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Do shared features of offered alternatives have an effect in consumer choice?

Shu Li [a,*], Rui Zheng [a], Li-Bo Li [b,c]

[a] *Center for Social and Economic Behavior, Institute of Psychology, Chinese Academy of Sciences, Beijing 100101, China*
[b] *School of Mathematics, University of New South Wales, Australia*
[c] *School of Actuarial Studies, University of New South Wales, Australia*

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Abstract

Are features shared by alternatives canceled, and is greater weight placed on the unique features in choosing among the alternatives provided? The present article evaluates the possible cancellation operation in terms of pricing and preferential choice and determines whether features shared by competing alternatives affected consumer decisions. This article suggests that features shared by alternatives may be canceled only when the shared features are irrelevant to the unique features and that shared features that are relevant do matter. Implications of the cancellation-and-focus model of choice and its relation to the equate-to-differentiate model of choice are discussed.

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* Corresponding author.
E-mail address: lishu@psych.ac.cn (S. Li).
URL: http://www.psych.ac.cn/en/laoshi/lishu.htm (S. Li).

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1. Introduction

Consumers are often faced with the need to choose one alternative from a mutually exclusive set of alternatives: To buy or not to buy? Which features to purchase? Which brand to use? Many formal analyses that examine forced choice assume that features common to all the offered alternatives in the choice set are canceled in the process of choice (Tversky, 1972). Such a cancellation operation is also one of the editing operations discussed in Prospect Theory (Kahneman & Tversky, 1979). This operation simplifies the mental representation of a choice problem by cancelling the components that are explicitly common to the alternatives. Subsequent evaluation of the alternatives is not based on the cancelled common components. The idea that features shared by alternatives should cancel out during preference judgments, leaving the choice to be made only on the basis of the unique features, has provided grist for the theoretical mills. Given the importance of the unique features in comparative judgments, a decision model called the cancellation-and-focus model (Houston & Roskos-Ewoldsen, 1998; Houston & Sherman, 1995; Houston, Sherman, & Baker, 1991) has been developed. The cancellation-and-focus model is based on the differential treatment of shared and unique features when faced with a choice dilemma. This model describes a feature-matching comparison process for preference choices, in which features shared by the choice alternatives are cancelled, and greater weight is placed on the unique features of the alternative which is the subject, or starting point, of the comparison. It proposes that the result of a comparison between available alternatives will depend not only on the features of those alternatives, but also on how these features are recruited and weighted for use in the comparison.

The decision rules can be characterized by the form of processing (Bettman, 1979). This aspect can be of two general types: processing by alternative and processing by attribute. In the former case, each alternative in the choice set is processed and evaluated as a whole, and then a choice is made on the basis of these evaluations. In the latter case, all alternatives are compared on a single attribute then on another, etc. These two forms of processing are generally referred to, respectively, as *interdimensional* vs. *intradimensional* (Payne, 1976); in the consumer choice literature, they are termed choice by processing brands vs. choice by processing attributes (Bettman & Jacoby, 1976). The cancellation-and-focus model falls into the category of *intradimensional* evaluation. Tversky (1969) suggested that intra-dimensional evaluations are simpler and more natural than inter-dimensional ones. Building also on the notion of intra-dimensional processing, an alternative decision model called the equate-to-differentiate model (Li, 2004) has been developed as a means by which the weak dominance rule can be made applicable in more general cases. Weak dominance states that if alternative A is at least as good as alternative B on all attributes, and alternative A is definitely better than alternative B on at least one attribute, then alternative A dominates alternative B (cf. Lee, 1971; von Winterfeldt & Edwards, 1986). The prime justification for proposing this model came from the wealth of evidence pointing to fundamental limitations in an individual's capacity to process information, together with many findings suggesting that an individual's decisions typically conform to a principle other than utility maximization. The equate-to-differentiate model therefore postulates that, in order to utilize the very intuitive or compelling rule of *weak* dominance to reach a binary choice between A and B in more general cases, the final decision is based on detecting A dominating B if there exists at least one n such that $U(\phi_n^A) - U(\phi_n^B) > 0$ having subjectively treated all $U(\phi_k^A) - U(\phi_k^B) < 0$ as $U(\phi_k^A) - U(\phi_k^B) = 0$, for $k = 1, \ldots, m$,

$k \neq n$, or, detecting B dominating A if there exists at least one j such that $U(\phi_j^B) - U(\phi_j^A) > 0$ having subjectively treated all $U(\phi_t^B) - U(\phi_t^A) < 0$ as $U(\phi_t^B) - U(\phi_t^A) = 0$, for $t = 1, \ldots, m$, $t \neq j$, where ϕ_t^B and ϕ_t^A is the value of each A and B on attribute t respectively (for an axiomatic analysis, see Li, 2001a).

The evidence from this body of work indicates that the violation of cancellation could in fact be observed when the determinant dimension (attribute), on which the intra-dimensional utility difference is the greatest and thus the final decision is based, is caused to swap by presenting/subtracting the common outcome (for risky choice see Li, 1993, 1994; Li & Adams, 1995; for riskless choice see Li & Taplin, 2001; for similarity judgment see Li, 2001b; for Prisoner's Dilemma games see Li, Taplin, & Zhang, 2007). Guided by a ''relatedness hypothesis'', Bonini, Tentori, and Rumiati (2004) also found that, for risky choice, the participants did not cancel the outcome shared by two prospects when it was semantically related to another outcome within the same prospect. In those circumstances, people would rather consider the two outcomes together and combine their probabilities to get a global estimate of the grouped outcomes.

