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Fact or Artifact

Does the compromise effect occur when subjects face real consequences of their choices?

Holger Müller[1], Eike Benjamin Kroll[2], and Bodo Vogt[2]

Abstract

This study investigates context effects in general and the compromise effect in particular. It is argued that earlier research in this area lacks realism which is a major drawback to research conclusions and stated management implications. The importance of this issue is stressed by previous research showing that behavioral anomalies found in hypothetical experimental settings tend to be significantly reduced when real payoff mechanisms are introduced. Therefore, to validate the compromise effect, an enhanced experimental design is presented with participants making choices in the laboratory that are binding. We find that the compromise effect holds for real purchase decisions, and therefore is validated and not an artificial effect in surveys on hypothetical buying decisions. While conclusions and implications for marketing managers derived in previous work assume that context effects hold for real market decisions, the results created by this enhanced design close this gap in marketing literature.

Keywords: choice in context, compromise effect, irrelevant alternatives, hypothetical bias, experimental design

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1. Introduction

Economists model choice using standard valuation theory. Experimental studies have found several violations of the fundamental axioms of utility theory being independence of irrelevant alternatives (IIA-Axiom) and transitivity. One of the most prominent violation is termed preference reversals (Lichtenstein and Slovic 1971; Loomes et al. 1991) which led to more intuitive models like Regret Theory (Loomes and Sugden 1982). Whenever such violations were found, new versions as well as extensions of expected utility theory were suggested covering the observations from the lab. But all of the suggested theories still have one assumption in common, which is that people have consistent underlying preferences (Cubitt et al. 2001; Simonson and Tversky 1992). However, this fundamental assumption of existing economic choice models is challenged by experimental results showing that the ranking of alternatives within a choice set is influenced by the choice set itself (Bateman et al. 2007). Therefore, people's choices might be easier manipulated than economists have thought (Beshears et al. 2008; Choi et al. 2008).

While experimental results mentioned above consider choices between simple prospects, marketing research considers more complex choice situations where the options are more multifaceted in properties. These kinds of decisions are even more prone to violations since decision makers seem to focus on components that distinguish options (Tversky 1972) leading to seemingly inconsistent choice behavior. Reflecting the discussions of experimental economists in risk research mentioned in the first paragraph, empirical evidence in marketing literature confirms that both content and structure of the set of alternatives does in fact have an influence on revealed preferences (Tversky and Shafir 1992). Such context effects proved to be common, robust and represent the rule rather than the exception in observed choice behavior (Simonson and Tversky 1992). One context effect investigated in many previous studies is what was termed compromise effect, according to which subjects under certain conditions are more likely to choose an option that reflects a compromise rather than an extreme position within a given choice set due to extremeness aversion of subjects.

A lot of progress has been made in decision research and understanding these effects is important for both theory and practice (Payne et al. 1992). For example, experiments have shown that newly introduced brands have a significant impact on choice (Pan and Lehmann 1993) and revealed the fact that trade-off choice sets trigger relatively higher negative emotions (Hedgcock and Rao 2008). The confirmed robustness of context effects stresses the need for context-dependent models which are known to outperform standard value maximization models (Kivetz et al. 2004).

Whenever generalizations of behavioral anomalies identified in hypothetical environments are intended, experimental settings using real payoffs and binding transactions are required to validate observed effects. Methodologically it is argued that real payoffs in experiments are required when studies focus on judgments and decision-making (Hertwig and Ortmann 2001). From economic experiments we know that violations of rational assumptions found in hypothetical studies can be reduced by introducing payments of real money (Siegel and Goldstein 1959). Furthermore, in the area of risk research a violation of classical theory as the preference reversal phenomenon can be significantly reduced when real payoffs rather than hypothetical questions are used (Bohm 1994).

However, in the remainder of the paper we will argue that the degree of realism in previous studies is generally low, which is a major drawback, especially when implications for real decisions of marketers like product or price positioning are derived. Thus, enhanced experimental designs need to be applied in order to verify generalization and applicability of laboratory-based research results. Therefore, the objective of our research is to examine if context and compromise effects respectively occur when the decision process in the laboratory experiment is designed closer to reality.

