Anchoring Induced Biases in Internet Buyers' Price Estimates

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Abstract

One of the heuristics adopted by human beings when they are making estimation under uncertainty is anchoring and adjustment, which refers to the situation in which people anchor on a specific value and then adjust it to yield a final judgment. Because the adjustment is usually insufficient, the estimates can be biased toward the anchor value and result in anchoring effect. Anchoring effect has been proved to be robust in many domains. However, the study on anchoring effect in electronic commerce context has remained largely unexplored. Moreover, we postulate that the repeated occurrence of anchor will moderate the effect of anchor on participants' price estimates. One experiment was conducted to investigate anchoring effect as well as the moderating role of repeated anchor in electronic commerce context. The results showed that anchoring effect is robust and the repeated anchor did not influence the occurrence of anchoring effect.

1. Introduction

With the proliferation of Internet, it has become one of the important transaction platforms. Internet shoppers cannot see and touch the physical products, therefore, the advertisements, product description and many other relevant or irrelevant cues provided on web pages can have potential to influence buyers' decisions. Anchoring effect is one of the possible results in which people's price estimates are biased toward the anchor to be appeared in virtual store.

Scholars in marketing area are also interested in exploring the anchoring effect in consumer behavior. For example, Yadav [14] suggested that buyers anchored their evaluation on the item perceived as most important and then made adjustments on the basis of their evaluations of the remaining bundle items. Wansink et al. [11] proposed a simple anchoring and adjustment model describing how consumers make purchase quantity decisions. Further, Kristensen and Garling [3] demonstrated that how the buyers' price estimates was influenced by anchor in negotiation. However, the evidence for anchoring effect in electronic commerce context is limited. Accordingly, this study aims to investigate the anchoring effect in Internet era, and to understand whether the anchor embedded in web pages influences Internet buyers' price estimates.

Although the anchoring effect has been empirically well established in many domains, there is still considerable debate regarding how anchoring effect occurred. Not all uninformative numbers produce anchoring effects. Instead, certain features of the anchor, target and judgmental task are required. For example, the extremity of anchor value, the amount of attention paid to the anchor, and the relevancy between anchor and target.

Experimental study conducted by Wilson et al. [12] is an example that considered the issue of attention in anchoring effect. They suggest that the amount of attention people paid to the anchor value is the key to obtain anchoring effect. However, this issue has remained largely unexplored. Therefore, the investigation of the relationship between attention paid on anchor and the induced anchoring effect in e-commerce context is another goal of current study.

2. Theoretical Background

The basic description of anchoring effect refers to the situation in which an arbitrarily chosen reference point (anchor) significantly influence the decision makers' value estimates, and the anchor that was insufficiently adjusted toward the true value of the object to be estimated yield the final estimates [6]. The insufficient adjustment of the estimate away from the anchor provides the source of decision bias, which was the so called anchoring effect.

2.1 Experimental design of anchoring effect

The traditional experimental design of anchoring effect was suggested by Tversky and Kahneman [10] which involves two separate judgment tasks: a comparative judgment followed by an absolute estimate. In the comparative judgment, an anchor was provided explicitly as the standard of comparison. In the next stage, participants were asked to estimate the target value. Most of the anchoring studies were conducted following this two-staged experimental design (i.e. [4] [7] [12] [13]). For example, in Wilson et al.'s [12] study (experiment 1), half of the participants were asked to judge whether the anchor was less than, equal to, or greater than the number of countries in the United Nations (comparative judgment). Afterward these participants responded to the dependent measure: how many countries there are in the United Nations (absolute judgment).

2.2 The activation of anchoring effect

The phenomenon of anchoring effect is similar to standard priming effect, whereby attention to a stimulus (i.e. anchor) increases the activation potential of a category or value, increasing the likelihood that this value will be used when judging a subsequently encountered stimulus (e.g., [2]). In this view, the findings of [12] suggested that the amount of attention paid to the anchor is a key to induce anchoring bias.

In Wilson et al.'s experiment ([12], Study 2), each participant was assigned a unique ID number, which required different amounts of attention, as the basis of comparison. For example, in the red-blue condition, people were asked to note whether the number was written in red or blue ink; in the four-digit condition, participants were asked to check whether the number was a four-digit number; in the GT-100 condition, participants checked whether the number was greater than 100; in the GT-1920-1940 condition, participants checked whether their number was greater than either 1920 or 1940. Among the above conditions, the red-blue condition requires the lowest amount of attention and the comparison condition where participants have to check whether it was less than or greater than the target value needs to pay the most attention to it.

Wilson et al. [12] found that a greater anchoring effect will be induced when people pay more attention to the anchor value. Based on [12] and the standard priming view, we assume that increasing the more times the anchor appears, the greater the anchoring effect.

3. Method

3.1 Research Framework

In our experiment, participants were provided with either high or low anchor value as the basis of comparison. Moreover, half of the participants were assigned to the conditions in which the anchor value is presented repeatedly to increase the possibility of attention paid to the anchor by participants. The research framework is depicted in Figure 1.



Figure 1 Research Framework

3.1 Hypotheses

The following hypotheses were proposed and examined. The two hypotheses aim to examine the anchoring effect as well as the moderating effect of repeated anchor.

H₁: Participants in high anchor condition make higher estimates than those in low anchor condition.

H₂: The repeated occurrence of anchor moderates the effect of anchoring on subjects' estimation.

3.2 Experimental Design

An experimental Web site was established to examine the anchoring effect and the relationship between attention and anchoring in a fictitious virtual store. The experiment is a 2 (anchor: high/low) \times 2 (anchor reinforcement: intensified / normal) between-subjects factorial design. 169 undergraduate students were recruited as participants and then were randomly assigned into one of the following four conditions: high / intensified anchor; low / intensified anchor; high / normal anchor; low / normal anchor.