Bearing this in mind, we can see that, although the evidence from Houston et al's experiments indicates that features shared by alternatives are canceled and greater weight is placed on the unique features in choosing among the alternatives provided, the shared features used actually do not change the intra-dimensional evaluation of the difference between unique good features or the difference between unique bad features (e.g., the automobile selecting problem in Houston & Sherman, 1995, see Appendix A). In other words, what Houston and Sherman manipulate is that, when a choice is a contest between unique *good* (bad) features of the alternatives, all the shared features are limited to *bad* (good) ones. Accordingly, when being faced with *a unique-good, shared-bad pair of alternatives*, the shared bad features provide no differentiating information upon which a choice could be made, and will cancel each other out. Because both items' unique features are primarily positive, once the individual begins to focus primarily on one of the items, that item should be favored. However, when being faced with *a unique-bad, shared-good pair of alternatives*, as the person focuses on either item, its unique-bad features should become especially prominent, and the item should become increasingly less appealing. This emphasis on the unique-bad features of the current focus of the comparison should turn the individual toward the alternative.

An inference from the previous analysis of both probabilistic common outcomes (e.g., a 21% chance of winning ¥3000 from both prospects under consideration, see Li, 1993, 1994; Li & Adams, 1995) and sure thing common outcomes (e.g., both Candidates A and B have one additional paper accepted, see Li, 2001b; Li, 2003; Li & Taplin, 2001) is that, if shared-good features (which lessen the ''good'' difference) were added to the unique-good pair of alternatives or if shared-bad features (which lessen the ''bad'' difference) were added to the unique-bad pair of alternatives, and hence changing the intra-dimensional evaluation (*i.e.*, processing by attribute.) of the difference between the unique good (bad) features, the cancellation-violating behavior could be generated. We therefore reason that, without taking the change in intra-dimensional evaluation into account, previous demonstrations by Houston et al. might not be conclusive. If, and only if, the change of shared features does not alter the intra-dimensional evaluation across different decision conditions, the cancellation can be produced.

It is also worth noting that, although Dhar and Sherman (1996) find that the attractiveness of the choice set can be enhanced or reduced by altering which features appear

unique, their manipulations of the uniqueness of the good or bad features (see Appendix B) are similar to those used by Houston and Sherman (1995). That is, they constructed their choices in a very specific way – each alternative shared its good but not its bad features with one other description, while sharing its bad but not its good features with another alternative.

In order to state the problem more generally, consider a binary choice between **A** and **B**. Let Set_A be the finite set of unique features included in **A** and Set_B be the finite set of unique features included in **B**. Now we let S be the set of features shared by both alternatives **A** and **B**.

We define s_i to be a *relevant* shared feature if $s_i \in S$, $i = 1, \ldots, n$, is equivalent to at least one feature in Set_A and Set_B. Otherwise s_i is defined to be *irrelevant*.

Therefore formally $s_i \sim \phi_j^B$ and $s_i \sim \phi_j^A$ for some j, if and only if there exist a $f : s_i \to \phi_j^A$ (f is unique to each individual). If such f does not exist then s_i is *irrelevant*.

Given the above equivalence relationship, Set_A together with S is the disjoint union of equivalence classes (Similarly for Set_B and S), given by

$$\{\text{Set\_}A, S\} = \cup[\phi_j^A].$$

To illustrate the above axiomatic analyses with a concrete example, imagine that you are offered a choice between the two computers, A (512 MB RAM with 10 GB Hard Drive) and B (256 MB RAM with 20 GB Hard Drive). Computer A is better than Computer B in terms of RAM size, while Computer B is better than Computer A in terms of Hard Drive space. Suppose Computer A and Computer B can be decomposed into two classes only, which are [Storage] and [RAM]. The two options then can be depicted in Fig. 1 through the application of indifference curves.

The equate-to-differentiate way to solve the problem is to construct a negatively accelerated (concave) utility function over the two offered features (RAM and Hard Drive) and then determine whether the utility difference between RAMs is smaller or larger than that between Hard Drives. As soon as the feature on which the utility difference is the greatest is determined, the decision maker's task is to achieve a so-called *equated dominance*, i.e.,

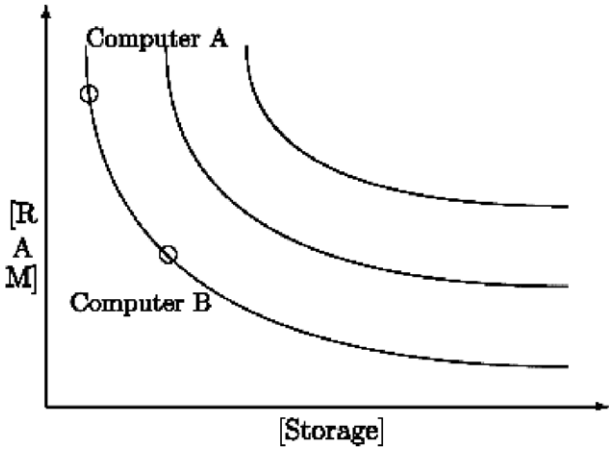


Fig. 1. A choice between Computers A and B which is supposed to be indifferent to a particular decision maker.

Computer A (B) dominates Computer B (A) having treated the smaller feature difference that Computer B (A) is better than Computer A (B) as subjectively non-existent.

Now that you have made your choice, imagine again that a feature shared by the choice options is "4 GB USB Flash Drive". Both 4 GB USB Flash Drive and Hard Drive are very likely to be classified under the equivalence class [Storage], the Flash Drive will be seen as relevant to the Hard Drive. The inclusion of 4 GB USB Flash Drive will render the equating of difference on Hard Drive easier than that on RAM (see Fig. 2), thus leading to choosing the better RAM option (choosing the option with the better RAM outcome having treated the Hard Drive outcomes as subjectively equal), which is Computer A. That is, if we are indeed guided by the weak dominance rule in making our choices, quite possibly the decision outcome is then reached by seeing the "20 GB Hard Drive + 4 GB USB Flash Drive" and "10 GB Hard Drive + 4 GB USB Flash Drive" to be equal. There will be virtually no difference between consuming "20 GB Hard Drive" and "10 GB Hard Drive" when additional "4 GB USB Flash Drive" was added to both A and B. As a result, A dominating B will be reached by only taking the unique feature of RAM's differences into account.

