Because it was the first one – The effect of purchase order on the sunk-cost effect

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1 Introduction

Imagine you booked a ski trip to Michigan for $100. Several weeks later, you buy a ski trip to Wisconsin for $50. Later you notice that they take place at the same weekend. You assume that you will enjoy Wisconsin more. Which trip will you go on? When Arkes and Blumer (1985) asked their participants, 54% indicated to use the alternative with the higher costs, though they like it less.

As these participants, many people want to make use of products they already paid for, not willing to waste them. The phenomenon that a payment increases the likelihood to use a product or service is a well-established fact and is referred to as the sunk-cost effect (Thaler 1980). The effect of sunk costs on decisions as well as moderating and mediating factors have been researched in a variety of studies and disciplines, including psychology (Zeelenberg/Dijk 1997; Astebro et al. 2007; Strough et al. 2008), sociology (Janssen et al. 2003), management (Conlon/Garland 1993; Keil et al. 2000; Sleesman et al. 2012), marketing (Soman/Cheema 2001; Soman/Gourville 2001; Just/Wansink 2011), industrial economics (Manez et al. 2009), and finance (Guler 2007). Despite the widespread discussion on the sunk-cost effect, research has shown that effect sizes of the sunk-cost effect show a high variability (Roth et al. 2014).

Yet, the common element of most studies that elaborate on utilization decisions in response to sunk costs is that the decision maker purchases an alternative with high sunk costs first before she gets aware of further alternatives with lower or no sunk costs (Thaler 1980; Arkes/Blumer 1985; Soman 2001). However, the effect of the order in which the decision maker purchases the high and low sunk cost alternatives has surprisingly not yet been subject to research.

Now, imagine the pictured situation from the very beginning with a slight change: You first buy the cheaper but preferred trip to Wisconsin and afterward the more expensive trip to Michigan. Comparing this decision with the stated scenario at the beginning, the following questions emerge: Will the sunk-cost effect be the same in both cases? Are these choices truly equivalent or do you feel they are different? Can the purchase order of the two trips affect the likelihood to actually go there?

Building on research on the status-quo bias (Samuelson/Zeckhauser 1988; Kahneman et al. 1991) and research on order effects in discrete choices (Louviere et al. 2008), we believe that the purchase order can affect consumer reactions. Thus, this paper elaborates on how order effects influence consumer's reactions to sunk costs. Our work differs from the cited and other previous studies analyzing the relationship between sunk costs and the probability of utilization in two important ways: (1) We extend previous research on the sunk-cost effect with respect to the influence of order effects; (2) we elaborate on these

effects with two different experimental designs. Alongside an experiment with the established ski trip scenario of Arkes and Blumer (1985), we also use an experimental design with real monetary consequences. Thereby, we contribute to the current literature by underlining previous findings on the existence of the sunk-cost effect. However, we also find support for the idea that the effect strength is significantly affected by the order in which the consumer obtains the alternative with the highest sunk costs. Consequently, we reason that the strength of the sunk-cost effect in utilization decisions may be overestimated in previous studies.

The remaining paper is structured as follows: The next chapter presents and discusses existing findings on the sunk-cost effect. Then, building on the theoretical foundation of status-quo bias and order effects, we derive our research hypothesis. In chapter 4, we present the design, implementation, and discussion of the results of each experiment separately. We conclude with chapter 5 by providing a brief outlook on future research.

2 Literature review

Following standard microeconomic theory, people should base their decisions solely on current and future costs and benefits. However, people deviate from this principle and empirical studies have al-ready elaborated on the effect of sunk costs on the choice between differently priced product alternatives.

Therefore, Arkes and Blumer (1985) define the sunk-cost effect as "a greater tendency to continue an endeavor once an investment in money, effort, or time has been made." Yet, this paper deals with utilization decisions that focus either on the choice between similar attractive alternatives with different levels of sunk costs or on the usage intensity of an already-paid-for product. In line with that, Thaler (1980) refers to the influence of already spent money on decisions as the sunk-cost effect and argues, "paying for the right to use a good or service will increase the rate at which the good will be utilized, ceteris paribus."

