

Order Effects of Purchase Experiences on Repurchase Probability in the Online Marketplace*

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Abstract: This study examines whether the sequence of a consumer's purchase experiences with a seller will influence the consumer's repurchase probability. In detail, this study tries to find out whether a consumer's first transaction with a seller has stronger impacts on the consumer's repurchase probability than the following transaction experiences (the primacy effect), and whether a consumer's last transaction is more influential on the consumer's repurchase probability than the previous transaction experiences (the recency effect). Objective transaction data collected from a dominant online marketplace in China are used in verifying the research questions. The findings show that there are recency effects but no primacy effects of purchase experiences on repurchase probability. Theoretical contributions and practical implications of the research findings are discussed.

Keywords: Electronic Commerce, Repurchase, Order Effects, Primacy Effects, Recency Effects, Satisfaction

1 Introduction

It is crucial to understand the impacts of consumers' purchase experiences on their repurchase behaviors, because increased repurchase rates commonly mean the reducing of costs and rising of profits [9]. Since repurchase behavior is a relatively classical topic, there are several streams of research which focus on the topic. These streams of research examine the impacts of consumer experiences (e.g. satisfaction, perceived consumer value, seller performance and product quality) on repurchase related variables (e.g. repurchase intention, repurchase behavior and loyalty) in different settings (e.g. repurchase of a product, repurchase of a brand, continue use of a service, repurchase from a website and repurchase from a retailer) [1, 6, 8, 11, 12]. Despite the variety, these studies are the same in examining the effect of merely one transaction experience (satisfied or dissatisfied) on repurchase behavior. However, when a consumer has a sequence of transaction experiences with a seller (especially when the transaction experiences are inconsistent), how to estimate the consumer's repurchase probability? There is no explicit answer to this ques-

tion in the literature.

The effect of a transaction experience sequence on repurchase behavior is not an imaginary research question, but a practically important problem. In conventional marketplace, a consumer may have inconsistent experiences when purchasing different products of a certain brand, or when purchasing commodities from a certain retailer. In online marketplace, a consumer may also have inconsistent experiences when purchasing books from an online book store, or when purchasing goods from an e-retailer. How will the consumer process a sequence of inconsistent transaction experiences? How does the transaction experience sequence influence the consumer's repurchase behavior? Will the consumer still repurchase when he/she is dissatisfied with the last transaction but the previous transactions are all satisfied? Will the consumer's first transaction experience with a product (or retailer, service, brand) be more influential than the following transaction experiences on the consumer's repurchase probability? Answers to these questions can not only help managers understanding consumers' repurchase behavior, but also guide managers in estimating consumers' repurchase probabilities, identifying consum-

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ers who are loyal and retaining consumers who are about to leave.

This study tries to verify the effect of a consumer's transaction experience sequence (with an e-retailer) on his/her repurchase probability in the online marketplace. In detail, this study tries to find out whether a consumer's first transaction has stronger impacts on his/her repurchase probability than the following transaction experiences, and whether a consumer's last transaction is more influential on his/her repurchase probability than the previous transaction experiences. The study adopts the belief updating psychology to capture the order effect of transaction experiences on repurchase probability. Using actual transaction data collected from Taobao (a dominant online marketplace in China), the research questions are examined. The research findings are hopefully generalized to other settings both in conventional marketplaces and electronic marketplaces.

The paper is organized as follows: After the introduction, section 2 reviews literature, illustrates the research model and propose several hypotheses. Section 3 describes the research methodology. Section 4 presents the research results. Finally, section 5 discusses the research findings.

2 Research Model

2.1 Belief-Updating Model

Suppose a consumer has n transaction experiences with a seller. The transaction experiences are coded by signs: '+' for a satisfied transaction experience, and '-' for a dissatisfied one. The transaction experiences happened as a sequence S . For example, '+--+' indicates that the consumer has purchased three times in total, and he/she is satisfied with the first and third transaction, while is dissatisfied with the second transaction. After these n transactions, the consumer will repurchase from the seller at the probability of R_S ($0 \leq R_S \leq 1$).

