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# Customer Reactions in Out-of-Stock Situations – Do promotion-induced phantom positions alleviate the similarity substitution hypothesis?

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# Customer Reactions in Out-of-Stock Situations – Do promotion-induced phantom positions alleviate the similarity substitution hypothesis?

Jana Luisa Diels and Nicole Wiebach<sup>1</sup>

## Abstract

Out-of-Stock (OOS) is a prevalent problem customers face at the POS. In this paper, we demonstrate both theoretically and empirically how OOS-induced substitution patterns can be explained and predicted by means of context and phantom theory. We further analyze the relevance of promotions, for which OOS is most pronounced, as essential driver of differences in customers' OOS reactions. The results of an online experiment demonstrate that customers substitute unavailable items in accordance to a *negative* similarity effect which is reduced, however, for OOS items on promotion. The empirical findings further suggest that customers' OOS responses differ for promoted vs. non-promoted items. We find that customers being affected by a stock-out of promotional products significantly more often postpone purchases and tend to avoid substitution resulting in severe losses for the retailer. However, for non-promoted items, customers easily switch to alternative brands. That way, manufacturers lose profit and possibly loyal customers.

**Keywords:** *Out-of-Stock, Context Effects, Phantoms, Promotion, Consumer Decision Making*

**JEL classification:** *M31, C12, C13, C81*

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## 1 Introduction

Out-of-Stock (OOS) is not only a prevalent problem in today's retailing practice but also of high relevance in online and service sectors such as airlines or hotels. With regard to stationary retailing, the European Optimal Shelf Availability (OSA) survey revealed an average OOS level of 7.1% and an augmented rate of 10% for items on promotion (ECR Europe & Roland Berger, 2003). Customers encountering such OOS situations are forced to react. Potential behavioral responses include item switching, brand switching, store switching, as well as purchase postponement and cancellation. Depending on the respective response, both retailers and manufacturers may face severe damages (Campo, Gijbrecchts, & Nisol, 2000). In the short run, possible risks for the manufacturer comprise an unexpected cannibalization of its product range or the loss of customers to competing brands. Conversely, if customers decide to look for the missing item in another store, the retailer faces major losses. In the long run, OOS situations represent a serious threat to brand and store loyalty as the temporal unavailability of products might lead to a first contact with a competing brand or store which, in turn, can destroy a permanent brand relationship if this contact is positive (Karakaya, 2000).

Previous OOS research has primarily investigated the magnitude of the potential behavioral reactions and linked them to different assumed and easily observable determinants. Though so far, the specific impact of stock-outs for brands on promotion has remained unstudied. However, as many customers adapt their buying behavior to promotional activities (DelVecchio, Henard, & Freling, 2006), they can be expected to be especially dissatisfied if an attractive promotion is OOS. As a result of this, we assume the behavioral responses to differ. Knowledge about those differences is of high practical relevance since OOS is particularly pronounced for products on promotion.

Moreover, substitution patterns with regard to the remaining brands at the POS have up to now prompted only little research. Recent studies have primarily regarded the OOS problem in the context of the classical decision theory. This is a common assumption; however, is it reasonable to assume that the preference rank ordering remains stable if the preferred brand is not available? If customers face an OOS situation, they are confronted with an entirely new decision situation represented by an altered choice set. Therefore, we claim that the rank ordering of preferences may change and the relative attractiveness will be built on different reference criteria to compare the alternatives (Sheng, Parker, & Nakamoto, 2005). We use context theory (Huber, Payne, & Puto, 1982; Simonson, 1989; Tversky & Simonson,

1993) and research on phantoms (Pratkanis & Farquhar, 1992; Highhouse, 1996) to explain and predict the substitution behavior subsequent to an OOS in a theory-based way. Thereby, our study reveals that for the temporary unavailability of products, substitution patterns correspond to a *negative* similarity effect (Tversky, 1972). However, due to promotion, the relative positions in the attribute space are changed and the OOS item can be construed as an asymmetrically dominating or a relatively superior phantom causing the *negative* similarity effect to diminish.

Our paper contributes to marketing and retailing literature (1) by including promotion as an important driver of customers' reactions in OOS situations, (2) by employing context and phantom theory to explain the OOS-induced preference shifts and (3) by investigating substitution behavior and making it predictable for retailers and manufacturers.

The paper is organized as follows: The next section briefly reviews recent research on OOS as well as context and phantom theory. The discussion provides valuable insights for the deduction of our research questions and hypotheses on the effect of promotion and context on customer reactions in OOS situations. We then describe the methodology and discuss the results of an online experiment. Finally, implications are derived and directions for future research are indicated.

## **2 Theoretical Background**

### *2.1 OOS literature review*

The phenomenon of temporarily unavailable brands is generally referred to as an OOS or a stock-out (Schary & Christopher, 1979; Verbeke, Farris, & Thurik, 1998). Studies on behavioral responses to such stock-out situations date back to the 1960s when Peckham (1963) and the Progressive Grocer (1968) descriptively analyzed how customers react to the short-term unavailability of products at the POS. Later studies on OOS have primarily considered the probability of different behavioral patterns and have linked them to product-related, store-related, consumer-related and situation-specific variables (cf., Campo et al., 2000; Emmelhainz, Stock, & Emmelhainz, 1991). At this, most of these studies have differentiated between item switching, brand switching, store switching, purchase postponement and purchase cancellation as main OOS responses.

The first stream of research looks at behavioral reactions. The results, however, vary strongly from study to study making it difficult to detect general patterns of OOS behavior. For instance, Campo et al. (2000) found that only 2% of OOS-affected customers switch to another store while the majority postpones its purchase (49%) or chooses another product within the remaining alternatives (44%). By contrast, Schary and Christopher (1979) observed that almost 48% of the customers visit another shop to buy the unavailable product and only 11% decide to delay the purchase. These large variations can be traced back to methodological differences between the studies, which include surveys (e.g., Campo et al., 2000; Sloot, Verhoef, & Franses, 2005), field or quasi-experiments (e.g., Verbeke et al., 1998; Zinn & Liu, 2001), in conjunction with hypothetical (e.g., Campo et al., 2000) vs. real OOS situations (e.g., Zinn & Liu, 2001), as well as differences in the analyzed product category and the respective period under consideration (long-term (e.g., Hegenbart, 2009) or short term (e.g., Sloot et al., 2005)). Moreover, some studies do not include all of the possible OOS reactions. Hence, the observed probabilities are to some extent biased and cannot be directly compared to the results of other studies.