2. Literature Review

In this section, we discuss important previous studies investigating context effects. The experimental designs of these studies can be distinguished from each other by several framing aspects like basic characteristics of options, selection mechanisms, consequences of choices, incentives and the sample-design.

The very first papers addressing context effects used both a between-subjects and a within-subject design (Huber et al. 1982; Huber and Puto 1983). However, after this original work on the subject matter between-subject designs were used addressing different aspects of context effects. Only (Simonson and Tversky 1992) used both designs to identify several effects which they assigned to tradeoff contrast and extremeness aversion. Other researchers used a within-subject design to show the influence of new brand entry (Pan and Lehmann 1993) and to demonstrate the compromise effect in risky choices (Herne 1999) with the latter paper being the only one we came across that merely used the within-subject design. It has to be noted, that basically, to investigate whether decisions of a certain subject are influenced by different choice contexts, time lagged within-subject designs appear to be appropriate. However, to avoid evident biasing impacts (for example memory effects), primarily between-subjects designs should be applied in research on context effects in general.

In order to analyze context effects one can use choices between fictitious options as well as real brands. While most studies use choices among fictitious options, establishing context effects to real market behavior requires studies using real brands. Some of the studies aiming at generalizing the effects used choices between product variations of fictitious brands (Amir and Levav 2008; Kivetz et al. 2004) or line extensions of a real, but only one specific parent brand (Simonson and Tversky 1992). It is important to note that definable market-available brands represent central information as well as a risk reducing cue in real purchase decisions. For instance, subjects often simplify information processing, reduce cognitive control and assess product quality with respect to brands only. Furthermore, products' homogeneity in physical features (Erdem and Swait 2004) increases in general. Thus, what effectively differentiates a product offering and strongly influences subjects´ decisions in ordinary buying situations is most often only the brand itself and its associations. Therefore, at least recent studies rightly started analyzing choices in context using real brands of circumscribable competing products (Novemsky et al. 2007; Sinn et al. 2007).

A different issue addressed in previous research is whether laboratory experiments should include a no-buy option for reason of reflecting real market-based choice behavior of subjects. For purposes of defining implications for marketing managers it is important to note that forcing choices has a

significant impact on participants' behavior and might therefore bias choices (Dhar and Simonson 2003). For instance, it has been shown that compromise effects become more likely when no-buy options are excluded from the whole choice setting. However, most of the studies on context effects available use forced choices for investigation and are therefore lacking realism in this part.

Designing experiments to draw conclusions for real market behavior it is vital that decisions in the laboratories are meant to be about real consequences. It is important to note that binding transactions are required since real consequences produce different choices than choices between hypothetical options due to the existence of a hypothetical bias (Holt and Laury 2002; Holt and Laury 2005; Murphy et al. 2005). Research on context effects in general, however, uses only hypothetical choices, most often for reasons of realizing sufficient response and practicability, despite the fact that the degree of realism in such settings is obviously reduced. Thus, it is important to implement enhanced experimental designs that increase the level of realism.

Analyzing previous research on context effects and the compromise effect in particular, one can see that the effect is well established in the marketing literature with profound implications for marketing managers in the field. However, in an overall perspective we can clearly identify a lack of realism in the experimental designs in all of these previous studies. In order to derive reliable implications especially for marketers and support real pricing and positioning decisions, both context as well as compromise effects should be investigated with a much closer relation to behavior in real purchase decisions. Table 1 provides an overview of different designs applied in most prominent studies on the subject.

Table 1 Selected designs of previous research on context effects

Year	*Auhtor*	*Between Subjects*	*Within Subjects*	*Binding Transaction*	*Hypothetical Choice*	*Forced Coice*	*No-Buy Option*	*Fictitous Brands*	*Real Brands*	*Line Extensions*	*Circumsribable Products*
1982	Huber Payne Puto	x	x		x	x		x			
1983	Huber Puto	x	x		x	x		x			
1987	Ratneshwar Shocker Stewart	x			x	x		x			
1989	Simonson	x			x	x		x			
1992	Simonson Tversky	x			x	x			x	x	
1993	Pan Lehmann	x	x		x	x		x			
1999	Herne		x		x	x		x			
2000	Drolet Simonson Tversky	x			x	x		x			
2003	Dhar Simonson	x			x	x	x	x			
2004	Kivetz Netzer Srinisavan	x			x	x		x		x	
2005	Chernev	x			x	x		x			
2007	Levav	x			x	x		x		x	
2007	Sinn Milberg Epstein Goodstein	x			x	x			x		x
2007	Novemsky Dhar Schwarz Simonson	x			x	x			x		x
2009	Müller Kroll Vogt	x		x			x		x		x