The most classical psychology of estimating a probability based on previous experiences is the Bayesian psychology. However, Bayesian psychology treats a sequence of experiences as a collection, and the sequence of the experiences is omitted. For example, according to the Bayesian psychology, $R_{+-} = R_{-+} = R_{++}$, which means the position of the dissatisfied transaction experience has no impact on the

repurchase probability. In fact, this is not likely to happen, because the last transaction experience is usually more impressive than the previous ones. Researchers also criticized that the Bayesian psychology is incomplete in accounting for the order of experiences [3].

Another psychology is the belief updating psychology [5]. This psychology allows a consumer adjusts his/her repurchase probability based on the purchase experiences one by one. This psychology has been widely used in the cognitive psychology [4] and education [10] literature. It also has been adopted in electronic commerce research [7].

There are two important inferences of the belief updating psychology: the primacy effect and the recency effect.

2.2 Primacy Effect and Recency Effect

The primacy effect means the first impressions are important [7], while the recency effect means the last impressions are influential [7]. Researchers found that students are more likely to remember the first several words and the last several words in a words list [10]. Buda and Zhang found order effects of information presentation on the attractiveness, willingness to purchase, and perceived performance of a product [2].

In the online marketplace, when a consumer plans to transact with a new seller, the consumer knows little about the seller. The first transaction experience will influence the consumer's evaluation of the seller's performance stronger, because the belief updating based on a 'zero' is relatively large [5].

Hypothesis 1 (Primacy Effects): A consumer's first transaction experience with a seller has a stronger impact on his/her repurchase probability than the following transaction experiences in the online marketplace.

According to the belief updating model, the last transaction experience will also has stronger impacts on repurchase probability, because the last transaction experience will update the "summarization" of all the previous transaction experiences [5]:

Hypothesis 2 (Recency Effects): A consumer's last transaction experience with a seller has a stronger impact on his/her repurchase probability than the previous transaction experiences in the online marketplace.

A further research question is: if both the primacy effect and the recency effect exist, which effect is stronger? Because a seller's performance can change,

the last transaction experience will signal the seller's performance more accurately than the first transaction experience. Therefore, we expect a stronger recency effect than the primacy effect.

Hypothesis 3 (Comparison): The recency effect of purchase experiences with regards to repurchase probability in the online marketplace is stronger than the primacy effect.

3 Methodology

This study uses field data collected from actual online marketplace website to verify the hypotheses. Compared with survey or experiment, the field data is more relevant to practice. Moreover, this study use actual repurchase behavior data, which can more accurately represent consumer's repurchase behavior [6, 8] than repurchase intention.

3.1 Data Collecting & Coding

We collected from Taobao by a spider program. Taobao is the most dominant online retailing marketplace and the second largest marketplace in China. The online marketplace platform and the reputation system of Taobao are similar to other prevalent online marketplaces, such as eBay. The representative nature of Taobao makes our findings easy to be implied and generalized.

We collected more than 20,000 consumers' full transaction histories, and then coded these consumers' experiences according to their ratings to sellers. Positive rating was coded as '+', and neutral or negative ratings were coded as '-' (according to Taobao rules, both neutral ratings and negative ratings indicate dissatisfied transactions). If a consumer purchased multiple items within a transaction, we used the worst rating to represent the transaction. This is because that the neutral & negative ratings are not usual, thus will be more impressive. The coding process is illustrated by Table 1. The table shows four transactions between a consumer and a seller. We coded the four transactions as four data points, and set "Repurchase" as "Yes" or "No" according to whether there are following transactions.

After the coding process, we summarized all the data points, and calculated the average repurchase rate of each case. The number of data points and average repurchase rate in each case is illustrated in Table 2.

3.2 Test Order Effects

We selected the cases with only one dissatisfied

experience, such as '+-', '++-' and '++----', to control the impacts of the number of satisfied or dissatisfied transactions on repurchase probability.

If there are no order effects, then the sequence of transaction experiences should have no impact on the repurchase rates, e.g. $R_{+-} = R_{++-} = R_{++--}$. However, if there are recency effects, the dissatisfied experience in the last position is more influential than the dissatisfied experiences in other positions (except the first position, which will be discussed later), e.g. $R_{+-} < R_{++-}$. Similarly, if there are primacy effects, the dissatisfied experience in the first position is more influential than the dissatisfied experiences in other positions (except the last position), e.g. $R_{+-} < R_{++-}$. We compared the repurchase rates of these cases to test Hypothesis 1 and 2.