A limiting case is illustrated in Fig. 3, where the choice would be further simplified and Computer A weakly dominating Computer B would then be reached.

In contrast, if a shared feature is different from the class of RAM or Drive space, such as Premium Anti-Radiation Glare Filter and many others, the feature turns out to be irrelevant. The inclusion of such shared features will inevitably form a new class such as [S_Anti-Radiation] by itself and creates an extra dimension in the decision vector. Such a presentation of shared features will not trigger the limiting process and enhance the equate-to-differentiate approach. As a result, cancellation is applicable in this case.

It is worth noting that, "irrelevant" is a loaded term in the consumer behavior literature (e.g., Carpenter, Glazer, & Nakamoto, 1994). Carpenter et al. (1994) found in their experiments that consumers often value distinguishable, unique, but irrelevant attributes. A common type of irrelevant attribute is one that implies greater benefit, sometimes on a key function, but in reality does not provide the implied benefit. For instance, Alberto

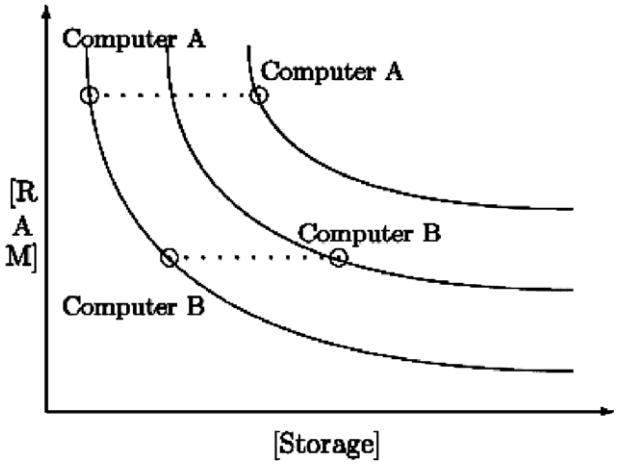


Fig. 2. A shift along [Storage Space] rather than [RAM] with the addition of a USB.

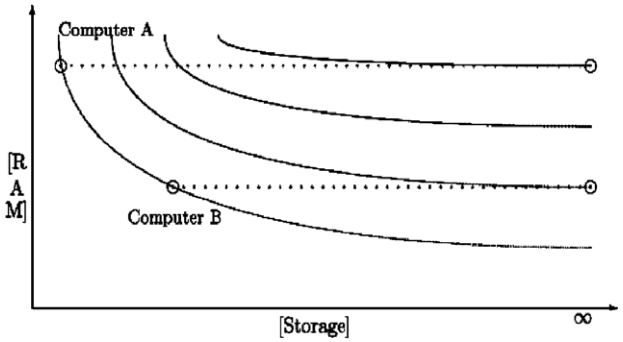


Fig. 3. A shift along [Storage Space] with the addition of a USB in a limiting case.

Culver differentiates its Alberto Natural Silk Shampoo by including silk in the shampoo. Carpenter et al. (1994) refer to silk in shampoo as "irrelevant," because silk is meaningless to shampoo. Nevertheless, we refer to Premium Anti-Radiation Glare Filter in a computer as "irrelevant." This is not because the Filter is meaningless to the computer offered, but because it is different from the class of RAM or Drive space.

Thus, the major goal of the present paper is to further enhance our understanding of feature distinctiveness on preferential choice and to apply these results by outlining their implementation for an analysis of choice incidence. Building on the notion that the neglect of shared features is problematic when shared features were selected from a *relevant set* but not when selected from an *irrelevant* set, the following three experiments examine whether this claim of intra-dimensional evaluation processing holds for consumer choices involving a comparison between the available alternatives.

2. Experiment 1

2.1. Method

2.1.1. Participants

Participants were 130 actual local handphone (mobile phone) users in Singapore who participated as volunteers. They were randomly selected when making a handphone call on the spot. The mean number of handphones owned by each participant was 1.1 and the standard deviation was .35.

2.1.2. Stimuli and design

A binary choice problem involving two handphone plans was prepared. It was based on actual handphone promotional plans, advertised by Singtel in Singapore newspapers.[1] Hence, the rate, value-added services (Short Messaging System – SMS), and promotional offers (lucky draws) are modeled after the plans from Singtel (handphone operator) in Singapore.

[1] Advertisement (22 September, 2000). *Lianhe Zaobao*, p. 5.

Two alternative plans were thus formed on the above basis where Plan A is better than Plan B on price charges, while Plan B is better than Plan A on SMS services provided (see Table 1).

An additional feature shared by both A and B, either *Free $5 SMS messages* or *Chance to win Lucky Draw prizes worth $15,000*, was designed in the present experiment (see Table 2). The actual questionnaire presented to participants contained only one shared feature without the brackets, either adding "Free $5 SMS" or adding "Chance to win Lucky Draw".

The shared feature of "Free $5 SMS messages" ($s_1$) is deemed as relevant (Free $5 is presumably equivalent to the feature of SMS services). The shared feature of "Chance to win Lucky Draw prizes worth $15,000" ($s_2$), which relates to special promotional offers, is regarded as irrelevant (Lucky Draw presumably do no belong to the same class as price charges or SMS services).