3. Hypotheses development

Studies investigating choices in context reveal significant differences in purchase decisions by changing the set of alternatives. In our study, prevalent interpretations of identified context effects and compromise effects respectively are challenged by applying an enhanced experimental design.

It has to be noted that by altering the content of choice sets the external (contextual) reference prices of subjects might be influenced according to the adaption-level-theory (Helson 1964). That means the reference price shifts upwards when high priced options are included in a choice set. Due to this shift of reference prices, products are presumably perceived as relatively cheap when a more expensive alternative is available. Thus, once a high priced alternative is added to a choice set of low and medium priced alternatives, the absolute number of purchases is expected to increase. Furthermore, due to the change in price perception the willingness to pay is altered. That means, when the reference price is shifted upwards, products formerly perceived as too expensive to buy are now perceived as reasonably priced. Therefore, not only the number of purchases increases, but also the willingness to pay for a given product should be higher, when adding a higher priced alternative. Therefore it is hypothesized that:

H1: Including high priced options (H) to a set of low (L) and medium (M) priced options increases number of purchases.

H2: Including high priced options (H) to a set of low (L) and medium (M) priced options increases subjects' willingness to pay.

According to the compromise effect people tend to choose options that are a compromise rather than an extreme relative to the other available options. Therefore, by changing the choice set, the degree of extremeness of an alternative can be altered by adding another option. Suppose there are two options with only two relevant product features in a choice set. In this case both options reflect extreme positions relative to each other. Following the concept of extremeness aversion (Simonson and Tversky 1992), a third alternative can be added in a way that makes one of the previous two options a compromise in terms of tradeoff between the two product attributes. Thus, one of the initial options

becomes a compromise and given an equal degree of brand familiarity (Sinn et al. 2007) and attribute importance (Simonson and Tversky 1992) it is more likely to be chosen.

H3: Choice shares of medium priced options (M) increase when high priced options (H) are included in the choice set.

The degree of realism in previous studies on context effects needs to be increased because of the existence of a hypothetical bias. Studies have shown that participants in laboratory studies state the value of an option as higher when decisions are hypothetical (Holt and Laury 2002; Holt and Laury 2005). Furthermore it is known that for elicitation of willingness to pay the same effect applies (Murphy et al. 2005). Thus, linking subjects´ choice decisions with randomly selected buying obligations should decrease observed willingness to pay.

H4: Subjects' willingness to pay stated in non-binding buying simulations exceeds willingness to pay revealed in binding transactions.