Another stream of studies tries to identify fundamental determinants of OOS responses. Typically, a classical choice approach (e.g., by using multinomial logit models) is applied to relate the distinct OOS reactions to different determinants. The results show that product-related characteristics with significant influence on OOS reactions include, amongst others, brand loyalty, availability of acceptable alternatives, purchase frequency, brand equity and product involvement (e.g., Campo et al., 2000; Hegenbart, 2009; Sloot et al., 2005; Zinn & Liu, 2001). Store-related characteristics of great importance are store loyalty, perceived store prices and store distance (e.g., Campo et al., 2000; Hegenbart, 2009; Sloot et al., 2005). Consumer characteristics that have turned out to be relevant comprise shopping-attitude, mobility, shopping frequency, general time constraint and age (e.g., Campo et al., 2000; Hegenbart, 2009; Sloot et al., 2005). Finally, situational characteristics with particular influence on OOS reaction patterns include, amongst others, required purchase quantity, specific time constraint and urgency of the purchase (e.g., Campo et al., 2000; Hegenbart, 2009; Zinn & Liu, 2001).

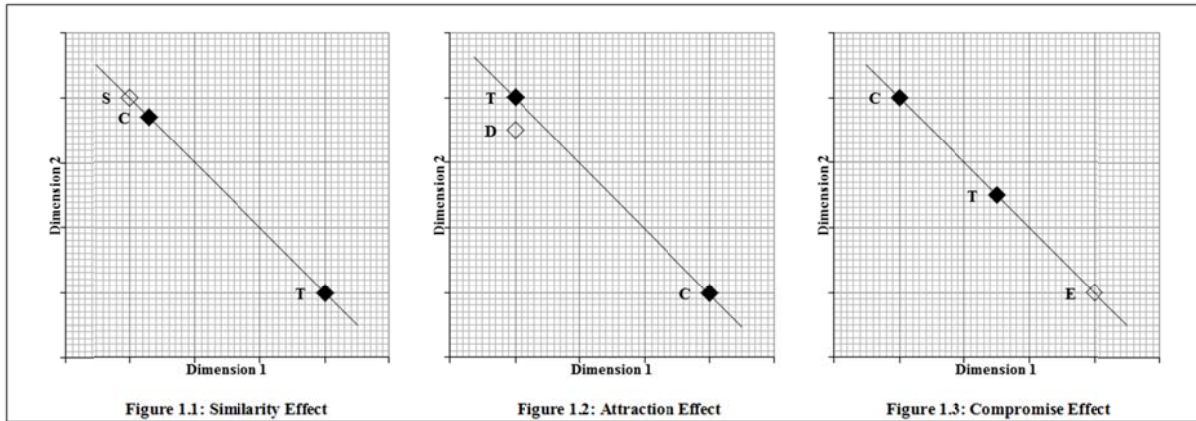
Apart from their merits, these studies also have limitations. Firstly, although they have successfully proven significant relationships between customers' OOS reactions and some influential factors, they partially lack a theoretical foundation to explain their findings. Hence, some of the results do not allow for the derivation of generalized rules to explain and predict OOS reaction behavior. Secondly, while the majority of studies have analyzed general

reaction behavior in OOS situations, only little thought has so far been devoted to OOS-induced substitution patterns (Campo, Gijsbrechts, & Nisol, 2003; Breugelmans, Campo, & Gijsbrechts, 2006). However, such knowledge is especially relevant for retailers and brand managers as it enables them to encounter the negative consequences of OOS situations by providing adequate substitutes. A theory-based analysis of substitution behavior thus represents a valuable avenue for further research which will be covered in the current research paper.

## 2.2 Preference formation in situations of varying choice sets

In the applied modeling approach, we try to overcome the limitations of classical economic theory (Luce, 1959) as extant research on consumer decision-making has revealed that consumers often do not have well-defined preferences and construct choice when required (Bettman, 1979; Payne, Bettman, & Johnson, 1992; Tversky, Sattath, & Slovic, 1988). Accordingly, choices are dependent on the positions and the presence or absence of other alternatives (e.g., Bhargava, Kim, & Srivastava, 2000; Huber et al., 1982; Simonson, 1989).

Research on the context-dependence of choice has so far brought into focus the effects of new product introduction on customers' preference formation. Researchers have revealed that in these situations the essential criteria of rational choice (e.g., regularity, *IIA*) are violated and preference relationships among the core alternatives are changed subject to the altering choice set if a new alternative is included. In general, the studies have employed the following experimental set-up (see Figure 1): Subjects are initially confronted with a core set consisting of a target (*T*) and a competitor (*C*) in a two-dimensional space with approximately the same probability of choice. One core alternative is better on one dimension whereas the counterpart is superior on the other dimension. Subsequently, a new option (*S*, *D* or *E*) is introduced adopting a specific position in the choice set and shifts in choice proportions are examined. It has been proven that by introducing a new option into the choice set (1) similar options lose proportionally more choice share than dissimilar ones (*similarity effect*, *Figure 1.1*) (Tversky, 1972), (2) dominating options can increase their share disproportionately (*attraction effect*, *Figure 1.2*) (Huber et al., 1982) and (3) options that become a compromise between two alternatives are chosen above average (*compromise effect*, *Figure 1.3*) (Simonson, 1989). Our study focuses on one of the most accepted phenomena: the similarity effect which has been demonstrated by Tversky (1972) and Debreu (1960).

