pay more attention to the discount level when considering utilitarian instead of hedonic products.

The results from the two studies largely support our theorizing: The time constraint leverages promotional effectiveness more for hedonic than for utilitarian products (supported in Studies 1 and 2), whereas the discount level increases promotional effectiveness for utilitarian more than for hedonic products (only supported in Study 2). In accounting for possible nonlinearities in the discount level effect for DoD promotions with our Groupon data, we also found that particularly high discount levels can reduce promotional effectiveness for hedonic products. Hedonic products imply a greater degree of heuristic processing, compared with utilitarian products, so this result suggests that once a discount level increases to the point that consumers perceive it as implausibly high, they also use it as heuristic cue and question the value of the promotional offer.

These findings provide several insights for price promotion literature. First, we enrich existing literature by investigating the effectiveness of an extreme form of a price promotion that differs from other instruments in terms of both its substantial price discounts (usually at or above 50%) and its tight time constraints (usually between one and seven days).

Second, we extend previous findings by revealing the significant interactions between the category of the promoted product and these two key characteristics of a DoD promotion. Specifically, our study implies that tight time constraints and high discount levels contribute divergently to promotional effectiveness, depending on the underlying product category. The discount level effect is greater for utilitarian than for hedonic products, but the opposite is true for hedonic products.

Third, by addressing the high discount levels in DoD promotions explicitly, we provide evidence of the potential for negative discount level effects (in hedonic categories). These results are noteworthy, because previous literature largely suggests positive impacts on promotional effectiveness for each element.

Fourth, we add to information processing research. Previous studies mainly have focused on consumer-specific factors (e.g., consumers' knowledge and expertise, cognitive capacities, and level of arousal) that determine whether consumers use heuristic or systematic processing. Our study instead stresses the importance of distinguishing between utilitarian and hedonic products.

5.2. Managerial implications

On the basis of our empirical results, which reveal that time constraints and discount levels divergently contribute to the effectiveness of DoD promotions, depending on the product category, we urge managers to design DoD promotions with great care. For hedonic products, a particularly tight time constraint seems to offer a more effective form of leverage than an increased discount level. Contrary to popular DoD practice, we recommend *not* over-discounting when offering hedonic products; the discount level, in the observed ranges, simply cannot increase promotional effectiveness any further in these product categories. For example, as we detail in Table 2, the average discount levels of current DoD promotions in the hedonic product categories of our sample range from 52% (boat category) to 59% (bowling category). Setting even higher discount levels would be unlikely to generate additional sales and even might cause sales declines, because consumers

may start to question the credibility of the offer. This finding becomes particularly notable when we consider that many firms engaging in DoD promotions, such as those with Groupon, feel compelled to offer discounts that greatly exceed 50%.

Our recommendation for utilitarian products is quite different. Different degrees of time constraints, beyond those currently being used (i.e., one to seven days), have limited effects. Instead, increased discount levels make utilitarian products particularly interesting for consumers. A possible explanation for this effect is that consumers engage more in systematic processing in these product categories, such that they actually calculate and process the monetary savings associated with a given discount level. In contrast, heuristic cues, such as time constraints, play seemingly more minor roles. This observation implies that the DoD format might not be any more effective than traditional price promotion formats that do not impose any explicit time constraint. From a different perspective, our results also suggest that DoD promotions are relatively more attractive for hedonic and less attractive for utilitarian products.[9]

5.3. Limitations and suggestions for further research

This study takes a specific perspective on the effectiveness of DoD promotions. Additional research should be carried out to complement our findings. First, more factors could be considered or measured (in lab and field settings) to explain promotional effectiveness more comprehensively. For example, DoD promotions typically are offered in an online environment, characterized by the absence of face-to-face interactions, an inability to handle the product, and the need to disclose private information. Against these backdrops, trust in the firm becomes a critical dimension in a consumer's evaluation of a price promotion (Häubl & Trifts, 2000; Hoffman, Novak, & Peralta, 1999; Smith, Menon, & Sivakumar, 2005). Little information tends to be available about firms on the Internet, so trust is nearly the only foundation consumers have for making research and purchase decisions; it represents an essential driver of success for any company (Lohse, Bellman, & Johnson, 2000; McStay, 2011). Lack of trust also is a main reason that some consumers prefer not to shop over the Internet (Pavlou, 2003). Further research could experimentally manipulate consumers' trust in the firm, to study the effectiveness of DoD promotions. With field data, either information about how many people already bought the deal at a particular point in time or consumer reviews of the promotion and offering firm could provide proxies of the information available to consumers who seek to reduce uncertainty or increase their level of trust in the firm.