4. Experimental Design of the study

4.1. Sample and Stimuli

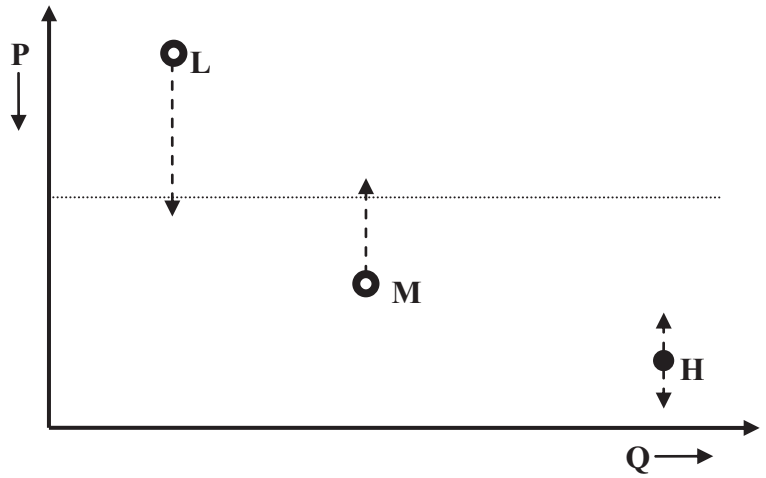
Our study used a between-subjects design with two experimental conditions. The first offers L and M (CS2) and the second the same products plus a third alternative H (CS3). That means in CS2 both alternatives represent a rather extreme choice, while in CS3 through offering a third alternative, M becomes a compromise between L and H. We recruited a total number of 233 female students from different fields of study at the Otto-von-Guericke-University Magdeburg. During the recruitment participants received a show-up fee (8 Euro cash payment). In order to avoid biasing effects, the recruitment and payment of the show-up fee was executed two weeks prior to the experiment. Participants were randomly assigned to both of our experimental conditions. Based on information about buying experience and product attribute importance (price and brand-based quality) gathered in numerous pre-tests, we selected toothpaste and shampoo as product groups under examination. For reason of realistic framing only frequently used and therefore equally familiar brands available in real market purchases and positioned in different price and quality levels served as alternatives L

(Dentagard, Herbal Essences) and M (Colgate, Elvital) in the choice sets. Note, that for including a high quality brand with an extreme price position making this option irrelevant for most subjects, we selected H (Sensodyne, Paul Mitchell) deliberately as a brand of the premium segment.

4.2. Procedure

Our study used a computer-aided survey realized in a laboratory environment (MaXLab at the University of Magdeburg). After formal instructions, participants´ willingness to buy for selected brands of both product groups was determined with a closed-ended approach in a first complex. Placed into cabins with computer screens, subjects were provided with seven randomly ordered price scenarios and asked to indicate which brand (if any) they would buy. To evade empirically proven problems like starting point bias (Mitchell and Carson 1989) or sequence effects of closed-ended approaches, a randomized presentation of price scenarios as well as brand positions in a virtual shelf on the screen was generated by the software. Buying decisions contained systematic price trade-offs in terms of an incrementally increasing (decreasing) price of L (M), while option H varied in price randomly within a smaller range around real market prices[1] (see figure 1).

Fig. 1 Trade-Off design
L = low priced brand
M = medium priced brand
H = high priced brand



To avoid hypothetical bias, subjects were instructed at start that they had to draw a scenario number from a box after the experiment. The decision in that scenario became binding, what means that participants were either faced with an obligation to buy the chosen product at the price given or they could not buy any of the products in case of having decided not to buy in that scenario. That means,

[1] Price scenarios of each product group are presented in the appendix.

according to standard procedures in eliciting preferences, a random payoff mechanism was applied to avoid portfolio effects (Grether and Plott 1979). Transactions were realized at a later date for reason of ensuring sufficient liquidity of subjects.

A second complex investigated hypothetically stated willingness to pay (open-ended approach). Subjects had to indicate the highest price they would accept for the preferred brand (L or M) directly given a fixed price level of option H in CS3 or without presentation of H in CS2. Additionally, information about buying behavior and demographics were gathered.

Note, that in contrast to the majority of previous studies described in section 2, we used real purchase decisions including no buy options. Therefore, only familiar brands really available at market and clearly definable by subjects in terms of quality and price served as alternatives of the choice set. Furthermore, a no-buy-option was included similar to real purchase decisions instead of forcing subjects to choose or buy a brand from the choice set presented. Concerning the transactions, participants obtained selected products and had to pay for it with their own currently available money rather than their incentive payment given two weeks ago already (actual "out of pocket" money). That means, although we basically used a design quite similar to a typical laboratory-based buying simulation, our experimental environment contains in fact the touch of realism, which was subject to fully justified criticism of previous studies (Sinn et al. 2007).

5. Results of the study

In a first step, we tested homogeneity of the randomly assorted samples of the two experimental splits. In statistical pre-analysis, we found no significant differences between demographical characteristics (e.g. age class, faculty) and information reflecting consumers´ buying behavior (e.g. purchasing frequency, brand familiarity, brand preferences) of subjects in CS2 and CS3 (for all tested combinations: $\chi^2<5.7$, n.s.). Differences identified in choice behavior of participants are therefore clearly caused just by variation of the experimental factor, that is the content of the choice sets .