Two ways of seeing the shared features, feature-adding and feature-subtracting, were prepared in the present experiment. In the feature-adding condition, participants first saw Plans A and B without a shared feature (Table 1) and then saw Plans A and B with a shared feature (Table 2). The cover stories for feature-adding condition, which stresses the commonality of the two plans before presenting Plans A and B with a shared feature (i.e., Table 2), read as "Due to heavy competition from other companies, the handphone plans were enhanced. Both plans offer extra free $5 worth of SMS (Short Message System) messages." and "A promotion was launched. Everyone who has a handphone plan will be entitled to join a lucky draw, where they will have a chance of winning $15,000" for relevant and irrelevant manipulation respectively. In the feature-subtracting condition, participants first saw Plans A and B with a shared feature (Table 2) and then saw Plans A and B without a shared feature (Table 1). The cover stories for the feature-subtracting condition, which stresses the commonality of the two plans before presenting Plans A and B without a shared feature (i.e., Table 1), read as "In order to cut costs, $5 worth of SMS messages was removed from both packages" and "The promotion period for joining the lucky draw has ended. Hence, both the plans no longer enable you to join in the lucky draw" for relevant and irrelevant manipulation respectively.

Table 1
Plans A and B without a shared feature

Handphone Plan A	Handphone Plan B
18¢ per min peak charges	20¢ per min peak charges
8¢ per min off-peak charge	10¢ per min off-peak charge
180 SMS messages	360 SMS messages

Table 2
Plans A and B with a shared feature

Handphone Plan A	Handphone Plan B
18¢ per min peak charges	20¢ per min peak charges
8¢ per min off-peak charge	10¢ per min off-peak charge
180 SMS messages	360 SMS messages
Free $5 SMS messages	Free $5 SMS messages
(Chance to win Lucky Draw prizes worth $15,000)	(Chance to win Lucky Draw prizes worth $15,000)

Each participant was required to answer in both feature-adding and feature-subtracting conditions with each condition having two choices (with and without the shared feature). Participants were asked to indicate their choice by circling a number on the 7-point scale. A total of four choices are therefore to be made by participants. In order to counterbalance the order of the question presentation, the choice problems were presented in two different versions. That is, in Version 1, it was presented in this order: feature-adding condition with relevant shared feature and feature-subtracting condition with irrelevant shared feature while in Version 2, it was presented in the reversed order: feature- subtracting condition with relevant shared feature and feature-adding condition with irrelevant shared feature. Each of approximately half of the participants were randomly assigned to respond to either of the two versions.

2.2. Results

Of all the participants who answered the questionnaire, we ended up with a total of 70 out of 130 participants answering Version 1 and 60 out of 130 participants answering Version 2. Mean strength of preference (1 means participant definitely chose A and 7 means participant definitely chose B) as a function of shared feature (without a shared feature vs. with a shared feature) and feature-changing order (feature adding vs. feature subtracting) was shown in

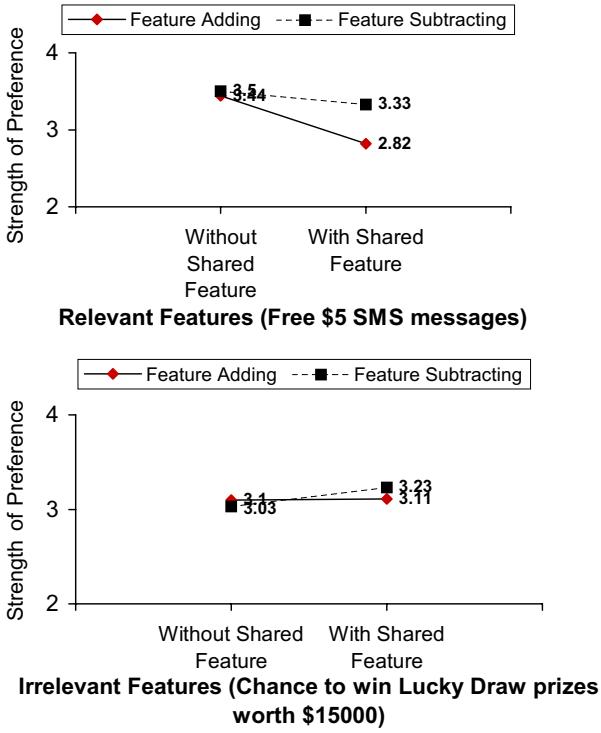


Fig. 4. Handphone Problem: Mean ratings of strength of preference as a function of shared feature (without a shared feature vs. with a shared feature) and feature-changing order (feature adding vs. feature subtracting). Indifferent preference has a value of 4, smaller values denote A preferred choice, and larger values denote B preferred choice.

Fig. 4. When the shared feature of "Free $5 SMS messages" was added or subtracted, the analysis of variance conducted on the data revealed a significant main effect of shared feature on the rated preference, with Plan A (the less-expensive plan that includes fewer SMS messages) being more likely to be chosen with a shared feature while Plan B being more likely to be chosen without a shared feature ($F(1,128) = 12.31$, $P < .002$), but no significant difference between feature adding and feature subtracting groups in rating the preference ($F(1,128) = .76$, *n.s.*). There was also no significant interaction ($F(1,128) = 3.04$, *n.s.*).

On the other hand, when the shared feature of "Chance to win Lucky Draw prizes worth $15,000" was added or subtracted, the analysis of variance conducted on the data indicated that the main effect of a shared feature on the rated preference was not significant ($F(1,128) = 2.05$, *n.s.*) and the main effect of feature-changing order was also not significant ($F(1,128) = .01$, *n.s.*). There was no significant interaction ($F(1,128) = 1.54$, *n.s.*). It appears that choices between mobile phone plans differ depending on whether the shared feature was "Chance to win Lucky Draw" or "Free $5 SMS". This is true regardless of whether the shared feature was presented in a way of feature-adding or in a way of feature-subtracting.

In exploring and determining the conditions that govern the cancellation, it has been suggested that subjects can consistently edit and cancel common components so as to conform to the cancellation principle if the experimental design promotes such a strategy (e.g., Birnbaum & McIntosh, 1996). The data gathered in the present experiment showed that the more transparent or compelling condition selected (i.e., all three outcomes were presented to the same person simultaneously) to test cancellation did not lessen the violation of this basic rule of normative decision making.