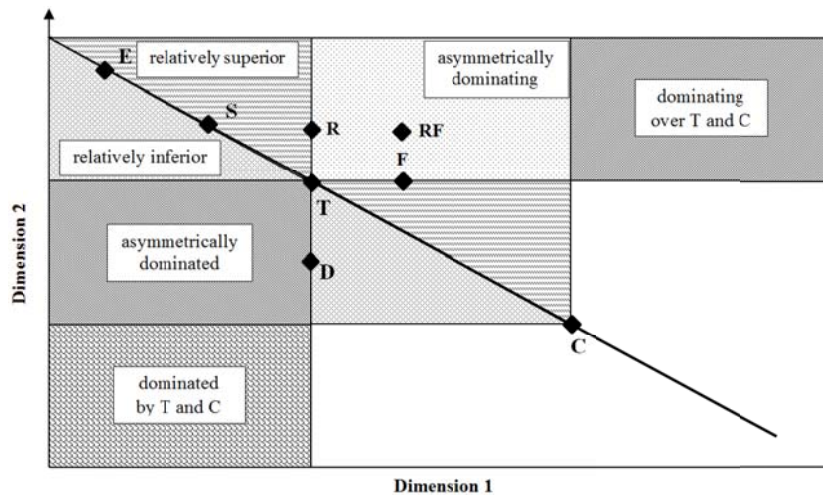


**Figure 1: Similarity Effect, Attraction Effect and Compromise Effect**

In contrast to the broadly covered research domain on new product introduction, the unavailability of items (e.g., OOS) and the resulting consequences for preferences and choice have so far been paid less attention to in the literature. Yet, research on phantom alternatives offers a surplus knowledge to explain preference shifts in case of reduced choice sets. Here, a phantom alternative represents a choice option which looks real but for some reason is unavailable at the time a decision is made (Farquhar & Pratkanis, 1993). Phantoms can be the result of internal or external constraints like budget limitations or time restrictions, or may be attributed to situations of scarcity such as stock-outs. From the decision-maker's point of view, known phantoms are distinguished from unknown phantoms: If the decision-maker is aware of the unavailability of the alternative at the beginning of the choice process, the option is classified as known / recognized phantom. On the other hand, if consumers are surprised by the unavailability subsequent to the decision-making, alternatives are referred to as unknown / unrecognized phantoms (Pratkanis & Farquhar, 1992). Although phantom alternatives only represent illusory options which cannot be chosen, they elicit an influence on the preference structure of a decision maker. This is because subjects utilize the 'irrelevant' information of phantoms to evaluate the available alternatives (Farquhar & Pratkanis, 1993). Phantom alternatives cause shifts in the preference structure which do not conform to the *IIA* assumption. Accordingly, a phantom alternative does not lead to a proportionate increase in the choice probabilities of the available alternatives but to disproportionate shifts in preference depending on different relative positions of the unavailable product.

With regard to those relative positions, literature on phantom alternatives further distinguishes between *asymmetrically dominating* (Pettibone & Wedell, 2007) and *asymmetrically dominated* phantoms (Fitzsimons, 2000; Hedgcock, Rao, & Chen, 2009),

*relatively inferior* (Doyle, O'Connor, Reynolds, & Bottomley, 1999)<sup>2</sup> and *relatively superior* phantoms and phantoms that are *dominated by* or are *dominating* both *T* and *C* (Gierl & Eleftheriadou, 2005) (see Figure 2)<sup>3</sup>. Asymmetrically dominating (dominated) phantoms refer to options that dominate (are dominated by) either *T* or *C*. On the other hand, the term *relatively inferior* (*superior*) is used to describe phantoms that show a slightly worse (better) trade-off for the two considered attribute dimensions than the alternatives *T* and *C* of the core-set. Regarding *asymmetrically dominating* phantoms, several positions of superiority can be differentiated (Pettibone & Wedell, 2007) (see Figure 2). That is, phantoms can either dominate the target product (*T*) on the dimension where they excel the competitor (*C*), forming a range-increasing phantom *R*, or they increase the frequency on the dimension 1, making the target (*T*) the third best in lieu of the second best alternative on this attribute and representing a frequency-increasing phantom *F*. The *RF* phantom is another range-increasing phantom that also manipulates the frequency ranking on dimension 1. It is also suggested that phantoms can dominate real options with regard to a third, i.e. a new attribute, resulting in so-called *N*-phantoms. Further, combinations of *R*-, *N*- and *F*-phantoms are imaginable (Gierl & Eleftheriadou, 2005).



*S*-phantom similar to *T*, same trade-off-line, *E*-extreme phantom, same trade-off-line, *D*-asymmetrically dominated phantom, *F*-frequency increasing phantom, *R*-range increasing phantom, *RF*-range and frequency increasing phantom

**Figure 2: Combining Positions of Phantoms and Decoys**

<sup>2</sup> It is argued that phantom items cannot be inferior to the options of the core set since inferior products are not chosen by the customer and can thus not be unavailable due to high demand (Eleftheriadou, 2004).

<sup>3</sup> Referring to Pratkanis & Faquhar (1992), we utilize the term phantoms to describe items that are unavailable at the time a decision is made. By contrast, Highhouse (1996) and Pechtl (2011) argue that only unavailable alternatives dominating a target option can be named phantoms. Pettibone & Wedell (2007), however, apply the expression “phantom decoys” for each item of the choice set that cannot be selected.



Despite the elaborate classification of phantoms, only few of these potential positions have so far been empirically tested. The majority of studies have analyzed the impact of asymmetrically dominating phantoms on preference formation proving a positive effect of asymmetrically dominating  $R$ -phantoms on  $T$ 's choice probability in relation to  $C$  (e.g., Highhouse, 1996; Scarpi, 2008; Hedgcock et al., 2009). Possible explanations include loss aversion (Tversky & Kahnemann, 1991), shifts in attribute importance (Highhouse, 1996; Hedgcock et al., 2009), value shift (Pettibone & Wedell, 2000) and the similarity substitution heuristic (Tversky, 1972; Pettibone & Wedell, 2000). Pettibone and Wedell (2007) further revealed that for asymmetrically dominating  $F$ - and  $RF$ -phantoms the effect on  $T$ 's choice share is smaller than for the range-increasing phantoms. Gierl and Eleftheriadou (2005) even showed that asymmetrically dominating  $F$ - and  $RF$ -phantoms lead to preference advantages of  $C$  in comparison to  $T$ .

An avenue of research is offered by analyzing the existence of the traditional context effects (similarity, attraction and compromise) in situations of unavailable choice options (Wiebach & Hildebrandt, 2010). More precisely, it can be asked if the respective effects tested for product entry reverse when one alternative is taken away from the choice set. In Figure 2, we combine the decoy positions provided by context effects studies and the so far distinguished positions of phantom alternatives. Thereby, we extend research on unavailability and the resulting preference shifts by adding relevant positions of phantoms to the attribute space which are neither dominating nor dominated (i.e. they are located on the same trade-off-line as  $T$  and  $C$ ).