According to H1 and H2, including high priced options not chosen by participants and therefore considered as irrelevant alternatives to a set of low and medium priced options in binding buying

decisions is expected to induce an increase in demand in general. This should lead to more purchases as well as higher willingness to pay (WTP). Note, that adjoining a high priced option could basically increase the number of purchases in CS3 merely because preferences and demand structures of consumers might not be covered or reflected in the small available set consisting of only two brands in Split CS2. However, due to our experimental configuration (where H represents a too expensive, irrelevant premium quality brand in both product groups) we assumed such situations to be quite unlikely, which proved to be right according to later discussed results of our choice analysis. Nevertheless, decisions for option H were excluded from the analysis for reason of accuracy. Although not significant in one of the product groups under examination, results support at least the tendency expected in H1. Thus, compared to Split CS2, subjects of CS3 more frequently select products from the choice set presented instead of refusing to buy any of the brands in the seven buying decisions. For instance, the total (average) number of shampoos chosen in the experiment rises from 486 to 579 (4.1 to 5.0), which turns out to be significant (*KS-Z*=1.578, $p<0.05$). Note, that we used Kolmogorov-Smirnov-tests (*KS*) for variables were in fact not normally distributed. These results are highlighted in Table 2.

Table 2 Number of purchases in binding buying decisions (overall)

Product group	*Split Sample*	*CS2 n = 118*	*CS3 n = 115*	*KS-Z*	*p*
toothpaste	purchases/no buy	625/201	634/171		
	mean purchases	5.30	5.51	0.974	0.299
	std.dev. purchases	2.06	2.15		
shampoo	purchases/no buy	**486**/340	**579**/226		
	mean purchases	**4.12**	**5.03**	**1.578**	**0.014**
	std.dev. purchases	2.72	2.39		

Furthermore, results obviously confirm that including a high priced alternative H in CS3 increases subjects´ willingness to pay as suggested in H2. Note, that in this analysis subjects´ WTP is indirectly derived by using the highest price a person accepted in one of the buying decisions as an approximate value. Farther, decisions for option H were excluded and only individually accepted price levels for brands L and M were included in computations of WTP. Otherwise, any choice of H would logically bias revealed price acceptance of subjects in CS3 in a somewhat irregular manner, because the high priced option H does not exist in the choice set of CS2. As shown in Table 3, average WTPs for

brands L and M in CS2 are clearly lower than in CS3, i.e. the WTPs differ by 15 (22) Cent for toothpastes (shampoos). The observed difference is significant in both product groups (toothpaste: *KS-Z* =1.311 $p<0.10$; shampoo: *KS-Z*=1.407, $p<0.05$).

Table 3 Willingness to Pay (WTP) in binding buying decisions

Product group	*Parameter*	*CS2*	*CS3*	*Difference* $WTP_{CS3} - WTP_{CS2}$	*KS-Z*	*p*
toothpaste	n	115	106			
	mean WTP (€)	1.05	1.20	**+0.15**	**1.311**	**0.069**
	std.dev. WTP	0.41	0.44			
shampoo	n	106	108			
	mean WTP (€)	1.72	1.94	**+0.22**	**1.407**	**0.038**
	std.dev. WTP	0.52	0.47			

The observed demand-increasing effect can only be explained by behavioral anomalies, that is the impact of offering irrelevant alternatives. Potential reasons for such anomalies in choice behavior are already discussed in section 3 (Hypotheses development). That explains especially the sharp increase in total number of purchases. However, concerning the WTP a choice analysis has to be made to check whether higher values are caused merely by such reference price effects leading to higher ranges of acceptable prices for the same brand or simply by subjects altering choice decisions and switching from low to medium priced brands.