Table 1, Example of Coding

Order	Purchase	Coding	Repurchase
1	1 item, 1 positive rating	+	Yes
2	3 items, 3 positive ratings	++	Yes
3	2 items, 1 negative rating, 1 positive rating	++-	Yes
4	1 items, 1 neutral rating	++--	No

Table 2, Repurchase Rates

Purchase Experience	N	R	Purchase Experience	N	R
-	9750	0.056	++++	37321	0.606
+	1313390	0.162	-----	14	0.857
+-	423	0.177	+++++	9	0.556
++	536	0.136	+++++	12	0.417
++	211637	0.351	+++++	22603	0.671
++-	72	0.319	+++++	11	0.727
++-	64	0.266	+++++	9	0.222
++-	103	0.155	+++++	15163	0.711
+++	74101	0.504	+++++	8	0.500
+++	23	0.609	+++++	10786	0.748
+++	16	0.313	+++++	8063	0.765
+++	35	0.257	+++++	6167	0.798

To test Hypothesis 3, i.e., whether the recency effect is stronger than the primacy effect, we directly compare each two cases when dissatisfied experience is in the first and in the last position, e.g. R_{+-} and R_{++-} .

We used t-test in comparing the repurchase rates of different purchase experiences. The t-test in use is unequal sample sizes and unequal variance t-test. The cases with no more than 5 data points are omitted, because the repurchase rates calculated based on no more than 5 data points is not reliable. It is also less possible to generate significant results based on such a small sample size.

4 Results

The summary of the t-tests is illustrated in Table 3. The second row of the table shows the comparison results with regards to the primacy effect. Surprisingly, we found that the comparison results are consistently reversed compared with our predictions. Therefore, H1 is not supported.

The third row of the table shows the comparisons related to the recency effect. We found that when the dissatisfied experience is at the last position, the repurchase rates are consistently lower than when the dissatisfied experience is not at the last position. However, only one of the four comparisons is significant. The insignificant results may be caused by the small samples of these cases. Therefore, H2 is weakly supported.

The comparison results in the fourth row illustrate a stronger effect of recency effect than primacy effect. In other words, the last transaction experience has stronger impacts on the repurchase rate. H3 is also supported.

The discussions of the results are reported in the next section.

Table 3, Comparison Results

Hypotheses	Predictions	Findings	Supported
H1 Primacy Effect	$R_{++} < R_{+-}$	$R_{++} > R_{+-}$ (n.s.)	Reverse
	$R_{+++} < R_{++++}$	$R_{+++} > R_{++++}$ (+)	
	$R_{++++} < R_{++++}$	$R_{++++} > R_{++++}$ ($p < 0.1$)	
	$R_{++++} < R_{++++}$	$R_{++++} > R_{++++}$ ($p < 0.1$)	
H2 Recency Effect	$R_{+-} < R_{++}$	$R_{+-} < R_{++}$ ($p < 0.05$)	Weakly Yes
	$R_{+++} < R_{++++}$	$R_{+++} < R_{++++}$ (n.s.)	
	$R_{++++} < R_{++++}$	$R_{++++} < R_{++++}$ (n.s.)	
	$R_{++++} < R_{++++}$	$R_{++++} < R_{++++}$ (n.s.)	
H3 Com- parison	$R_{+-} < R_{++}$	$R_{+-} < R_{++}$ ($p < 0.05$)	Yes
	$R_{+++} < R_{++++}$	$R_{+++} < R_{++++}$ ($p < 0.01$)	
	$R_{++++} < R_{++++}$	$R_{++++} < R_{++++}$ ($p < 0.05$)	
	$R_{++++} < R_{++++}$	$R_{++++} < R_{++++}$ ($p < 0.05$)	

5 Discussions

This study has two main findings. First, the last purchase experience has stronger impact on repurchase probability, which illustrates a recency effect. Second, the primacy effect does not exist in the online marketplace.

These findings show that the transaction experiences are not treated as equal by consumers, thus the Bayesian method will be not appropriate in evaluating a consumer's belief on a seller's performance, or in

estimating the consumer's repurchase probability. Models considering the order effects [5] should be used in this situation.