In the case of OOS situations, the analysis of a reversed or *negative* similarity effect seems most promising, as empirical studies show that people tend to switch to a similar alternative when the preferred product is unavailable in an attempt to save effort to re-evaluate the reduced choice set (e.g., Tversky, 1972; Pettibone & Wedell, 2000) and to enhance information-processing efficiency (Cohen & Basu, 1987). However, for OOS items on promotion, the respective relative position changes from a non-dominating phantom to a relatively superior or an asymmetrically dominating phantom (due to changes in price) and the effect on choice decisions can be expected to alter. The *negative* similarity effect as well as the effect of relatively superior phantoms still lacks an empirical proof. The present study aims at filling this research gap.

### 3 Research Questions and Hypotheses

We employ the results of previous studies on OOS, context and phantom theory to develop our system of hypotheses to elaborate differences in behavioral OOS responses as well as in OOS-induced substitution patterns due to promotion versus non-promotion. We thus add to existent OOS literature by including promotion as an important driver of OOS reactions and making substitution patterns predictable. Furthermore, we extend context and phantom theory by demonstrating the existence of a *negative* similarity effect and by testing so far unstudied phantom positions.

The first part of the analysis focuses on the behavioral OOS responses. Up to now, research on customer reactions to OOS has not explicitly regarded promotion as a factor of influence, although OOS particularly occurs for promoted items and some recent publications have underlined that this domain requires further research (e.g., Hegenbart, 2009; Sloot et al., 2005). Empirical studies on consumer behavior have significantly proven promotional activities to affect customers' purchase decisions with regard to brand and store choice (e.g., Gupta, 1988; Blattberg & Jeuland, 1981; Bell, Chiang, & Padmanabhan, 1999), purchase timing (e.g., Blattberg, Eppen, & Lieberman, 1981; Shoemaker, 1979; Wilson, Newman, & Hastak, 1979) as well as purchase quantities (e.g., Blattberg, Buesing, Peacock, & Sen, 1978; Blattberg et al., 1981). In an attempt to save money, customers adapt their purchase patterns to promotional activities. Consequently, if the respective purchase plans are hindered by OOS situations, behavioral responses can be expected to differ. Therefore, we expect OOS responses to vary from the so far discussed reactions when the OOS item is on promotion.

In particular, we assume that customers who are faced with an OOS for a promoted item will tend to leave the affected store and visit another branch of the same retail chain to be able to nevertheless benefit from the promotional offer. We base this assumption on empirical findings which show that customers consciously switch between retailers to make their purchases in stores offering price promotion and featuring on certain articles (e.g., Fox & Hoch, 2005; Kumar & Leone, 1988; Walters, 1991). To account for this reaction pattern, "branch switching" is introduced as new OOS reaction in our study which has so far been neglected in empirical OOS research. Branch switching indicates store and brand loyalty at the same time and can therefore be perceived the preferential reaction to OOS for both retailers and manufacturers. In contrast, the average of available empirical evidence on OOS responses suggests that 50% of OOS-affected customers are willing to substitute the missing item within the retail assortment. Accordingly, we expect customers who encounter a stock-

out for a regular item to rather substitute within the remaining alternatives as they are not missing a special offer and are less motivated to switch the retail outlet.

***H<sub>1a</sub>**: In OOS situations of promoted items, customers change the branch with higher probability than in OOS situations of non-promoted items.*

***H<sub>1b</sub>**: In OOS situations of non-promoted items, customers show a higher probability to substitute than in OOS situations of non-promoted items.*

The marketing literature has typically viewed promotional activities as a reason for customers to stockpile (e.g., Shoemaker, 1979; Blattberg et al., 1981; van Heerde, Gupta, & Wittink, 2003; Bell et al., 1999). That is, customers trade off inventory costs and product prices and consequently buy earlier and larger quantities of the promoted article than actually required. Since time of purchase and time of consumption do not necessarily correspond, it can be assumed that customers would rather defer a purchase for a product that is OOS if this purchase was only motivated by a promotional offer. On the other hand, customers whose purchase was motivated by the need to maintain daily consumption can be expected to more often not postpone the purchase.

***H<sub>1c</sub>**: In OOS situations of promoted items, customers postpone the purchase with higher probability than in OOS situations of non-promoted items.*

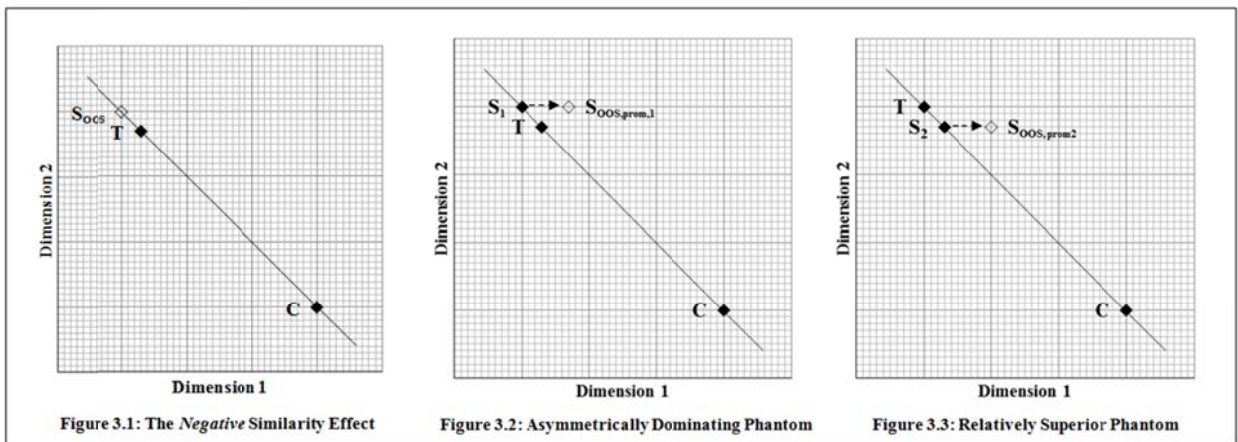
The second part of our hypotheses addresses customers' substitution patterns when items are OOS. Moreover, we focus on the differences in switching patterns as reactions to stock-outs for promoted versus non-promoted items. According to experimental research on consumer choice, preferences are not stable but depend on the positions and the presence of other available alternatives (Bettman, Luce, & Payne, 1998). Since in OOS situations at least one alternative is missing in the choice set, the relative positions of the remaining options change and customers' preferences can be expected to shift (Huber et al., 1982; Simonson, 1989).