Second, the discount levels remained constant over the period available for each deal. Because time constraints—and the effects of increased time pressure as a deadline approaches—are key to any DoD promotion, firms might be interested in knowing whether, when, and how changing the discount levels over time influences the effectiveness of DoD promotions. Our empirical results indicate that the effects of such dynamic pricing policies may be more relevant in utilitarian product categories; however, if consumers become increasingly exposed to such practices, they might respond differently when considering hedonic products offered as DoD too.

Third, our theorizing relied on information processing literature and its key argument that consumers process information depending on the nature of the purchase situation, which is strongly influenced by the product category. However, consumers also may differ in their ability to process information. Further research could control for this individual-

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[9] This conclusion receives even further support from our empirical finding in Study 2 because the estimated parameter of the dummy variable for product category (1 = hedonic) is positive. Please note that this main effect of product category does not emerge in Study 1, where deal attractiveness was the dependent variable (instead of sales in Study 2).

level characteristic and thereby provide further differentiated evidence of the effects of discount levels and time constraints in DoD promotions.

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Appendix A. Exemplary stimuli (Study 1)

Example 1: Discount = 50%, duration = 7 days, product type = utilitarian

Example 2: Discount = 70%, duration = 1 day, product type = hedonic

Notes: The photo we used in our lab experiment to represent the hedonic "dinner of the dark" product category was similar, but not identical to the one included in Example 2. The original photo can be obtained upon request.

References

Aggarwal, P., & Vaidyanathan, R. (2003). Use it or lose it: Purchase acceleration effects of time-limited promotions. *Journal of Consumer Behaviour, 2*(4), 393–403.

Anderson, N.H. (1974). Information integration theory: A brief survey. In D.H. Krantz, R.C. Atkinson, R.D. Luce, & P. Suppes (Eds.), *Contemporary developments in mathematical psychology: Measurement, psychophysics, and neural information processing. Vol. 2.* (pp. 236–305). San Francisco: W.H. Freeman.

Bagozzi, R. P., & Yi, Y. (1988). On the Evaluation of Structural Equation Models. *Journal of the Academy of Marketing Science, 16*(1), 74–94.

Bagozzi, R.P., Yi, Y., & Phillips, L.W. (1991). Assessing construct validity in organizational research. *Administrative Science Quarterly, 36*(3), 421–458.

Bellman, R.E. (1961). *Adaptive control processes.* Princeton, NJ: Princeton University Press.

Berkowitz, E.N., & Walton, J.R. (1980). Contextual influences on consumer price responses: An experimental analysis. *Journal of Marketing Research, 17*(3), 349–358.

Blair, E.A., & Landon, L. E., Jr. (1981). The effects of reference prices in retail advertising. *Journal of Marketing, 45*(2), 61–69.

Bolton, R.N. (1989). The relationship between market characteristics and promotional price elasticities. *Marketing Science, 8*(2), 153–169.

Brock, T.C. (1968). Implications of commodity theory for value change. In A.G. Greenwald, T.C. Brock, & T.M. Ostrom (Eds.), *Psychological foundations of attitudes* (pp. 243–275). New York: Academic Press.

Byers, J.W., Mitzenmacher, M., & Zervas, G. (2011). Daily deals: Prediction, social diffusion, and reputational ramifications. *Working paper (retrieved October 9, 2014)* (http://arxiv.org/abs/1109.1530).

Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology, 39*(5), 752–766.

Chandon, P., Wansink, B., & Laurent, G. (2000). A benefit congruency framework of sales promotion effectiveness. *Journal of Marketing, 64*(4), 65–81.

Cialdini, R.B. (1999). Of tricks and tumors: Some little-recognized costs of dishonest use of effective social influence. *Psychology & Marketing, 16*(2), 91–98.

Della Bitta, A.J., Monroe, K.B., & McGinnis, J.M. (1981). Consumer perceptions of comparative price advertisements. *Journal of Marketing Research, 18*(4), 416–427.

Dholakia, U.M. (2010). A critical review of question—Behavior effect research. *Review of Marketing Research, 7*, 145–197.

Dholakia, U.M. (2011a). What makes Groupon promotions profitable for businesses? *Working paper (retrieved March 21, 2015)* (http://ssrn.com/abstract=1790414).