In line with this definition, Soman (2001) confronts his subjects with the decision between a ticket for a theater performance and a rock concert, in which the ticket for the theater is connected with higher sunk costs. Despite their preferences for the rock concert, most subjects choose to attend the theater performance. In a similar vein, Tan and Yates (1995) use a scenario with differently priced summer holiday destinations to show that more than half of the subjects choose the resort vacation, which is tied to higher sunk costs, even if they stated a higher preference for the cheaper desti-nation. Thaler (1980) and Gourville and Soman (1998) find similar results when participants had to decide to brave a snowstorm to attend a basketball game or to watch the game at home. Although

many studies that examine the sunk-cost effect employ a scenario- based research design, real world observations can also be found. Arkes and Blumer (1985) demonstrate that customers who paid the full price for a theater season subscription attended more plays dur-ing the season than customers with discounted tickets. Likewise, Just and Wansink (2011) manipulate the fee of the buffet at an all-you-can-eat pizza restaurant and find that subjects having paid the full price for the buffet consumed more slices of pizza than subjects who paid half the price.

Soman and Gourville (2001) extend these findings and show that the theatergoer's likelihood of using a paid-for ticket is a function of the number of plays the person purchased. Consequently, thea-tergoers with a seasonal ticket were less likely to attend each play. In a similar vein, Gourville and Soman (1998) tracked the attend-ance of members of an athletic facility in Colorado. They find that the monthly attendance rate was the highest in the month of the payment transaction and declined steadily until the next payment was due. In line with these findings, Phillips, Battalio, and Kogut (1991) received inconsistent results. They sold differently priced, but equivalent lottery tickets to college students and measured the subject's valuation of each ticket. The data reveal that some sub-jects increase their ticket valuation in response to sunk costs, whereas others decrease them.

Although predominantly discussed, research on the sunk-cost effect is not limited to monetary costs. However, results on behavioral sunk costs are controversial. Zeelenberg and van Dijk (1997) exam-ine the effect of behavioral sunk costs like time or effort. The au-thors find that in certain cases, behavioral sunk costs may even lead to reverse sunk-cost effects. They argue that incurring sunk costs can also result in risk-avoiding behavior when a safe alternative option satisfies the decision maker's aspiration level. Soman (2001) was not able to show a sunk-cost effect when he manipulated the hours worked to obtain tickets for a rock concert or a theater per-formance. Interestingly, the sunk-cost effect reappeared when hour-ly wages for the time investment were provided. In contrast, Cunha and Caldieraro (2009) were able to demonstrate a behavioral sunk-cost effect. In their experiment, the authors manipulated subjects' cognitive effort to evaluate a pen, before subjects were offered an-other pen. Subjects then had to decide which pen to keep as com-pensation for their participation. The authors find that subjects with a high cognitive effort to evaluate the pen considerably more often retain the first pen. Nevertheless, when Otto (2010) tried to repli-cate the experiment, he was not able to confirm these findings. Cunha and Caldieraro (2010) clarify that the occurrence of the ef-fect highly depends on the magnitude of the behavioral invested sunk costs of the initial choice relative to the level of opportunity costs.

In addition to the evidence for the basic sunk-cost hypothesis, re-search also elaborates on moderators such as the decision maker's familiarity with economic decision-making or the time delay be-tween the initial and the subsequent decision. As one example Greitemeyer, Schulz-Hardt, Popien, and Frey (2005) survey bank employees on a decision for an already-paid-for vacation. They find that employees that are trained in economic decision-making fall prey to the sunk-cost fallacy. Likewise, participants in Tan and Yates's (1995) vacation scenario show a sunk-cost effect, despite their background. Dick and Lord (1998) measure the impact of membership fees on usage intensity over time and find evidence for the moderating impact of time on the sunk-cost effect. They find that higher fees led to an increased number of rentals and those participants psychologically amortized the membership fees over time.

Other research puts its focus on other factors that potentially influ-ence the strength of the sunk-cost effect. There is evidence that the effect can be significantly reduced by the occurrence of an unex-pected windfall gain (Soman/Cheema 2001) or a low payment transparency (Soman/Gourville 2001).

3   Theoretical foundation and hypotheses

Literature offers several explanations why the sunk-cost effect occurs. Most prominent are Kahneman and Tversky's (1979) prospect theory and Thaler's (1985, 1999) theory of mental accounting. In addition, Festinger's (1957) theory of cognitive dissonance and the regret theory of Loomes and Sugden (1982) provide a valuable framework.