3. Experiment 2

The results of Experiment 1 provide initial support for our hypotheses and suggest that cancelling the components that are explicitly common to the alternatives depends on whether shared features are relevant or irrelevant to the unique features. There are two potential problems with Experiment 1, however. First, the comparison of relevant vs. irrelevant shared features was made within participants, the kinds of phenomena under consideration might lead to the obtained patterns of responses. The second problem with Experiment 1 was related to the question presentation. Experiment 1 presented the shared features in a way that participants first saw relevant shared feature and then irrelevant shared feature in both Version 1 (adding-subtracting) and Version 2 (subtracting-adding). It could be argued that such an order of presentation could make participants realize they should ignore the irrelevant feature. To overcome these two problems, in Experiment 2, and in Experiment 3 as well, we used a between-participants design to examine whether the same pattern of results would be replicated.

In this experiment, the notion of canceling the features shared by the alternatives was operationalized by assigning an equivalent worth (value) to each feature common to the offered alternatives. We reasoned that, if the same weight were placed on the shared features in choosing among the alternatives provided, these features should be given the same worth by decision makers who edit and cancel them. Taking Houston and Sherman's (1995) automobile selecting problem for example, the worth assigned to a shared feature (e.g., stereo included) of Automobile A should be equal to that assigned to a shared feature (e.g., stereo included) of Automobile B, if the shared feature is cancelable.

In particular, we thus hypothesized that: equal worth (value) in terms of buying price should be placed on *ir*relevant rather than relevant shared features in choosing among the alternatives provided.

3.1. Method

3.1.1. Participants

The participants in this experiment were 244 undergraduate students from various disciplines at Fujian Hwa Nan Women's College. The ages of the participants ranged from 18 to 24 (mean age = 20.65 years). They were all boarding students.

3.1.2. Stimuli and design

A "dormitory-renting" problem was prepared. The rental rate and the facilities described were based on genuine rental rate and facilities provided by the College in accordance with the regulations proposed by Fujian Local Price Bureau and Education Committee. Two alternative dormitory rooms were thus formed on the above basis where Dormitory A is better than Dormitory B on ROOM DENSITY, while Dormitory B is better than Dormitory A on HOT WATER SUPPLY or COOLING SYSTEM. It was presented in questionnaire form in three versions that differed only in the cell entries that lacked a common superscript. The problem reads as follows:

Suppose at the beginning of new semester the College arranges for there to be two types of student dormitory available for you to choose from:

Dormitory **A**	Dormitory **B**
[1,2,3]four-person room	[1,2,3]six-person room
[1,2]no boiler hot water provided	[1,2]1 hour per day boiler hot water provided
[3]no ceiling fan installed	[3]ceiling fan installed

I. The market rental rate is ranged from ¥600 to ¥1000 for each academic year. What is the highest rent would you pay for Dormitory A? _____ Yuan.

II. The market rental rate is ranged from ¥600 to ¥1000 for each academic year. What is the highest rent would you pay for Dormitory B? _____ Yuan.

Now that you have made your decision, you learn that conditions for both Dormitory **A** and Dormitory **B** have been improved as follows:

Dormitory **A**	Dormitory **B**
[1,2,3]four-person room	[1,2,3]six-person room
[1,2]no boiler hot water provided	[1,2]1 hour per day boiler hot water provided
[3]no ceiling fan installed	[3]ceiling fan installed
[1]solar-powered water heater installed	[1]solar-powered water heater installed
[2]daily room cleaning service provided	[2]daily room cleaning service provided
[3]air conditioner installed	[3]air conditioner installed

III. The market rental rate is ranged from ¥600 to ¥1000 for each academic year. What is the highest rent would you pay for Dormitory A? _____ Yuan.

IV. The market rental rate is ranged from ¥600 to ¥1000 for each academic year. What is the highest rent would you pay for Dormitory B? _____ Yuan.

The superscript numbers 1, 2 and 3 indicated the offered feature applicable to Versions 1, 2 and 3 respectively. The unique features (X_1 = ROOM DENSITY; X_2 = HOT WATER SUPPLY or COOLING SYSTEM) were always listed in the first two rows while the feature that was explicitly common to both Dormitory **A** and Dormitory **B** (''solar-powered water heater installed'', or ''daily room cleaning service provided'' or ''air conditioner installed'') was listed in the third row. The actual problems presented to participants contained only one feature (of the same superscript number) for each cell, but with the superscript number omitted.

The shared feature of ''solar-powered water heater installed''/''air conditioner installed'' (s_1) in Version 1/Version 3 was deemed as relevant (i.e., both the shared feature of ''solar-powered water heater installed'' and the unique feature of ''boiler hot water provided'' presumably fell under the class of ''HOT WATER SUPPLY'' in Version 1; both the shared feature ''air conditioner installed'' and the unique feature ''ceiling fan installed'' presumably fell under the class of ''COOLING SYSTEM'' in Version 3). On the other hand, the shared feature of ''daily room cleaning service provided'' (s_2) in Version 2 was regarded as irrelevant (i.e., ''daily room cleaning service provided'' presumably did not form an equivalence class or did not amplify the value of either ROOM DENSITY or HOT WATER SUPPLY).

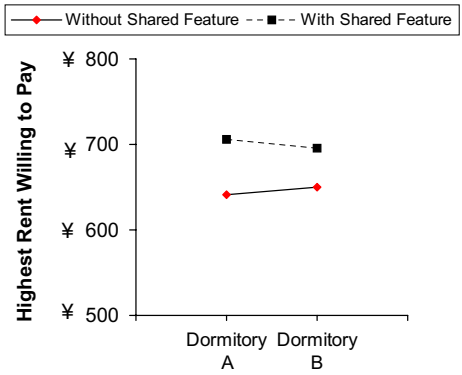
Roughly about one third (75, 91 and 78 students) of the participants responded to each of the three versions. Each participant thus received only a single task that was interspersed among other tasks for a different experiment. They filled out the questionnaire at their own pace. Upon completing the questionnaires, participants were thanked and debriefed.