Dholakia, U.M. (2011b). How businesses fare with daily deals: A multi-site analysis of Groupon, Living Social, Open Table, Travelzoo, and Buy With Me promotions. *Working paper (retrieved October 9, 2014)* (http://ssrn.com/abstract=1863466).

Dholakia, U. M. (2012). How businesses fare with daily deals as they gain experience: A multi-time period study of daily deal performance. *Working Paper (retrieved October 9, 2014)* (http://ssrn.com/abstract=2091655).

Dholakia, U.M., & Kimes, S.E. (2011). Daily deal fatigue or unabated enthusiasm? A study of consumer perceptions of daily deal promotions. *Working Paper (retrieved March 21, 2015)* (http://ssrn.com/abstract=1925865).

Folger, R. (1992). On wanting what we do not have. *Basic and Applied Social Psychology, 13*(1), 123–133.

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research, 18*(1), 39–50.

Gijsbrechts, E. (1993). Prices and pricing research in consumer marketing: Some recent developments. *International Journal of Research in Marketing, 10*(2), 115–151.

Grewal, D., Marmorstein, H., & Sharma, A. (1996). Communicating price information through semantic cues: The moderating effects of situation and discount size. *Journal of Consumer Research, 23*(2), 148–155.

Grewal, D., Roggeveen, A.L., & Lindsey-Mullikin, J. (2014). The contingent effects of semantic price cues. *Journal of Retailing, 90*(2), 198–205.

Groupon (2015). Fourth quarter 2014 results (retrieved March 28, 2015). http://files.shareholder.com/downloads/AMDA-E2NTR/4163977848x0x809122/876E0C46-1AFE-46B0-B7C3-6266535A21B1/Groupon_4Q14_Earnings_Slides.pdf

Gupta, S., & Cooper, L.G. (1992). The discounting of discounts and promotion thresholds. *Journal of Consumer Research, 19*(3), 401–412.

Hamilton, R., & Chernev, A. (2013). Low prices are just the beginning: Price image in retail management. *Journal of Marketing, 77*(6), 1–20.

Häubl, G., & Trifts, V. (2000). Consumer decision making in online shopping environments: The effects of interactive decision aids. *Marketing Science, 19*(1), 4–21.

Hirschman, E.C., & Holbrook, M.B. (1982). Hedonic consumption: Emerging concepts, methods and propositions. *Journal of Marketing, 46*(3), 92–101.

Hoffman, D.L., Novak, T.P., & Peralta, M. (1999). Building consumer trust online. *Communications of the ACM, 42*(4), 80–85.

Hofmann, D.A., & Gavin, M.B. (1998). Centering decisions in hierarchical linear models: Implications for research in organizations. *Journal of Management, 24*(5), 623–641.

Inman, J.J., McAlister, L., & Hoyer, W.D. (1990). Promotion signal: Proxy for a price cut? *Journal of Consumer Research, 17*(June), 74–81.

Inman, J., Peter, A.C., & Raghubir, P. (1997). Framing the deal: The role of restrictions in accentuating deal value. *Journal of Consumer Research, 24*(1), 68–79.

Jacoby, J., & Olson, J. C. (1977). Consumer response to price: An attitudinal, information processing perspective. In Y. Wind, & M.G. Greenberg (Eds.), *Moving ahead with attitude research* (pp. 73–86). Chicago: American Marketing Association.

Khan, U., Dhar, R., & Wertenbroch, K. (2005). A behavioral decision theory perspective on hedonic and utilitarian choice. In S. Ratneshwar, & D.G. Mick (Eds.), *Inside consumption: Frontiers of research on consumer motives, goals, and desires* (pp. 144–165). London: Routledge.

Kim, J.Y., Brünner, T., Skiera, B., & Natter, M. (2014). A comparison of different pay-per-bid auction formats. *International Journal of Research in Marketing, 31*(4), 368–379.

Krishna, A., Briesch, R., Lehmann, D.R., & Yuan, H. (2002). A meta-analysis of the impact of price presentation on perceived savings. *Journal of Retailing*, *78*(2), 101–118.

Kumar, V., & Leone, R.P. (1988). Measuring the effect of retail store promotions on brand and store substitution. *Journal of Marketing Research*, *25*(2), 178–185.

Kumar, V., & Rajan, B. (2012). Social coupons as a marketing strategy: a multifaceted perspective. *Journal of the Academy of Marketing Science*, *40*(1), 120–136.