Results of our choice analysis clearly confirm Hypothesis 3. As expected, the choice shares of medium (low) priced options increase (decrease) when high priced brands are included in a choice set due to the compromise effect. Analyzing aggregated data from our experiment, a significant change in decision behavior of subjects can be identified in both product groups (each $\chi^2>11$, $p<0.001$). Though very few subjects selected the high priced option H itself, its inclusion in the offered set strongly influenced the percentage of purchases of option M. Thus, the medium priced brands Colgate (+12%) and Elvital (+10%) considerably gain choice shares whilst the low priced brands Dentagard (-13%) and Herbal (-10%) obviously become less attractive and therefore lose a substantial proportion of purchases (see Table 4). This corresponds with results from many previous studies investigating the compromise effect. Note, that for reason of completeness the total number of purchases in CS3

includes choices for option H and therefore differs from values in Table 2. However, Chi²-values and significance levels are calculated for differences in choice shares only for the set of brands L and M.

It has to be noted, that the negligibly small share of choices for brand H in both product groups clearly proves irrelevance of this option as intended. Then again, several empirical studies demonstrated, that lone alternatives (as option H in our study) are generally less likely to be chosen anyway because consumers´ decisions depend on the distribution of available alternatives (Glazer et al. 1991).

Table 4 Choice shares of brands (overall)

Product group	*Split Sample*	*CS2 n = 118*	*CS3 n = 115*	χ^2	*p*
toothpaste	purchases	625	648		
Dentagard	%	75.2	61.7		
Colgate	%	24.8	36.1	21.489	**0.000**
Sensodyne	%	---	2.2		
shampoo	purchases	486	580		
Herbal	%	73.9	63.9		
Elvital	%	26.1	35.9	11.885	**0.001**
Paul Mitchell	%	---	0.2		

We checked, whether observed differences in overall shares were caused by altered choices in each of the presented buying decisions. This scenario-specific analysis reveals a pattern barely investigated or identified in previous research on context effects. As described above (see section 4), though randomly ordered and therefore not noticeable to participants of the experiment, our basic design of seven step-by-step buying decisions (scenarios) equals a systematic price variation. It simply contains a classical trade-off between a cheap brand, that becomes more expensive and a medium priced brand that gets cheaper incrementally. Note, that scenario 7 was excluded from this analysis, for this scenario did not match with that systematic trade-off because it reflected prices of brands normally paid obtained from the market. We found that the compromising effect induces larger changes in choice shares of medium priced brands M when price differences between the brands L and M become smaller. That means: the steeper the slope of the underlying price quality trade-off between L and M, the smaller the impact of the compromise effect gets. These findings are highlighted in Table 5, where scenario specific ratios (R) between relative shares of choices of the low and medium priced brands (L%/M%) and absolute differences in choice shares of the medium priced option M (D_M) are calculated for each product group and Split. Obviously, we encountered a negative (positive) relationship between relative price

(RP) and the change in choice shares (Ratio R) of brand M. In addition, results of Chi²-tests are given, which confirm significant differences between the choice shares of the buying decision scenarios in CS2 and CS3 (each $p<0.10$; except of scenario 2,3 in product group toothpaste).

Table 5 Choice shares of brands (scenario-specific)

toothpaste Scenario	*price Dentagard €*	*price Colgate €*	*Relative price RP Colgate*	*L%/M% CS2*	*L%/M% CS3*	*D_M* M%CS3 – M%CS2	χ^2	*p*	*Ratio R* $\frac{L\%/M\%CS2}{L\%/M\%CS3}$
1	0.19	1.99	10.5	21.20	6.08	**+7.1**	17.627	**0.001**	**3.5**
2	0.39	1.79	4.6	9.50	4.33	**+7.2**	5.725	0.126	**2.2**
3	0.59	1.59	2.7	6.00	2.86	**+8.1**	4.944	0.176	**2.1**
4	0.79	1.39	1.8	2.81	1.50	**+11.8**	4.558	**0.102**	**1.9**
5	0.99	1.19	1.2	1.27	0.93	**+11.2**	4.977	**0.083**	**1.4**
6	1.19	0.99	0.8	0.23	0.16	**+17.1**	8.443	**0.015**	**1.5**
shampoo Scenario	*price Herbal €*	*price Elvital €*	*Relative price RP Elvital*	*L%/M% CS2*	*L%/M% CS3*	*D_M* M%CS3 – M%CS2	χ^2	*p*	*Ratio R* $\frac{L\%/M\%CS2}{L\%/M\%CS3}$
1	0.99	2.79	2.8	18.40	5.71	**+7.9**	5.063	**0.080**	**3.2**
2	1.19	2.59	2.2	10.14	4.06	**+8.9**	5.911	**0.052**	**2.5**
3	1.39	2.39	1.7	4.08	3.05	**+7.2**	8.782	**0.012**	**1.3**
4	1.59	2.29	1.4	3.85	2.26	**+9.0**	5.148	**0.076**	**1.7**
5	1.79	1.99	1.1	1.24	1.00	**+11.9**	8.567	**0.014**	**1.2**
6	1.99	1.79	0.9	0.30	0.18	**+19.4**	9.512	**0.009**	**1.6**