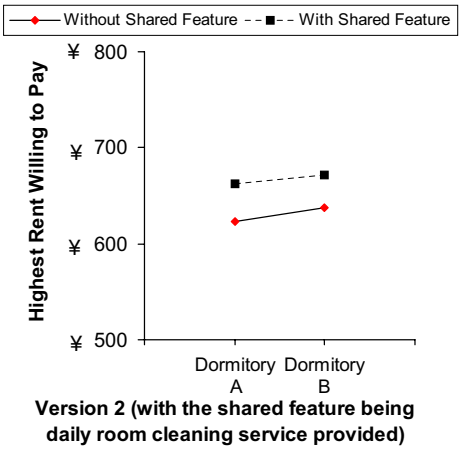
3.2. Results

The mean prices indicated, by shared feature (without a shared feature vs. with a shared feature) and alternative (Dormitory A vs. Dormitory B) were shown in Fig. 5. For purposes of data analysis, a variable called *worth of shared feature*, which was the difference between the variables pricing *with* shared feature and pricing *without* shared feature, was constructed. The resulting variable was greater than or equal to zero. A positive score on the new variable indicated that a worth was indeed placed on the shared features of the alternative.

Each participant's worth of shared feature was thus deduced via two ways. That is, Price for a shared feature (i.e., solar-powered water heater installed, or daily room cleaning service provided or air conditioner installed) = Price for A (B) with a shared feature − Price for A (B) without shared feature.

Mean price for a shared feature deduced from Dormitory A and that deduced from Dormitory B were then compared to each other by a within-participants t test. For Version 1 (with the shared feature being solar-powered water heater installed) and Version 3 (with the shared feature being air conditioner installed), participants were more likely to set a higher rent for the shared feature deduced from Dormitory A ($M_{\text{solar-powered water heater installed}} = ¥64.47$; $M_{\text{air conditioner installed}} = ¥101.92$) than that deduced from Dormitory B ($M_{\text{solar-powered water heater installed}} = ¥45.52$; $M_{\text{air conditioner installed}} =$





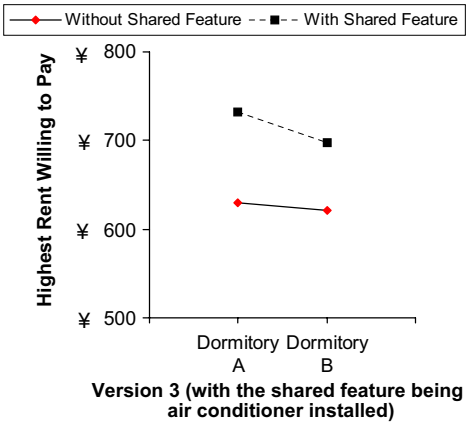


Fig. 5. Dormitory-renting problem in three versions: mean rent as a function of shared feature (without a shared feature vs. with a shared feature) and alternative (Dormitory A vs. Dormitory B).

¥77.30). This difference was statistically significant, $t(74) = 3.05$, $p < .01$ for Version 1 and $t(77) = 3.08$, $p < .01$ for Version 3. For Version 2 (with the shared feature being daily room

cleaning service provided), however, participants tended to set an equivalent rent for the shared feature (daily room cleaning service provided) deduced from Dormitory A ($M = ¥38.84$) and that deduced from Dormitory B ($M = ¥34.62$), $t(90) = 1.08$, *n.s.* It appears that, consistent with the hypothesis being tested, features that are common to all the alternatives do play a role in providing diagnostic information in the sense that a differentiating worth might be placed on them.

Moreover, an analysis of variance was used to examine the indicated overall prices shown in Fig. 5. Note that there was indeed a significant two-way interaction (shared feature × alternative), revealed by participants who responded to Version 1 ($F(1,74) = 9.27$, $p < .01$) and Version 3 ($F(1,77) = 9.48$, $p < .01$). Nevertheless, such a two-way interaction revealed by participants who responded to Versions 2 was not statistically significant ($F(1,90) = 1.17$, *n.s*). The character of the interaction was consistent with the results revealed by the *t* tests. That is, it was only in Version 2 that participants placed a *proportionally* higher price on both Dormitory A and Dormitory B when a shared feature (daily room cleaning service provided) was added.

In the introduction, a distinction between relevant and irrelevant shared features was discussed. The three versions designed for the "dormitory-renting" problem corroborated this line of reasoning. The highly significant two-way interactions were thus seen as supportive evidence that the decision-makers tend to place an equal worth (price) on the common features, if and only if the common features are *ir*relevant to the unique features.

It was, however, worth noticing that pricing and preferential choice are not always consistent. The preference reversal (PR) phenomenon, which was first reported by Lichtenstein and Slovic (1971) and by Lindman (1971), questioned whether giving a price is the same as giving a preference. If a choice was not based on maximizing the overall worth of a option (for more detailed arguments, see Li, 1995, 1996), our finding in pricing might not necessarily challenge the assumption that features common to all the offered alternatives in the choice set are canceled in the process of choice (Tversky, 1972). Experiment 3 was therefore planned to investigate the replicability and existence of the present findings in a choice setting.

4. Experiment 3

The aim of Experiment 3 was twofold. First, it tested whether the findings in Experiment 2 were applicable in a choice setting. The second aim was to overcome two common problems with the first two experiments. The first problem with either Experiment 1 or Experiment 2 was related to the inference of "relevancy". Although we referred the observed differences as "relevancy", in previous experiments, we did not check whether our experimental manipulations achieved the intended effects in participants' perception. To provide supplementary evidence, a set-rating task, which measures whether paired unique-shared features fall into the same set (class), was designed and posed to participants in Experiment 3. Second, although we reasoned that final choice is based on a single fixed dimension (feature), we did not provide any empirical evidence to support such assertion. To uncover the process of how intra-dimensional evaluation influences individual preferential choice, in Experiment 3, we measured each participant's decision of taking the two unique features' differences into account and examined whether it mediated the shared feature effect on individual preference.