In this research, we primarily test the similarity hypothesis for product exit – the *negative* similarity effect. We build on prior research on product entry to generate the respective hypothesis for the reversed scenario of product exit. Based on the assumption that all available alternatives lie on the same trade-off line and hence neither option dominates the other (see section 2, Figure 1.1), the similarity hypothesis for market entry asserts that a new alternative takes share disproportionately from more similar alternatives (Tversky, 1972). Due

to the addition of  $S$  to the choice set,  $S$  and  $C$  are perceived as exchangeable options and constitute one cluster in the consumer's mind (categorization process) (Cohen & Basu, 1987; Tversky, 1977). The loyalty of a potential buyer is divided by the similar items (Huber & Puto, 1983). By contrast, the perceived distance with regard to the dissimilar option  $T$  is increased (Parducci, 1965). The similarity effect is logically incompatible with the proportionality assumption underlying constant utility and independent random utility models of choice (Luce, 1959; Mc Fadden, 1980).

We propose for the inverse setting that in OOS situations the choice share of the similar and available item ( $T$ ) will increase disproportionately, whereas the respective share of the dissimilar option ( $C$ ) will decline or remain the same when the preferred item ( $S$ ) is OOS ( $S_{OOS}$ ) (see Figure 3.1). This is because customers seek to simplify the decision process and minimize the risk of substitution by switching to rather similar alternatives (Breugelmans et al., 2006). In addition, the expected substitution behavior can be explained by the loss-aversion principle (Tversky & Simonson, 1993). The assumption that losses loom larger than accordant gains (Kahnemann & Tversky, 1979) predicts people to select the similar option. Besides, by choosing the similar option, the decision-maker with an initial preference for  $S$  obtains an item that is unambiguously superior to the unlike item on the obviously more important dimension. The postulated *negative* similarity effect results in a violation of the proportionality framework (Luce, 1959), since  $\frac{P[T|\{T,C,S\}]}{P[C|\{T,C,S\}]} < \frac{P[T|\{T,C\}]}{P[C|\{T,C\}]}$ .

**$H_{2a}$ :** In OOS situations of non-promoted and non-dominating items the negative similarity effect occurs.



**Figure 3: The *Negative Similarity Effect*, *Asymmetrically Dominating* and *Relatively Superior Phantom***

However, if the OOS alternative is on promotion, its relative position is altered due to changes in price. Let us assume that dimension 1 comprises the attribute price and the previously available alternative  $S_I$  illustrates a decision-maker's preferred item. Then, this preferred item is announced to be on promotion and OOS. Consequently, it is shifted in the attribute space as illustrated in Figure 3.2 and referred to as  $S_{OOS,prom1}$ . Since for  $S_{OOS,prom1}$  the value of the dimension 2 (e.g., quality) stays unaffected and the value of dimension 1 (price) improves as the item gets cheaper, it is perceived superior to the similar and available option  $T$  on both dimensions 1 and 2 and can be construed as an asymmetrically dominating *RF*-phantom (Pettibone & Wedell, 2007). As the dominated alternative  $T$  hence appears less attractive and its choice is harder to justify – findings supported by the dominance-heuristic (Highhouse, 1996; Simonson, 1989) and the loss-aversion principle of the relative advantage model (Tversky & Simonson, 1993) – we expect the decision-maker to be less inclined to choose the similar (and dominated) alternative than in the setting without promotion. Thus, we predict the increase in choice share of the similar option  $T$  to be smaller for the promotion setting. The *negative* similarity effect will consequently be alleviated.

The same holds true for another possible framing. If the initially preferred item  $S_2$  is superior to the similar alternative  $T$  on dimension 1 (price) but inferior to  $T$  on dimension 2 (e.g., quality), the factor promotion in the OOS scenario leads to a shift in the attribute space as displayed in Figure 3.3. The position of  $S_{OOS,prom2}$  is dubbed relatively superior by Gierl and Eleftheriadou (2005). So far, this phantom position has not been considered in the marketing literature. As the similar alternative  $T$  is relatively inferior to the OOS option, it is considered less attractive and its selection is again harder to justify (Highhouse, 1996; Simonson, 1989). In addition, the perceived distance to the initially dissimilar option  $C$  is diminished (Parducci, 1965) (see Figure 3.3). We conclude that the relative choice proportions of the similar alternative  $T$  will be reduced in comparison to the no-promotion setting. Accordingly, the postulated *negative* similarity effect is once more diminished. In total,  $H_{2b}$  states:

***H<sub>2b</sub>***: *In OOS situations of promoted phantoms, the negative similarity effect diminishes due to shifts in relative positions in the attribute space.*

To test the theoretically derived hypotheses, an online experiment is carried out. In the next paragraph, the empirical study is presented and major results are discussed.

## 4 Empirical Study

### 4.1 Setting

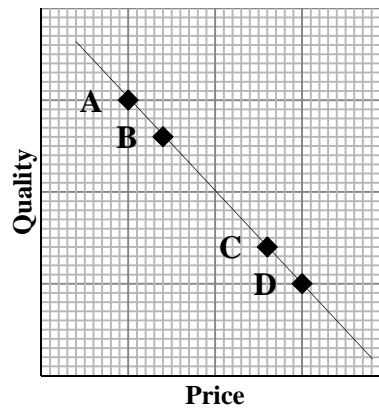
Data on OOS responses and substitution behavior were collected by means of an online experiment. We worked with a pretest-posttest control group design with randomized group assignment. While the control group faced a stock-out during an average shopping situation, the experimental group was administered a treatment in the form of an OOS situation for a promoted item. Washing detergent was chosen as test product as it on average exhibits high OOS rates (ECR Europe & Roland Berger, 2003) and is frequently on promotion. Moreover, we selected all test persons being familiar with detergents purchases which favored the realistic notion of the hypothetical test environment.

Initially, test persons were faced with four detergent brands that differed in price and quality (see Table 1). Quality was operationalized by quality points awarded by the German product test foundation “Stiftung Warentest” with regard to cleaning power, color protection and ecological ingredients. This information was also given to the participants. Prices conformed to current German drugstore prices.

	<i>Price (for 18 loads)</i>	<i>Quality</i>
Brand A	6,69€	90
Brand B	5,99€	80
Brand C	3,49€	50
Brand D	2,85€	40

**Table 1: Characteristics of the Detergent Brands**

The four alternatives were constructed such that always two brands resembled each other and formed similar substitutes. Consequently, the choice set consisted of two alternatives with a high quality-price combination and two alternatives with a rather low quality and low price. Moreover the four alternatives were non-dominating in that they were placed on the same trade-off line (see Figure 4).