3.3 Materials

Product description, anchor manipulations and measurements were all presented on the computer screen in front of each participant. The experimental web site contains four web pages. The first page describes a virtual store selling all kinds of electronic appliances including mobile phone, PDA...etc. Before reading the target product description presented in the third page, participants were asked to make comparison of the price of a given product with the anchor value (38800 or 900). The amount of attention subjects paid to the anchor was manipulated in the third page. Finally, all the participants were asked to make price estimation using an online questionnaire presented in the fourth page.

3.4 Manipulation

The experiment involves two anchors, and the value is 38800 and 900 for high and low anchor respectively. In anchor intensified condition, the anchor values were presented repeatedly in three different locations in a single web page. In order to avoid the suspicion from participants, a random number were added or subtracted from the anchor value. The range of variation did not exceed 5%.

3.5 Measurement

The questionnaire required four different evaluations of the target product. Each subject was asked to estimate (1) the appraised value of the target product, (2) the initial offer they will provide, (3) their willingness to pay, and (4) the highest offer they would pay for the target product (the reservation price). In general, a consumer will have first to decide the appraised value of the target product according to his knowledge and other relevant and irrelevant information, including the anchor. Based on the subjective appraised value, the consumer then have to decide his initial offer. Basically, a reasonable initial offer provided by buyer should less than the willingness-to-pay and below the reservation price, which will not surpass the appraised value given by the buyer.

4. Results and Discussion

Four independent ANOVA tests with the anchor type (high/low) as independent variable and each of the four estimates included as the dependent variable in each test were performed. The analysis revealed significant main effects of the anchoring manipulation on each dependent variable, as illustrated in Table 1.

Table 1 Univariate F-Values For the Dependent Variables

| | | Initial | Willingness | Reservation | Appraised | | | | |
|----------------------------------|------|----------|-------------|-------------|-----------|--|--|--|--|
| | | offer | to pay | price | value | | | | |
| Anchor | F | 21.480 | 25.732 | 45.533 | 25.065 | | | | |
| | Sig. | 0.000*** | 0.000*** | 0.000*** | 0.000*** | | | | |
| * n<0.05. ** n<0.01. *** n<0.001 | | | | | | | | | |

* p<0.05; ** p<0.01; *** p<0.001

The means of initial offer, willingness to pay, appraised value and reservation price in high and low condition is depicted in Figure 2. As expected, a high anchor value led to higher estimates than did a low anchor value on each of the four price estimates. This result supports H₁. Moreover, the initial offer is the lowest value, followed by willingness to pay, reservation price and appraised value. This pattern conforms to the above-mentioned anticipation.



Figure 2 Means of the four measured estimates

While the significant anchoring effect is observed, a further examination of the moderator role of anchor reinforcement effect is needed. We compare the estimates made by participants in high and low anchor condition when the anchor was repeated three times or only once. The result indicated that people in high anchor condition made higher estimates than those in low anchor condition no matter how many times (one or three) the anchor to be appeared (as shown in Table 2).

 Table 2 Means of Four Estimates in Anchor Intensified and Normal Condition

| Anchor reinforce- ment | Anchor | Initial offer | Willingness-to- pay | Reservation price | Appraised value | | | |
|------------------------------|--------|------------------|------------------------|-------------------|-----------------|--|--|--|
| Intensified | High | 16488.13 | 19668.39 | 20396.05 | 21810.5 | | | |
| | Low | 10073.17 | 11778.05 | 12129.27 | 11080.32 | | | |
| Sig. | | 0.010** | 0.005** | 0.006** | 0.000*** | | | |
| Normal | High | 15582.93 | 17923.17 | 18837.8 | 19590.24 | | | |
| | Low | 8708.14 | 9787.13 | 10372.43 | 11263.22 | | | |
| Sig. | | 0.000*** | 0.000*** | 0.000*** | 0.000*** | | | |
| * 0.05 ** 0.01 *** 0.001 | | | | | | | | |

* p<0.05; ** p<0.01; *** p<0.001

Therefore, the reinforcement of anchor did not moderate the effect of anchor, H₂ is not supported. The findings of significant anchoring effect in both intensified and normal anchor conditions are consistent with past researches. As stated by Chapman and Johnson [1], the initial comparison task assures that subjects attend to the anchor and compare it with the target. Further, Wilson et al. [12] also asserted that people in the comparison condition had to pay the most attention to the anchor value because they have to check whether it was less than or greater than the target value. Therefore, when the anchor value is constructed in the participants' short-term memory through the comparison process, the estimates will be biased toward the anchor and thus resulted in anchoring effect. The result of our study suggests that anchoring effect is a robust phenomenon in electronic commerce context.

5. Conclusion

Previous experiments had demonstrated that anchoring effect is robust across many situations. The result of our experiment has empirically shown that anchoring effect can be induced under electronic commerce context. The result also indicates that the occurrence of anchoring effect does not depend on the reinforcement of anchor value. This might suggests that the procedure of anchor comparison assures people attend to the anchor and no reinforcement mechanism is needed for the occurrence of anchoring effect.

It has been proved that anchoring effect is robust in many situations. Findings of current study replicate past researches and suggest that anchor can induce bias in electronic commerce context. Moreover, he procedures and experimental designs in this study can be either replicated or modified with a different sample to gather further evidence for the results discovered. Further, it can benefit practitioners in improving the design of e-commerce interfaces in real world applications.

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