4.1. Method

4.1.1. Participants

Two hundred and twenty-seven fast-food consumers (106 females and 121 males) in Hangzhou, Yantai, Beijing and Shenyang cities in China participated voluntarily. They were randomly selected on the basis that they went to a Westernized fast food restaurant at least once in the past 3 months (estimated mean = 7.03, SD = 14.07). The age of the participants ranged from 18 to 32.

4.1.2. Stimuli and design

A Filet-O-Fish ordering problem was prepared, which concerned a choice between ordering a regular Filet-O-Fish/large Coke and a big Filet-O-Fish/medium Coke. It was presented in questionnaire form in three versions that differed only in the cell entries that lacked a common superscript. It reads as follows:

Two sets of meals were promoted in a Westernized fast-food restaurant in this summer:

Set **A**	Set **B**
[1,2,3]A regular Filet-O-Fish	[1,2,3]A big Filet-O-Fish
[1,2,3]A large coke	[1,2,3]A medium coke
[2]A free iced black tea	[2]A free iced black tea
[3]A free polybag of wet-tissue	[3]A free polybag of wet-tissue

Approximately one third of the participants were randomly assigned to respond to each of the three versions. They were asked to indicate their choice by circling a number on a seven-point scale (1 for definitely choosing Set **A** and 7 for definitely choosing Set **B**).

Participants were then asked to determine whether the following two statements were applicable to them by circling a number on a seven-point scale:

I. When making your choice, the difference between "a regular Filet-O-Fish" and "a big Filet-O-Fish" has been

1	2 3 4	5 6 7
Not taken into account at all	Neither taken nor not taken into account	Fully taken into account

II. When making your choice, the difference between "a large coke" and "a medium coke" has been

1	2 3 4	5 6 7
Not taken into account at all	Neither taken nor not taken into account	Fully taken into account

Each shared feature (Iced Black Tea in Version 2 or Wet-Tissue in Version 3) was paired with the two unique features (Filet-O-Fish and Coke) respectively. For those who saw both the unique and shared features (Versions 2 and 3), participants were then asked to rate each paired features by using a number ranging from 0% to 100% to indicate whether the paired features fell into the same set (class). No participants responded to more than one version.

4.2. Results

Mean ratings of strength of preference indicated by shared feature (without a shared feature vs. with a shared feature of Iced Black Tea vs. with a shared feature of Wet-Tissue) were shown in Fig. 6. A one-way ANOVA analysis revealed that there was a significant effect of shared feature ($F(2, 224) = 3.08$, $p < .05$). Post-hoc comparisons revealed that (1) participants were more likely to choose Set B (with a Big Filet-O-Fish) when a free Iced Black Tea was added ($M = 5.42$) than when no shared feature was added ($M = 4.44$) ($p < .05$, LSD), a behavior violating the cancellation principle, and (2) participants choose an offered set equally when a free Wet-Tissue was added ($M = 4.58$) and when no shared feature was added ($M = 4.44$) (*n.s.*, LSD), a behavior satisfying the cancellation principle.

The judging data of taking the Cokes' difference into account and that of taking the Filet-O-Fish's difference into account enabled us to run a mediation analysis to see whether, in agreement with equate-to-differentiate predictions, the judging data of taking the two unique features' differences into account are indeed responsible for the choice preferences. To examine the mediating effect of the judging data between feature manipulation and individual preference, the three-step mediation analysis suggested by Baron and Kenny (1986) was performed. The analyses revealed that (1) feature (without a shared feature vs. with a shared feature of Iced Black Tea vs. with a shared feature of Wet-Tissue), on a between-participants basis, had a significant main effect on participants' choice behavior ($F(2, 224) = 3.08$, $p < .05$) with participants being more likely to choose Set B when a shared feature of Iced Black Tea was added ($M = 5.42$) than when a shared feature of Wet-Tissue was added ($M = 4.58$) and when no shared feature was added ($M = 4.44$), (2) feature (as two dummy variables) was a predictor of two types of judging data (i.e., the

Fig. 6. Filet-O-Fish Ordering Problem: Mean ratings of strength of preference as a function of shared feature (without a shared feature vs. with a shared feature of iced black tea vs. with a shared feature of wet-tissue). Indifferent preference has a value of 4, smaller values denote Set **A** preferred choice, and larger values denote Set **B** preferred choice.

Table 3
Mean rating of paired features indicating whether each paired unique-shared features falls into the same set

		Shared feature	
		Iced black tea (%)	Wet tissue (%)
Unique feature	Coke	52.48	26.52
	Filet-O-Fish	38.95	27.98

0% denoted that the pair does not fall into the same set at all, 100% denoted that the pair fully falls into the same set.

judging data of taking the Cokes' difference into account and that of taking the Filet-O-Fish's difference into account) ($\beta_{\text{Cokes' difference}} = .16$ and $\beta_{\text{Filet-O-Fish's difference}} = -.16$, respectively, p's $< .05$), and one of the two types of judging data was predictor of the choice preference ($\beta_{\text{Cokes}} = -.26$, $p < .01$ while $\beta_{\text{Filet-O-Fish}} = .06$, *n.s.*, indicating that they predict the individuals' preference in the opposite direction), and (3) when "two types of judging data" variables were entered as covariates, the effect of feature was eliminated ($F(2, 222) = 2.16$, *n.s.*), whereas the effect of the "judging data of taking the Cokes' difference into account" remained significant ($F_{1,222} = 15.20$, $p < .001$). These results suggest that "taking the Cokes' difference into account" but not "taking the Filet-O-Fish's difference into account" mediated the relationship between shared feature and participants' choice behavior. These findings provide empirical evidence that the knowledge of "decision being based on only one-dimensional difference" is able to permit prediction of choice preferences related to both the cancellation satisfying and cancellation violating situations.