**Figure 4: Initial Attribute Space**

To test the hypotheses about OOS reactions and substitution behavior, we applied a three stage approach: In a first choice situation, the test persons were asked to select their favorite product (nominal choice) and to indicate their preference ranking for all four alternatives on a constant sum scale (ratio data). Second, participants were confronted with a reduced choice set and informed that the item which they selected in the first choice situation was OOS and thus not selectable. The experimental group additionally received the information that their preferred product was on promotion but unfortunately already OOS. Respondents were asked to state if they would react to the OOS situation (a known phantom) by switching to one of the remaining brands, leaving the store to buy their favorite brand in another shop of the same or a different retail chain or by postponing the purchase. Subsequently, respondents were again confronted with the reduced choice set and this time forced to substitute.

Due to the promotional reduction in price, the relative position of the phantom was changed. As can be deduced from Figure 5a-d and Figure 6a-d, in comparison to the control group, in which the relative positions of the alternatives did not change, the phantoms for the experimental group took positions of asymmetrically dominating and relatively superior phantoms.

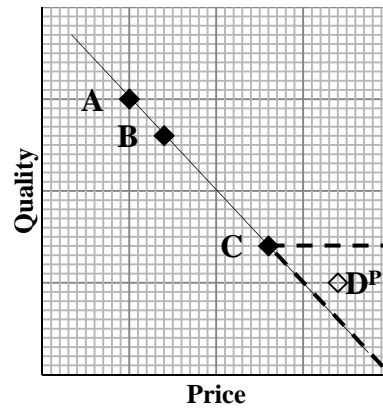
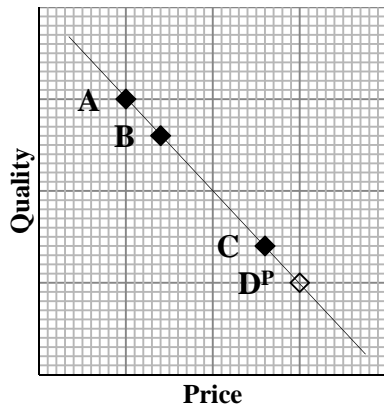
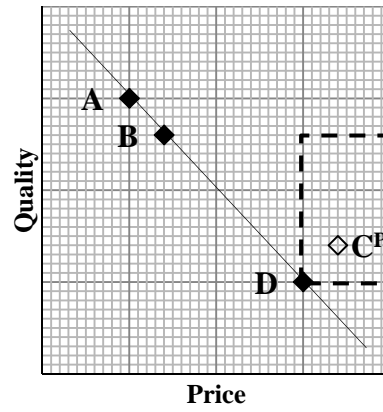
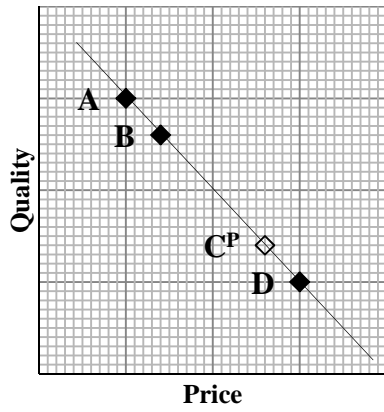
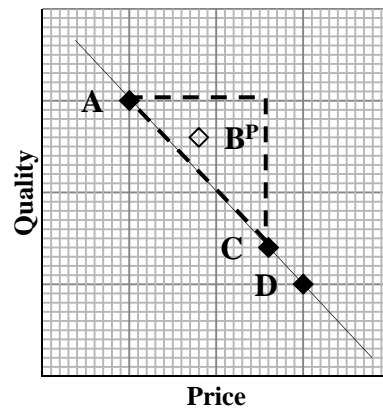
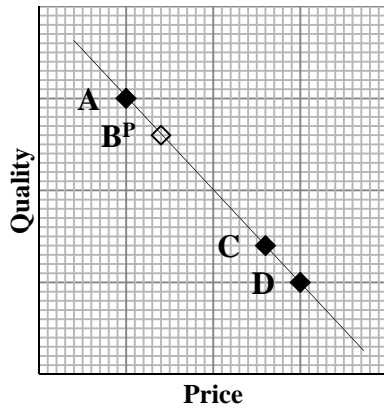
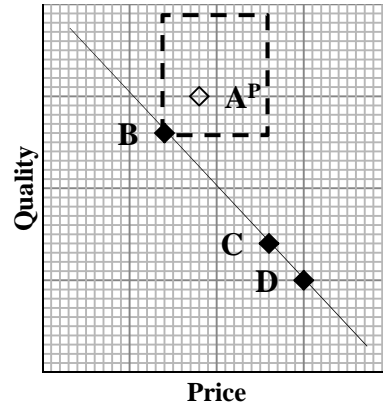
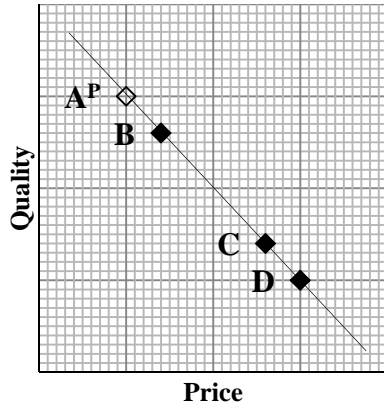


Figure 5 a-d: OOS Options as Phantom – Control Group

Figure 6 a-d: OOS Options as Phantoms - Experimental Group



In total, 234 online questionnaires were completed for the control group (without promotion), and 227 for the experimental group (with promotion).