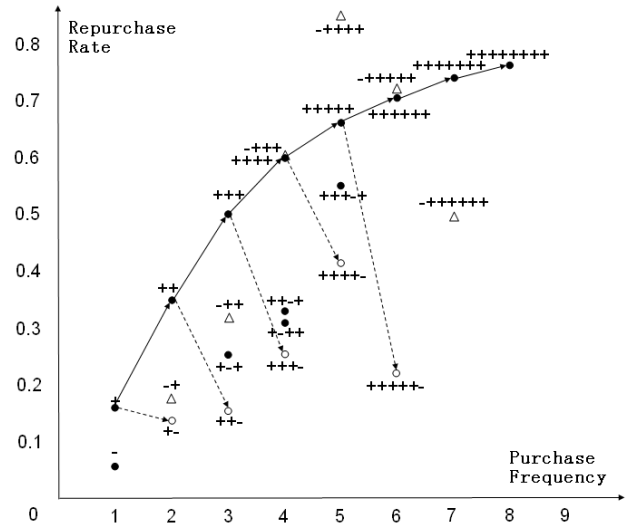


Figure 1, Purchase Experience & Repurchase Rates

The first finding illustrates that a consumer's repurchase probability is more sensitive to his/her last purchase experience. This finding suggests a seller should treat a consumer always carefully no matter how many satisfied transactions have been conducted between them, because the most recent transaction experience has a powerful impact on the consumer's repurchase probability. We demonstrate the repurchase rates in Figure 1. As illustrated by the dashed lines, the repurchase rates drop sharply when consumers have one dissatisfied transaction experience. Even when consumers already have four or five satisfied transaction experiences, one dissatisfied purchase experience is enough to drive valuable consumers away.

This finding also suggests that the reputation system of the online marketplace should put heavier weight on recent ratings than on earlier ratings. When the reputation systems of eBay and Taobao treat ratings in different time periods equally, however, Yahoo! Kimo (an online marketplace in Taiwan) use only each consumer's last rating in calculating the seller reputation. Researchers may compare the order effects in the reputation systems by comparing these different reputation system mechanisms.

The second finding is that the primacy effect does not exist in the online marketplace. As illustrated in Figure 1, the repurchase rates of the cases with a dissatisfied first transaction experience are not only higher than the cases with the dissatisfied experience

in other positions, but also close to or even higher than the cases with perfectly satisfied transaction experience. As illustrated in Table 4, except $R_{-+} < R_{++}$ and $R_{-++} < R_{+++}$, other comparisons are insignificant, and R_{-++++} is even significantly larger than R_{++++} . One possible explanation of the results is that, when a consumer's demands are remedied and the consumer comes back to the seller, the consumer's relationship with the seller will be even stronger. In this case, the consumer's repurchase rate will be at least equivalent to the situation as if the consumer has perfect purchase experiences.

Table 4, Comparisons with Perfect Experiences

Comparisons			Sig.
R_{-+}	<	R_{++}	$p < 0.01$
R_{-++}	<	R_{+++}	$P < 0.01$
R_{-+++}	>	R_{++++}	n.s.
R_{-++++}	>	R_{++++}	n.s.
R_{-++++}	>	R_{++++}	$p < 0.05$
R_{-++++}	>	R_{++++}	n.s.
R_{-++++}	<	R_{++++}	n.s.

The finding suggests that sellers should try to re-address consumers' needs when the consumers are not satisfied. A further question is that, does it mean sellers can pay less caution when they face a new consumer, because they can remedy the relationship afterwards? The answer is no. When consumers encounter a dissatisfied first transaction with a seller, their repurchase rate is about 5.6%, which is only one third to the repurchase rate when they encounter a satisfied transaction (16.2%). Sellers lose two thirds potential consumers from the first dissatisfied transaction, and these consumers will never give sellers the opportunity to remedy the relationships.

This study is one of the early studies which examine the order effects of consumer experiences in

online marketplaces. Because the study is based on the objective data collected from a Chinese online marketplace, culture factors may influence the research findings. Researchers may collect data from eBay to see whether culture will moderate the order effects.

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