The second complex of our experiment investigated price acceptance of participants. Hypothesis 4 predicts, that subject´s willingness to pay stated in non binding buying simulations exceeds the WTP observed or revealed in binding transactions due to the existence of a hypothetical bias. Firstly, concerning the directly stated highest price subjects would pay for their preferred brand (L or M), results clearly confirm the WTP-increasing effect of the inclusion of high priced options in the choice set. As shown in table 6, observed differences are significant for both of the product groups (each *KS-Z*>2.7, $p<0.05$).

Table 6 Hypothetically revealed WTP

Product group	*Parameter*	*CS2*	*CS3*	*Difference* $WTP_{CS3} - WTP_{CS2}$	*KS-Z*	*p*
toothpaste	n	118	115			
	Mean WTP (€)	1.57	1.92	+0.35	1.575	**0.006**
	std.dev. WTP	0.67	1.22			
shampoo	n	118	115			
	Mean WTP (€)	2.38	2.67	+0.29	1.606	**0.012**
	std.dev. WTP	1.54	1.27			

Secondly, compared to subjects´ WTP observed in binding buying decisions, hypothetically stated willingness to pay covers a higher range of acceptable prices. For example, based on results of CS3, the average WTP for toothpaste (shampoo) rises from 1.20€ (1.94€) to 1.92€ (2.67€) when subjects do not face real consequences of their decisions. This hypothetical bias in terms of a calibration factor CF of 1.6 (1.4) corresponds with results of a meta-analysis of more than 80 studies, according to which the identified median ratio of hypothetical to actual values is 1.35 (Murphy et al. 2005). The observed differences are in fact significant in each split of all product groups, as stated in H4 (each *KS-Z*>3.7, $p<0.001$).

Table 7 Hypothetically stated vs. revealed WTP

Product group	*Split*	*Parameter*	*Hypothetically stated WTP* WTP_H *(€)*	*Revealed (Binding) WTP* WTP_B *(€)*	*Difference* $WTP_H - WTP_B$	*CF* $\frac{WTP_H}{WTP_B}$	*KS-Z*	*p*
toothpaste	CS2	mean	1.56	1.05	+0.51	1.49	3.779	0.000
		std.dev.	0.67	0.41				
	CS3	mean	**1.92**	**1.20**	+0.72	**1.60**	4.131	0.000
		std.dev.	1.22	0.44				
shampoo	CS2	mean	2.38	1.72	+0.66	1.38	4.086	0.000
		std.dev.	1.53	0.52				
	CS3	mean	**2.67**	**1.94**	+0.73	**1.38**	3.914	0.000
		std.dev.	1.27	0.47				

Finally, it should be discussed to what extent the design of our study generates consistent results and reflects realistic purchasing behavior of consumers as intended. In addition to the closed ended approach, a replication of the second randomly selected price scenario was presented after the seventh buying decision in each product group as a check scenario. More than nine out of ten subjects (toothpaste: 98%; shampoo: 91%) made identical decisions which indicates consistent behavior as well as sufficient reliability of the choices. Furthermore, nearly 90% of the participants fulfilled their informal buying obligation (that is realized transaction one week after our experiments), though they were not and could not have been explicitly forced to. Moreover, a comparison of experimentally revealed prices with market-based observations of price ranges and mode prices indicates in fact realistic buying behavior of subjects. As shown in Table 8, brand prices accepted in buying decisions are positioned within the range of market prices and sufficiently fit to mode prices especially in Split CS3.