#### 4.2 Empirical results

The two groups resembled with regard to the distribution of the preference product: In the first decision situation, 18.4% (15.0%) of the control group (experimental group) chose product A, 37.6% (40.5%) product B, 36.8% (36.1%) product C and 7.3% (8.4%) product D (see Table 2). A chi-square test confirms the independence of the preference product and the experimental group so that a possible bias can be precluded ( $\chi^2(3)=1.24, p >.743$ ). A one-way ANOVA conducted on the preference ratings for the four products further affirms this notion ( $p >.10$ )

<b>Group</b>	<b>Product A</b>	<b>Product B</b>	<b>Product C</b>	<b>Product D</b>
Control Group <sub>nominal</sub>	18.4%	37.6%	36.8%	7.3%
Experimental Group <sub>nominal</sub>	15.0%	40.5%	36.1%	8.4%
Control Group <sub>points</sub>	23.42	29.66	34.17	12.75
Experimental Group <sub>points</sub>	20.61	31.81	35.50	12.08
ANOVA	F=1.979, df=1, p >.1	F=0.442, df=1, p >.1	F=1.053df=1, p >.1	F=0.171, df=1, p >.1

**Table 2: Summary of Results (Preference Product)**

#### *Behavioral reaction patterns*

To test for differences in the reaction patterns of the two groups, a chi-square test of the nominal reaction decisions was performed. A highly significant result ( $\chi^2(4)=27.203, p <.001$ ) confirms that reactions to OOS situations differ for promoted and non-promoted items. Considering the standardized residuals (cf. Table 3), it becomes evident that the significant relationship stems from the divergent frequencies regarding substitution, branch switching and purchase postponement. In comparison to the experimental group, more test persons of the control group reacted by substitution than could be expected for the independence of the factor promotion. At the same time, a disproportionate number of test persons decided to switch the branch or postpone the purchase in the experimental group.

<b>Group</b>		<b><i>Substitute</i></b>	<b><i>Branch Switch</i></b>	<b><i>Store Switch</i></b>	<b><i>Postponement</i></b>
Control Group	Count	144	7	9	74
	% of Total	61.5%	3.0%	3.8%	31.6%
	Expected Count	122.3	18.8	8.1	84.8
	Std. Residual	2.0	-2.7	0.3	-1.2
Experimental Group	Count	97	30	7	93
	% of Total	42.7%	13.2%	3.1%	41.0%
	Expected Count	118.8	18.2	7.9	82.2
	Std. Residual	-2.0	2.8	-0.3	1.2

**Table 3: Summary of Results (OOS Reaction, Nominal)**

A one-way ANOVA conducted on the preference ratings for the distinct reactions supports that test persons of the promotion scenario distributed significantly less points to the substitution reaction than their non-promotional counterparts ( $F=15.38$ ,  $df=1$ ,  $p<.001$ ). Concurrently, those respondents allocated significantly more points to the reactions branch switch ( $F=17.00$ ,  $df=1$ ,  $p<.001$ ) and purchase postponement ( $F=7.29$ ,  $df=1$ ,  $p<.01$ ) (see Table 4). Hence,  $H_{1a}$ ,  $H_{1b}$  and  $H_{1c}$  are supported.

<b>Group</b>	<b><i>Substitute</i></b>	<b><i>Branch Switch</i></b>	<b><i>Store Switch</i></b>	<b><i>Postponement</i></b>
Control Group <sub>points</sub>	56.53	7.24	8.02	28.21
Experimental Group <sub>points</sub>	43.89	13.32	7.25	35.54
ANOVA	F=15.38, df=1, p<.001	F=17.00, df=1, p<.001	n.s.	F=7.29, df=1, p<.01

**Table 4: Summary of Results (OOS Reaction, Ratio)**

In summary, it can be proven that the factor promotion exhibits a strong influence on reaction patterns in OOS situations. When faced with a stock-out for a non-promoted item, customers show a higher probability to substitute and a lower probability to switch the branch and to postpone the purchase than in the promotion scenario. This finding demonstrates that customers undertake considerable efforts to take advantage of promotional offers. The reaction branch switching proves to be an important OOS reaction which has so far been missing in the OOS literature.

### *Substitution patterns*

We expect substitution patterns to differ subject to the relative position of the OOS item, i.e. the phantom alternative. Specifically, we assume participants in ‘average’ OOS situations to switch to the most similar substitute (*negative* similarity effect) whereas test persons in situations of promoted OOS articles are less inclined to do so and can be expected to rather choose a dissimilar article.

Depending on the respective chosen preference product in the first decision situation, distinct substitute options existed for every test person. In order to make the results comparable, the preference points for the respective similar choice option were coded as *Similar Substitute* whereas the allocated preference points for the two dissimilar options were summed up and coded as *Dissimilar Substitute* (c.f. Table 5).

<b>Preference Product</b>	<b><i>Similar Substitute</i></b>	<b><i>Dissimilar Substitute</i></b>
A	Preference points B	Preference points C+D
B	Preference points A	Preference points C+D
C	Preference points D	Preference points A+B
D	Preference points C	Preference points A+B

**Table 5: Recoding of Preference Points**

To account for the existence of context-induced preference shifts and particularly the occurrence of the *negative* similarity effect, in the first step of the analysis the principle of *IIA* has to be disproved and significant differences between the observed and the expected choice shares need to be demonstrated. For that reason, a paired sample t-test was conducted to compare the individual expected choice shares under the Luce model and the *IIA* assumption ( $E_L(X)$ ) (cf. 2.2) to the observed choice shares for the similar substitute ( $O(X)$ ). The mean value of the expected shares ( $M_{E_L(X)}=46.27$ ) differs significantly from the mean value of the observed choice shares ( $M_{O(X)}=54.90$ ,  $p<.001$ ), thus proving that preferences in OOS situations shift contrary to the assumptions of fixed preferences and proportionality. In the same vein, we observe that for the non-promotional group the expected choice shares for the similar substitute lie significantly below their respective observed shares ( $M_{E_L(X)}=48.19$ ,  $M_{O(X)}=59.12$ ,  $p<.001$ ) (see Table 6). As the *negative* similarity effect (*NSE*) is said to occur whenever the observed choice share exceeds the expected choice share (mathematically:

$NSE = O(X) - E_L(X) > 0$ ), the existence of the *negative* similarity effect is confirmed. Hence hypothesis  $H_{2a}$  is accepted.

		<i>Whole Sample</i>	<i>Control Group</i>	<i>Experimental Group</i>
$M_{O(X)}$	Similar Substitute	54.90	59.11	50.55
	Dissimilar Substitute	45.10	40.88	49.45
$M_{E_L(X)}$	Similar Substitute	46.27	48.19	44.29
$NSE_{(X)}$	$O(X) - E_L(X)$	8.63	10.92	6.26

**Table 6: Observed vs. Expected Choice Shares**

In a second step, the diminishment of the *negative* similarity effect for the experimental group has to be shown. Due to the fact that in the promotion scenario, the relative position of the preference item changes towards an asymmetrically dominating or a relatively superior phantom (cf., Figure 3.2 and 3.3), we expect the *negative* similarity effect to be less pronounced as people are less inclined to switch to the most similar substitute. A between-group comparison of the mean value of the observed choice shares  $M_{O(X)}$  for the similar as well as the dissimilar substitute by means of a one-way ANOVA confirms this notion, revealing that test persons of the experimental group switch significantly more often to the dissimilar substitute than test persons of the non-promotional control group ( $F=15.38$ ,  $df=1$ ,  $p<.001$ ). Additionally, the strength of the *negative* similarity effect is calculated for both the control and the experimental group and compared by means of a one-way ANOVA. The results confirm the assumption of a diminishing *negative* similarity effect, demonstrating that the mean *negative* similarity effect of the control group lies significantly above the respective effect for the experimental group ( $NSE_{CG}=10.92$ ,  $NSE_{EG}=6.26$ ,  $F=3.75$ ,  $df= 1$ ,  $p<.05$ ). Consequently,  $H_{2b}$  is supported.