Lichtenstein, D.R., Ridgway, N.M., & Netemeyer, R.G. (1993). Price perceptions and consumer shopping behavior: A field study. *Journal of Marketing Research*, *30*(2), 234–245.

Liefeld, J., & Heslop, L.A. (1985). Reference prices and deception in newspaper advertising. *Journal of Consumer Research*, *11*(4), 868–876.

Lohse, G.L., Bellman, S., & Johnson, E.J. (2000). Consumer buying behavior on the Internet: Findings from panel data. *Journal of Interactive Marketing*, *14*(1), 15–29.

Lynn, M. (1991). Scarcity effects on value: A quantitative review of the commodity theory literature. *Psychology & Marketing*, *81*(1), 43–57.

McStay, A. (2011). *The mood of information: A critique of behavioural advertising.* London: Continuum.

Mobley, M.E., Bearden, W.O., & Teel, J.E. (1988). An investigation of individual responses to tensile price claims. *Journal of Consumer Research*, *15*(2), 273–279.

Monroe, K.B. (1984). Theoretical and methodological developments in pricing. *Advances in Consumer Research*, *1*, 636–637.

Myers, J.H., & Shocker, A.D. (1981). The nature of product-related attributes. *Research in Marketing*, *5*(5), 211–236.

Ong, B.S. (2015). Attitudes, perceptions, and responses of purchasers versus subscribers-only for daily deals on hospitality products. *Journal of Hospitality Marketing & Management*, *24*(2), 180–201.

Park, J.Y., & Chung, C. -W. (2012). When daily deal services meet Twitter: Understanding Twitter as a daily deal marketing platform. *Proceedings of the 3rd annual ACM Web Science Conference* (pp. 233–242). New York: Association for Computing Machinery.

Pavlou, P.A. (2003). Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model. *International Journal of Electronic Commerce*, *7*(3), 101–134.

Petty, R.E., & Cacioppo, J.T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change.* New York: Springer.

Pinheiro, J.C., & Bates, D.M. (2000). *Mixed effects models in S and S-Plus.* New York: Springer.

Ratchford, B.T. (1987). New insights about the FCB grid. *Journal of Advertising Research*, *27*(4), 24–38.

Samson, A., & Voyer, B.G. (2012). Two minds, three ways: Dual system and dual process models in consumer psychology. *AMS Review*, *2*(2–4), 48–71.

Sethuraman, R. (1996). A model of how discounting high-priced brands affects the sales of low-price brands. *Journal Marketing Research*, *33*(4), 399–409.

Shen, F. (2013). Information congruity in scarcity appeal: A structural equation modeling study of time-limited promotions. *Journal of Marketing Communications*, *10*, 1–20.

Smith, D., Menon, S., & Sivakumar, K. (2005). Online peer and editorial recommendations, trust, and choice in virtual markets. *Journal of Interactive Marketing*, *19*(3), 15–37.

Srinivasan, S., Popkowski-Leszczyc, P.T.L., & Bass, F.M. (2000). Market share response and competitive interaction: The impact of temporary, evolving and structural changes in prices. *International Journal of Research in Marketing*, *17*(4), 281–305.

Thompson, D.V., & Hamilton, R.W. (2005). The effects of information processing mode on consumers' reactions to comparative advertising. *Advances in Consumer Research*, *32*, 560.

Van Heerde, H.J., Leeflang, P.S.H., & Wittink, D.R. (2001). Semiparametric analysis to estimate the deal effect curve. *Journal of Marketing Research*, *38*(2), 197–215.

Völckner, F., & Hofmann, J. (2007). The price-perceived quality relationship: A meta-analytic review and assessment of its determinants. *Marketing Letters*, *18*(3), 181–196.

Wisniewski, K.J., & Blattberg, R.C. (1983). Response function estimation using UPC scanner data. In F.S. Zufryden (Ed.), *Proceedings of ORSA-TIMS Marketing Science Conference* (pp. 300–311). Providence, RI: The Institute of Management Sciences.

Wood, S.N. (2006a). *Generalized additive models: An introduction with R.* Boca Raton, FL: Chapman & Hall/CRC.

Wood, S.N. (2006b). Low-rank scale-invariant tensor product smooths for generalized additive mixed models. *Biometrics*, *62*(4), 1025–1036.

Zeithaml, V.A. (1984). Issues in conceptualizing and measuring consumer response to price. *Advances in Consumer Research*, *11*, 612–616.