In prospect theory, the value function represents the relation between objectively defined gains and losses and the subjective value a person places on them. The asymmetric curve progression leads to an overvaluation of sunk costs compared to unexpected gains (Kahneman/Tversky 1979). Building on this basic idea, Thaler (1985, 1999) argues that consumers track their expenses on mental accounts when they purchase a product. The created account remains open until the value of the product can be derived from its usage. If an individual forgoes a pending benefit she will have to close the account "in the red," leading to a painful loss. Consequently, the basic sunk-cost hypothesis that higher sunk costs lead to an increased usage probability is theoretically well-founded (Kahneman/Tversky 1979; Thaler 1985, 1999) and empirically demonstrated in multiple studies (Thaler 1980; Arkes/Blumer 1985; Dick/Lord 1998; Soman/Cheema 2001; Just/Wansink 2011).

However, despite the empirical evidence on the sunk-cost effect, we believe that the strength of the effect is overestimated by the way that it is measured. Building on the idea of the endowment effect (Knetsch 1989) and the status-quo bias

(Samuelson/Zeckhauser 1988), we argue that the sunk-cost effect is significantly stronger when an alternative with higher sunk cost has been purchased prior to an alternative with lower sunk costs.

Research has shown that consumers' valuation of an object increases once they have taken ownership of it. Prominently discussed under the endowment effect label, research finds that the lowest price at which owners sell an object is significantly higher compared to the highest price they would pay for the same object (Kahneman et al. 1990, 1991). In addition, Strahilevitz and Loewenstein (1998) find that for objects under possession this valuation increases with the duration of ownership. Similar to the endowment effect is what Samuelson and Zeckhauser (1988) term the status-quo bias. The status-quo bias presents the individual's preference to remain with the status quo because the disadvantages loom larger than the advantages.

The reasoning behind both effects again builds on the shape of prospect theory's value function and the associated loss aversion (Samuelson/Zeckhauser 1988; Strahilevitz/Loewenstein 1998). Loss aversion refers to the tendency to place greater weight on losses than on gains of equal absolute value. Consequently, Thaler (1980) argues that objects included in the individual's endowment are more highly valued than objects not held in the endowment, since removing an object from the endowment creates a loss while adding the same good presents a gain. Consequently, the former will be more heavily weighted and looms larger. The argumentation behind the status-quo bias is very similar: Taking the status quo as a reference point for the decision, individuals weigh potential losses from switching to another alternative as larger than potential gains. Consequently, the individual is biased towards the status quo.

Samuelson and Zeckhauser (1988) argue that especially in the domain of personal choice, individuals are likely motivated to achieve decision consistency. They reason that a decision maker strives to keep his positive self-image by justifying current or past decisions, whether or not they proved successful. To achieve that, past choices are rationalized and this rationalization extends to current and future choices. In addition, the idea of choice consistency is also supported by research on order effects in discrete choice models (Louviere et al. 2008). Finally, ego involvement as discussed by Landman (1987) might also play an important role in this switching decision. It argues that when people feel self-involved or identified with past decisions, they may persist with this past course of action.

This argumentation leads us to assume that existing findings of the sunk-cost effect overestimate its strength due to the order in which the alternatives are presented. Since the high sunk cost alternative is always presented before the low sunk cost alternative, we reason that previous studies also measured en-

dowment-effects or the status-quo bias in addition to the sunk-cost effect. Furthermore, we argue that consumers stick to their initial decision and keep their first purchase with a higher likelihood than subsequent purchases. Consequently, we derive the following hypothesis:

> H_1: *The sunk-cost effect is moderated by the order in which the alternatives are received. The sunk-cost effect is likely to be stronger when an alter native with higher sunk cost has been purchased prior to an alternative with lower sunk cost.*

4 Methodology

To test our hypothesis, our research takes two steps. In the first step, we take the widely used ski scenario of Arkes and Blumer (1985) to replicate their findings and to adapt it according to our research question. In the second step, we design an entirely new procedure to elaborate on the influence of sunk costs on choice behavior. That is, we develop a card game to examine further the moderating impact of sequence on the sunk-cost effect.

4.1 Experiment I

4.1.1 Participants and design

The first experiment was conducted at a large German university. We recruited 60 subjects for the experiment out of a class with business and economics students. Subjects were 30% female with an average age of 22.16 (SD=1.93) years. The subjects received course credit for participation. They were randomly assigned to one of the 2 (Sunk-Costs: High vs. Low) x 2 (Order: High First vs. High Last) factorial design.

4.1.2 Design and stimuli

In our adaption of the scenario of Arkes and Blumer (1985), we employed a design with two experimental groups, whereby the order in which the differently priced alternatives were presented was the between-subjects factor. The control group was confronted with the classic scenario in which the alternative with the higher sunk costs is obtained first. The treatment group was exposed to the very same scenario with a reversed sequence of choices.