Summing up, it can be claimed that customers' substitution patterns in OOS situations are context-dependent and change subject to the relative positions of the phantom and the remaining alternatives. Specifically, it shows that substitution behavior corresponds to a strong *negative* similarity effect as long as the available alternatives do not obviously dominate each other. Yet, when the relative dominance structure is changed due to promotion-induced alteration in price, customers less self-evidently choose the most similar substitute. Switching to the unlike alternative approaches switching to the similar alternative. Apparently, dominated options rupture decision heuristics leading customers to reconsider

their habitual choices and switch to options which do not correspond to the formerly exhibited preference structure.

## 5 Discussion and Implications

In summary, our analysis detects specific differences in OOS responses and substitution patterns for promoted and non-promoted items. As previous OOS studies have already shown, customers in OOS situations generally exhibit a high tendency to substitute unavailable items for other products within the assortment. However in our study, this response behavior turned out to be clearly more pronounced for customers in ‘average’ OOS situations. Yet, customers who encounter stock-outs for promoted items tend to postpone their purchases or visit another outlet of the same retail chain to buy the promoted product. Those customers seem to behave both brand and store loyal, as they neither switch the brand nor the retailer but undertake considerable effort to nevertheless buy the preferred brand within the promotional offer.

From the theoretical and empirical perspective, our findings suggest that OOS-induced preference shifts deviate from the assumptions of classical decision theory. Precisely, it can be observed that choice shifts depend on the relative position of the respective unavailable item, i.e. the phantom. We find that in ‘average’ OOS situations with non-dominating choice options, substitution patterns correspond to a *negative* similarity effect in that customers primarily choose substitutes which resemble the formerly chosen preference product on the considered attributes. This behavior can be interpreted as customers’ attempt to simplify the decision process and minimize the possible risk of mispurchase. However, our results indicate that for stocked-out products on promotion the *negative* similarity effect diminishes since customers significantly less often choose a similar substitute but consider the choice of an unlike product. A possible explanation for this finding is that due to promotional price reductions, the dominance structure between the phantom and the remaining alternatives is altered. The promoted but unavailable item dominates the similar and available alternative, for which reason it is perceived as less attractive in a direct comparison. Consequently, its choice gets harder to justify. That is why customers re-evaluate the available alternatives and more often opt for products which are not evidently dominated. The results suggest that theory on context and phantom effects can be applied to explain and predict preference formation and choice behavior in situations of stock-out induced reductions of choice sets. Promotion-induced phantom positions alleviate the similarity substitution hypothesis.

The managerial implications of our findings are twofold. For the manufacturer, we find that OOS situations may imply severe damages since customers willingly decide to substitute if the formerly preferred brand is temporarily unavailable. That way, the manufacturer not only loses margins in the short run but also bears the risk of losing possibly loyal customers to competing brands in the long run. Although a large part of OOS-affected customers decide to postpone the purchase, it remains unclear if those customers will return to the unavailable brand in their next shopping occasion. For stock-outs of promoted items, customers are less inclined to substitute and tend to follow the promoted brand into different stores. However, this finding indicates that customers are bargain hunters that only behave brand loyal when they expect financial compensation. Manufacturers have to question the value of those customers as they can be expected to easily switch to a competing brand if it happens to be on promotion.

For the retailer, on the other hand, our results suggest fewer damages as the majority of OOS-affected customers substitute within the retail chain and only very few decide to switch the store. In this regard, the newly introduced reaction ‘branch switching’ proves to be especially relevant since customers in OOS situations for promoted items do not punish the retailer by frequenting a different store, but voluntarily visit another branch of the same retailer to nevertheless profit from the promotional offer. This finding suggests that financial savings are a more relevant customer need than the disposability of products. However, a lot of customers decide to postpone their purchase – especially for stocked-out products on promotion – pointing to lost margins for the retailer in the short run. With regard to customers’ substitution patterns, our results indicate that retailers should always stock at least two similar products to facilitate substitution decisions in OOS situations.

Taken together, our study makes several key contributions to the marketing literature. Firstly, the results demonstrate the relevance of promotion as an essential driver for specific OOS reaction behavior. This is especially important as the OOS rates for promoted items are in general higher. Since OOS research has so far neglected the influence of promotion, previous implications have to be adapted and challenged. Secondly, we extend OOS research by adding branch switching as another important reaction possibility. This reaction turns out to be a meaningful response opportunity, in particular for promoted OOS items. Thirdly, we successfully relate assumptions of context and phantom theory to OOS reactions by testing the similarity substitution hypothesis and proving the existence of the *negative* similarity effect. Thereby we supply a theoretical framework to OOS research.

Despite the valuable contributions, our research is limited by several aspects which open avenues for further research. We tested our hypotheses in a single product category and on the basis of reported behavior. This may decrease the external validity of our results as test persons might have had difficulties putting themselves into the fictitious OOS situation. Although this data collection method has several advantages (e.g., minimization of white noise) and has been applied by previous OOS studies, further research has to generalize the results by examining more categories and in a real-world shopping situation. Moreover, the study only considers short-term OOS reactions. However, the assessment of permanent OOS-induced responses seems very interesting as damages to store and brand loyalty can only be recognized in the long-run and possibly after several OOS occasions. Since promotion proves to be an important driver of OOS responses, more research should be done to further analyze its influence. For instance, it could be very promising to test the influence of stock-outs for promotional products other than the preferred product. Finally, by combining research on context and phantom alternatives, the study offers ample opportunities to further analyze prevailing context effects in situations of reduced choice set by varying the position of the unavailable product to test the potential effects on preference formation and choice decisions.

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