Table 8 Accepted brand prices vs. observed market price ranges

Product group	Brand	*WTP CS2 binding transaction*	*WTP CS3 binding transaction*	*Price Range market observations*	*Mode Price market observations*
toothpaste	Dentagard (€)	0.76	0.81	0.45 – 0.89	0.79
	Colgate (€)	1.24	1.32	1.19 – 2.19	1.69
shampoo	Herbal (€)	1.48	1.60	1.15 – 2.09	1.69
	Elvital (€)	2.06	2.14	1.95 – 2.79	2.39

6. Conclusions

The main question our study examines is whether the impact of context effects in general and compromise effects in particular hold when the decision process is designed much more realistic than in previous studies. Earlier research has shown that behavioral anomalies are significantly reduced when decisions are made under the condition of real payoffs (Bohm 1994; Siegel and Goldstein 1959). While our study shows expected differences between hypothetical and real purchase decisions, the compromise effect, however, is validated and therefore is not an artificial effect in marketing research.

Numerous previous studies criticize the lack of realism of surveys in general, however, only certain aspects of experimental framing (e.g. the inclusion of real definable brands) were modified and improved to generate a more realistic choice setting. But none of the studies available uses binding transactions where participants face real consequences and have to pay with their own money for real products chosen. This paper provides an enhanced experimental design addressing this issue and provides results that are in fact much closer to real market behavior and therefore closes this gap in marketing research. The managerial implications of earlier papers are based on the assumption that observed behavioral anomalies in experimental environments hold for real market settings. By applying the enhanced experimental design of this study the uncertainty about prevalent interpretations of context effects is reduced.

Concerning the observed compromise effect in our choice setting, it has to be noted that option H deliberately represents an extreme position in terms of a high priced premium quality brand in both product groups. In contrast to previous studies on the compromise effect, choice shares of H are very low, that means subjects perceive this extreme option obviously as irrelevant. While our results confirm a significant influence of the inclusion of option H on choices, a violation of the

Independence-Axiom is detected once again. Furthermore, to explicate this behavioral anomaly it should be investigated in enhanced experimental designs, whether this effect is primarily price-driven and also occurs if H represents even a perfectly dominated and therefore an inferior brand. Further research should address this issue.

Besides the confirmation of compromise effects and the existence of a hypothetical bias in terms of differences in price acceptance, our results suggest that the content of choice sets influences subjects´ demand in general, leading to more purchases as well as higher willingness to pay. Although considered as irrelevant, the extreme option H seems to shift reference prices in fact upwards. This could challenge main interpretations of reference price theories (e.g. assimilation-contrast theory), according to which individuals´ external-based reference price standards responsible for the evaluation and acceptance of current prices are independent of irrelevant product prices perceived as too high due to contrast effects.

Although not part of the investigation our results provide a new interesting detail about the compromise effect, which seems to be systematically influenced by relative prices of options. The higher relative prices of compromise brands get, the smaller compromise impacts become. Concerning this observed pattern we assume, that the perceptibility of price differences between two brands becomes smaller when a relatively high priced option is included in the choice set and the range of prices presented therefore enlarges. However, an absence of noticeable price differences could lead to simplified choice heuristics, so that the perceived higher quality of the compromise brand becomes the essential attribute in the buying decision. For this is rather a suggestion than an explanation, the identified pattern of choice behavior gives rise to further research on reliable moderators of compromise effects.

7. Appendix

I: Trade-Off Price Scenarios

toothpaste Scenario	*price Dentagard* €	*price Colgate* €	*price Sensodyne* €	**shampoo** Scenario	*price Herbal* €	*price Elvital* €	*price Paul Mitchell* €
1	0.19	1.99		1	0.99	2.79	
2	0.39	1.79		2	1.19	2.59	
3	0.59	1.59	varying randomly around 3.99	3	1.39	2.39	varying randomly around 18.75
4	0.79	1.39		4	1.59	2.29	
5	0.99	1.19		5	1.79	1.99	
6	1.19	0.99		6	1.99	1.79	
7	0.79	1.69		7	1.69	2.39	

8. References

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