Similar to the original scenario subjects read a decision scenario in which they were confronted with a choice between two differently priced ski trips in the German Alps. Subjects read that they first bought a ski trip to Garmisch-Partenkirchen for 200 € and subsequently a trip to Oberstdorf for 100 €. Moreover, they were told that both trips happen to take place on the same weekend and

that the tickets are non-refundable. Subjects further read they would enjoy the trip to Oberstdorf more. Participants in the experimental group read the exact same scenario with the difference that the purchase order of the two trips was reversed. Subsequently, both groups had to indicate on which trip they would most likely go on. In addition, we asked questions on the perceived sunk-cost effect, manipulation checks and some demographic variable such as income, gender, and age.

4.1.3 Results

First, we run a manipulation check to confirm that the ski trip to Garmisch-Partenkirchen is actually perceived to be more expensive compared to the trip to Oberstdorf. Therefore, participants had to express their agreement with the statement "*The costs for the trip to Oberstdorf / Garmisch-Partenkirchen are high*" on a 5-point-scale (*strongly disagree* to *strongly agree*). We find that the mean evaluation of the trip to Oberstdorf is 2.10 (SD 0.85) vs. Garmisch-Partenkirchen 3.46 (SD 1.06). The t-test reveals that the differences are significant (t=8.38; p < 0.01) indicating that the manipulation has been successful. Considering the experimental groups, we did not find significant differences. Hence, we can assume the Garmisch-Partenkirchen trip is perceived to be more expensive in both conditions. We further checked the manipulated preference towards Oberstdorf. Again, participants expressed their agreement to the following statement: "*I expect a higher recreational value of the trip to Oberstdorf / Garmisch-Partenkirchen.*" The results reveal that Oberstdorf received a significantly higher (t=3.76; p<0.01) evaluation of 3.58 (SD 0.77) compared to Garmisch-Partenkirchen 2.81 (SD 0.91) indicating a successful manipulation.

Before we analyze the choices, we also analyze the perceived influence of sunk costs. Therefore, we asked participants to indicate their subjective evaluation of the sunk-cost effect. We used two indicators that focus on two important antecedents of the sunk-cost effect – the pain of payment and the regret of wasting the money. To analyze the differences we used an analysis of variance (ANOVA) on indicator and sum-score level. As Table 1 shows, consistent with our hypothesis, the perceived sunk-cost effect is higher in the control group compared to the treatment group. Subjects in the control group had a very high evaluation of the perceived sunk-cost effect (MV 4.04) compared to a much lower evaluation in the treatment group (MV 3.58).

	Control	Treatment	ANOVA
It would be painful to waste the money that has been spent to go to Garmisch-Partenkirchen	4.14 (SD 0.66)	3.69 (0.92)	F=5.53 $p \leq 0.05$
It would be a pity, if I could not make use of the more expensive weekend.	3.92 (1.13)	3.46 (0.84)	F=2.798, $p \leq 0.1$
Total	4.04 (0.79)	3.58 (0.77)	F=4.83 $p \leq 0.05$

Table 1: Perceived Sunk-Cost Effect

Alongside the self-reported statements, we also discuss the actual choices of the participants. Looking at the control group we find that in line with previous findings, a large proportion of the subjects in the control group chose the Garmisch-Partenkirchen trip (Table 2): 1/3 of the subjects chose an option with a lower preference and therefore acted in contrast to standard microeconomic assumptions. We thereby underpin the idea of a positive impact of sunk costs on the utilization probability of an alternative and replicate findings of Arkes and Blumer (1985).

Yet, besides the mere existence of the sunk-cost effect, we are especially interested in the influence of the purchasing order of the alternatives on the strength of the sunk-cost effect. To elaborate on that, we compare the number of participants who chose the alternative with the higher sunk costs (Garmisch-Partenkirchen) of both groups.

Looking at the results, we find that in the treatment condition only 12.5% of the subjects chose the more expensive trip to Garmisch-Partenkirchen. Hence, we find that the proportion of consumers that act in contrast to standard microeconomic assumptions was significantly reduced by ~20 percentage points when participants received the low-cost alternative first (χ^2= 3.33; p < 0.1).