On the other hand, the estimated set-rating data (see Table 3) enabled us to run a two-way ANOVA with repeated measures to examine our previous reasoning of the relevant and irrelevant distinction. The analysis of variance revealed (1) a significant between-participants effect ($F(1, 160) = 29.87$, $p < .01$), with the rating of whether paired unique-shared features fell into the same set being significantly higher when the shared feature was Iced Black Tea ($M = 45.72\%$) than when the shared feature was Wet Tissue ($M = 27.25\%$), and (2) a significant within-participants effect ($F(1,160) = 6.15$, $p < .02$), with the rating being significantly higher when the shared feature of Iced Black Tea was paired with the unique feature of Coke ($M = 52.48\%$) than when the shared feature of Iced Black Tea was paired with the unique feature of Filet-O-Fish ($M = 38.95\%$) ($t(79) = 2.97$, $p < .01$) whereas there was no significant difference between such a rating when the shared feature of Wet Tissue was paired with the unique feature of Coke ($M = 26.52\%$) and with the unique feature of Filet-O-Fish ($M = 27.98\%$) ($t(81) = .79$, *n.s.*). Such findings confirm that, as expected, the two shared features were not perceived and treated in the same way – the shared feature of Iced Black Tea can be seen as a relevant shared feature while the shared feature of Wet Tissue as an irrelevant one.

5. General discussion

It has been emphasized by some researchers (e.g., Dhar & Sherman, 1996) that both shared and unique features are relevant for judgments of similarity even though the precise weights may vary on the basis of task instruction. However, features that are common to all the alternatives do not provide diagnostic information for preference judgments, in contrast to judgments of similarity, and are therefore not useful in making a choice among alternatives. In the context of the present problems, the cancellation asserts that if Alternative A (or B) *without* the shared feature is preferred, then Alternative A (or B) *with* the shared

feature will also be preferred, regardless of the set of the shared features. Participants may place less emphasis on the common features and focus primarily on the unique features of the paired items. Varying the set of the shared features is not expected to reverse the original preference.

The three experiments reported in this paper, departing from the main trend, provide another avenue to investigate the conditions under which the cancellation is violated or not. Our findings certainly do not cohere with existing research that suggests that in order to simplify the choice between alternatives, people often disregard components that the alternatives share, and focus on the components that distinguish them (Tversky, 1972). The data gathered in the present study show that our participants did give a price or give a preference consistently (edit and cancel the shared features) when the features shared by alternatives are "irrelevant", but they did not cancel the shared features when the features shared by alternatives are "relevant". Confirming the prediction discussed in the previous section, inconsistent decisions (either giving a price or giving a preference) were observed, when the intra-dimensional evaluation of the difference between alternatives was manipulated to change, namely, when attempts have been made to lessen the differences between the two alternatives on unique features by adding or subtracting the shared features of "Free $5 SMS" in Experiment 1, of "solar-powered water heater installed"/"air conditioner installed" in Experiment 2, and of "free iced black tea" in Experiment 3, respectively. Such a finding, together with those obtained in Prisoner's Dilemma games (e.g., Li et al., 2007), risky (e.g., Li, 1994) and riskless choice domains (e.g., Li, 2001b), add to the evidence indicating that the violation of cancellation of normative decision theory can be produced, even though the shared features were transparently presented. Bonini et al. (2004) also suggest that people will not cancel the transparent common component when there is a strong semantic relationship to the target outcome (e.g., they both belong to the same basic category). To base the cancellation-and-focus model only on the distinction between unique and shared features will inevitably engender difficulty in enabling the cancellation to be interpreted unambiguously. We therefore reasoned that, without considering the intra-dimensional differences between alternatives offered, previous demonstrations by both Tversky et al. and Houston et al. might not be conclusive. The variation in selection of common outcomes (features) will leave their test result open.

The marketing implications of our findings would be that marketers could affect consumer preferences by manipulating the choice set of competing alternatives. The effect of shared features explored in this paper suggests that, for the consumer to make a choice of product comparisons, marketers should consider not only the unique features of their brands but also the features common to all available alternatives. The very compelling cancellation may hold only when shared features are irrelevant. In doing this, a marketer is able to alter consumers' decision even if he or she is about to add or subtract exactly the same feature that his or her competitors have already added or subtracted. Moreover, managers could also use similar tactics to impact employees' perceptions of choice alternatives.

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Appendix A

Example of a unique-good, shared-bad pair of alternatives (from Houston & Sherman, 1995)

Automobile A	Automobile B
Does not need repairs often	Good financing available
Stereo included	Good ratings from a consumer guide
Prestigious model	Good acceleration
Air conditioning included	A friend recommended this model
Hard to find service outlets	Hard to find service outlets
Poor warranty	Poor warranty
Poor mileage	Poor mileage
High priced	High priced

Example of a unique-bad, shared-good pair of alternatives (from Houston & Sherman, 1995)

Automobile A	Automobile C
Does not need repairs often	Does not need repairs often
Stereo included	Stereo included
Prestigious model	Prestigious model
Air conditioning included	Air conditioning included
Hard to find service outlets	High insurance costs
Poor warranty	Has had a lot of factory recalls
Poor mileage	Available in only a few colors
High priced	Repair parts are hard to get

Appendix B

Example of Unique Bad, Shared Good Alternatives (from Dhar & Sherman, 1996)

Place A	Place B
Beautiful scenery	Beautiful scenery
Pollution problem	Overcrowded
Plenty of nightspots	Plenty of nightspots
Expensive	Expensive
Good museums	Good museums
Long travel time	Poor transportation

Example of Unique Good, Shared Bad Alternatives (from Dhar & Sherman, 1996)

Place A	Place B
Beautiful scenery	Good restaurants
Pollution problem	Pollution problem
Good museums	Good theaters
Expensive	Expensive
Plenty of nightspots	Attractive beaches
Long travel time	Long travel time

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