	Chosen Ski Trip	
	Garmisch-Partenkirchen	Oberstdorf
Control	12 **(33.3 %)**	24 (66.7 %)
Treatment	3 **(12.5 %)**	21 (87.5 %)

Table 2: Frequencies of chosen ski trips

4.2   Experiment II

Experiment I was a questionnaire study and actual money was not involved. However, especially because monetary consequences are assumed to cause the sunk-cost effect, we decided to design a laboratory experiment with real money at stake (see Robbert, 2013, Robbert et al. 2013). We developed an experimental between-subjects design with two groups. As in Experiment I, the order in which the differently priced alternatives were presented was manipulated between the two experimental groups.

4.2.1 Design and stimuli

The experiment is based on a decision situation in a simple card game, which was played individually in a face-to-face setting. We chose this design to exclude uncontrolled side factors (e.g. price-quality relationship) and all contextual factors. The general layout is organized as follows:

One player is the instructor of the experiment; the other player is the subject. The game contains a playing field with four rows of eight cards and four single card fields located at the subjects' side of the playing field. The deck in the game contains 32 cards with the numbers 7, 8, 9, 10, jack, queen, king and ace, in all suits of a French deck. At the beginning, the cards are separated in all four suits and piled up in four squares in front of the subject. During the game, the instructor takes each stack individually and shuffles it. Afterward, she distributes the cards of each stack in the corresponding row on the playing field. The resulting matrix contains all eight cards of one suit in one row in a random order, ensuring the same expectation value for each card drawing. Additionally, there is a closed box on the field for discarded cards. Figure 1 gives a schematic illustration of the game setting.
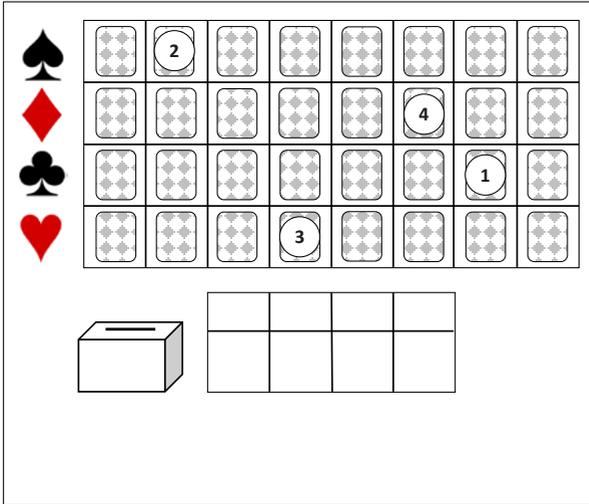
Figure 1: Schematic illustration of the card-game

The procedure of the game is as follows: The subject is told that she is allowed to draw three cards of her choice in exchange for a payment of 3 €. Each of these three cards has to be drawn from a different row. The subject indicates the preference order for four cards from 1 (*highest preference*) to 4 (*lowest preference*) in the choice set by placing numbered tokens on the respective cards.

Afterward, the actual drawing order is manipulated by tossing a coin. Depending on the outcome of the coin tossing, she draws the cards according to (Group I) or against (Group II) the previously expressed preferences. Now, the subjects are confronted with a sudden twist. In accordance with the initially determined sequence, the subject draws one additional free card *before* drawing the three "sunk cost" cards. When she plays the reversed order, she draws one additional free card *after* having drawn the three "sunk cost" cards. Consequently, the additional card is always the card, which the subject marked with the token (1), the highest preference. However, she is told that she can keep only three of the four cards and therefore has to discard one card of her choice and put it in the box on the playing field. After having discarded one card, the subject is allowed to face up the remaining three cards. Depending on the card, the participant receives a previously specified monetary compensation starting with 0.5 € for a seven to 4 € for an ace.

Finally, subjects of all groups fill out a questionnaire on their risk aversion, their familiarity with card games and gambling experience.

4.2.2 Subjects

We recruited 138 subjects for the experiment out of a class with business students at a German university. Subjects were 32% female with an average age of 23.33 (SD=2.69) years. The participants were randomly assigned to one of two experimental groups, leading to 65 subjects in Group I and 73 subjects in Group II. The card game took place in four rooms, which are connected to a computer lab. Prior to the experiment, the students filled out an unrelated questionnaire in the lab and received 5€ monetary compensation. With this money, they played the card game.

4.2.3 Results

To test our hypothesis, we compare the rejection rate of the free card for drawing against (Group I) and drawing according to (Group II) the pre-determined sequence. When we translate the choices to the ski trip scenario in experiment 1, Group I is in line with the classic scenario in which the option with the highest preference is chosen second. Group II represents the reversed group where the option with the highest preference is chosen first.

To compare the results, we use a 2 x 2 contingency table and test for group differences. First, we elaborate on the existence of the sunk-cost effect. According to microeconomic theory, we would expect that subjects do in fact never discard the card with the highest preference. In fact, this card did not involve any sunk costs in both conditions. Yet, in line with previous findings, we find that sunk costs do matter (Table 3).

When we take the average of both groups, we find that 13.8% of the subjects exhibit a sunk-cost effect. However, when we separately analyze both groups we observe significant differences. We discover that when the card with the highest preference is drawn at the end (Group I), the sunk-cost effect is very strong. The rejection rate in this setting is 23.1%. However, when subjects received their most preferred card in the very beginning (Group II), the rejection rate decreases to 5.5%. We find evidence that at least in this particular setting the sunk-cost effect almost disappears. Comparing the rejection rate of both groups, the difference is significant at (χ^2=8.97; $p < 0.01$). Therefore, we again find support for our hypothesis.

	Free Card	**Paid Cards**
Group I	**15 (23.1%)**	50 (76.9%)
Group II	**4 (5.5%)**	69 (94.5%)
Average	19 (13.8%)	119 (86.2%)

Table 3: Contingency table: rejection of cards

To avoid confounds we controlled for gender, age and the experience with card games and gambling. None of the control variables showed a significant impact on the observed behavior.

5   Summary and Conclusion

Summarizing the results of both experiments, we find that a sunk-cost effect can be observed. This is not a surprise since our results are in line with a vast amount of literature that has already shown this phenomenon. Yet, our research differs from prior research in a way that it explicitly takes into account the sequence in which alternatives are obtained. In two experiments, we show that the order in which an individual receives a sunk cost alternative plays an integral role in the effect strength of the sunk-cost effect.

Our results indicate that in choice experiments where the alternative with the higher sunk costs was received first the amount of subjects that exhibit a sunk-cost effect is significantly higher compared to the reverse order. In Experiment 1, we find that the preference towards the more expensive ski trip is especially evident when it is obtained first. When the same ski trip is chosen second the sunk-cost effect is significantly smaller. We observe the same in Experiment 2. Again, subjects tend to keep their paid cards, particularly when these cards were drawn first.

Interpreting our findings, we argue that previous research has attributed choice behavior in these situations solely to the existence of sunk costs. Yet we argue that order effects also drive choices. Thereby the effect sizes that have been measured in previous research might sometimes have overestimated the influence of sunk cost on decision-making. With these observations, our research has the following implications: We believe that the most relevant consequences of our study arise for the academic discussion. Our recommendation is that the influence of order effects has to be taken into account when working and inter-

preting previous studies on the influence of sunk costs on preferences for differ-
ent alternatives. In addition, future research should be aware of these effects and
try to control them. Despite our empirical results, we also add to the current
discussion by using a new experimental research setting. We believe that our
design contributes significantly to the methodology of the sunk-cost research.

Our research design faces some limitations: First, we used a card game as a
decision situation. Although we tested for confounding factors such as gambling
experience without any significant result, we cannot completely rule out that
these consumers for example with gambling experience act differently in such a
game setting. Second, we conducted both experiments in a lab environment. In
the first experiment, there were no monetary consequences involved, in the sec-
ond these consequences were small. Consequently, some questions remain unan-
swered especially when we discuss the managerial consequences of our results.
How does the sequence in which consumers purchase products or services in
real life influence utilization decisions? Despite our interesting findings from the
lab, we are not able to answer this question now. Moreover, our study only fo-
cuses on choice experiments between two or more alternatives. We cannot easily
translate our findings to real-world observations like the usage of theater tickets
or food consumption under flat-rate tariffs.

Regardless of the limitations, we believe that our experiments give guidance for
future research. It will be worthwhile to find out if order effects can also be
measured in real-world observations of the sunk-cost effect. Therefore, further
research should employ a field study, which collects data based on real-world
observation to replicate the order effects. Future research should elaborate on
how the order effects vary as a function of the price discrepancy between the two
choice alternatives. It is likely to assume that purchase order may play a higher
role when the prices paid for the two alternatives do not differ significantly. It is
also tempting to elaborate on how the observed order effects vary as a function
of the temporal distance between product purchase and product consumption. In
line with research on payment depreciation (Gourville/Soman 1998), we assume
that time decreases the perceived sunk-costs and consequently, that the positive
impact of sunk-costs on utilization diminishes. In these cases, the order effects
should become even more important.

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