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Full Length Research Paper

Internet users' decision bias: Order effect in e-commerce

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Most internet users were exposed to a large amount of information pieces when they were surfing the Internet. It is interesting to understand whether the same series of information presented in different order result in different judgments? Thus, the objective of this study is to examine the influence of information presentation order on the Internet users' decision making (an order effect). Further, some of the decision makers form their decisions immediately after they find any pieces of information (a Step-by-Step procedure), while for some Internet users the judgment was made once all the information has been collected (an End-of-Sequence procedure). It is expected that the Internet users' response mode would moderate the order effect and thus was also examined in current study. Two experiments were conducted in which different amount of information pieces were included. There are two pieces of information in experiment 1 and four information pieces were included in experiment 2. The result indicated significant order effects from both experiments. In addition, participants who were asked to follow a Step-by-Step procedure revealed recency effect while End-of-Sequence procedure produced no order effect. Finally, response mode has significant influence on the participants' attitude when the amount of information pieces increased. The results from current study can provide practical implications regarding how to design the information presentation sequence to create more favorable consumer responses.

Key words: Internet, order effect, information presentation, response mode.

INTRODUCTION

The information is in flood after the second industrial revolution, and the ability to handle and process information for judgmental purposes is increasingly important. However, human lack both the knowledge and computational skills necessary to make decisions in a manner compatible with economic notions of rational behavior (Simon, 1957). In fact, it has been shown that judgments and decisions can be influenced by the way information is presented or framed (Tversky and Kahneman, 1981). The phenomenon that the frame significantly affects how we infer meaning and hence understand the situation is the framing effect. For example, in Levin and Gaeth's (1988) study, the ground beef was framed as either "75% lean" or "25% fat" and was presented to two groups of subjects. The results indicated that the participants' evaluations were more favorable when the beef was described in percent-lean (positive term) than was described in percent-fat (negative term).

It is increasingly important to understand the influence of information presentation on human decisions especially in online retailing environment because in which business is conducted at a distance and customers have to rely heavily on product information provided by the Web sites. While most message framing research employed a single-message methodology (Levin and Gaeth, 1988; Haugtvedt and Wegener, 1994; Levin, Schneider, and Gaeth, 1998; Levin, Gaeth, Schreiber and Lauriola, 2002), it is a more common situation that Internet users are exposed to several messages describing the same event or object. Thus, the single-message method cannot address questions about situations that reflect real consumer situations: there is more than one piece of

information was provided.

When there are more than one piece of information presented, the situation is more complex than that involved in only one piece of information. First, the presentation order of multiple information pieces might influence the effect of message on Internet users' judgment. This question is derived because it is possible that a series of information would not be present in the same order to different decision makers. Thus, the first purpose of this research is to investigate the influence of infor-mation presentation order on the Internet users' decision making. That is, will the same information presented in different order result in different judgment?

Second, some of the decision makers form their decisions immediately after they find any pieces of information, while for some decision makers the judgment was made once all the information has been collected. The different ways to respond to information can be referred to as response mode (Hogarth and Einhorn, 1992), which is often discussed in two forms: Step-by-Step (SbS) and End-of-Sequence (EoS). The effect of information presentation order might be different among participants who apply different response modes. It is thus the second goal of current research to examine that whether the decision makers' decision be different when they response in different modes.

Finally, the amount of information presented in the web site should also be considered when we aim to examine the effect of information presentation order and response mode on Internet users' decision making. Thus, two laboratory experiments were conducted. In the first experiment, two pieces of information were presented in different order and the participants' responses were collected to examine the order effect. It is expected that different presentation order of the same information pieces will result in different responses, and thus order effect occurred. In addition, the respondents' response mode was manipulated to test its influence on judgment. The goal of the second experiment is to examine the order effect and the role of response mode when the amount of information increases. Thus, the second experiment replicates the first one except that the information pieces increase to four.

ORDER EFFECT AND RESPONSE MODE

According to Hogarth and Einhorn (1992), the order effect occurred when people see the information in the order A-B express different opinion with people see the infor-mation in B-A order. There are two types of order effects have been identified: primacy effect and recency effect. A primacy effect occurred if people's final judgment is more consistent with the first message. On the other hand, a recency effect is observed if the final judgment is more consistent with the final message in a series of evidence.

There two different ways to respond to information: Step-by-Step (SbS) and End-of-Sequence (EoS). Subjects in former response mode express their beliefs after receiving each piece of evidence in a given sequence, whereas in later response mode subjects only report their opinions once all the information has been presented. According to the belief adjustment model (Hogarth and Einhorn, 1992), recent information is weighted more than prior information and thus results in recency effect when the respondents were to respond in SbS procedure. In contrast, primacy effect will occur when the information was presented all at once and then respondents provide their final judgment because people will anchor on the message presented first and adjust it based on the subsequent information.

MATERIALS AND METHODS

Experiment 1

Participants

Participants were recruited from a large pool of under-graduate students in Taiwan in partial fulfillment of a class requirement and each participant received a NT $100 (about USD $3) McDonald coupon for their participation. A total of one hundred and fifty students were recruited.

Experimental design

The experiment is a 2 (presentation order: +-/-+) × 2 (response mode: SbS/EoS) between-subjects factorial design. The respondents were randomly assigned to one of the four conditions. All the participants were asked to answer questions measuring their attitude toward the target product (a hotel) and their intention to stay at the hotel after they were exposed to the manipulated framing messages.

Tasks, materials and procedures

An experimental web site was built up and the experimental stimuli were displayed through Web pages. Participants were told that in the forthcoming summer vacation, they are planning a journey to Hualien, a famous tourist attraction in Taiwan. As an important part of the plan, the participants have to evaluate a synthesis hotel based on the information provided on the experimental web site.

In the first page, a basic description of Hualien and the target hotel to be evaluated was provided as follows: "Hualien, located in the east of Taiwan, is facing the immense Pacific Ocean in the east and leaning against the grand Central Mountain Range in the west and is famous for its beautiful scenery. The natural resources in Taroko National Park, East Coast National Scenic Area, East Rift Valley Scenic Area and Yushan National Park make Hualien the most beautiful county in Taiwan. Hualien County is approximately 4628 sq. km and has a population of about 350,000. Four hundred years ago, the Portuguese sailors went past the East Coast of Taiwan, fascinated by its beauty, and called it "FORMOSA." It was called"chi-lai" in the ancient period. Owing to the Hualien River empties into the Pacific Ocean on the East Coast, where the surge and wave is turbulent, it is also called "huei-lan," similar sound with Hualien[1]." In the same page, the participants were told that they are

[1] This description of Hualien is adopted and modified from the tourist information provided in the Hualien Official Tourist Website: http://tour-

going to evaluate a hotel located in Hualien based on the reviews by a popular travel website and the reviews will be shown in the following pages.

After reading the instructions in the first page, the participants proceed to read the reviews, which include both positive and negative information. Half of the participants read one piece of information and provide response regarding their attitude and intention to stay at the hotel in their journey; after which they read the second piece of information and provide the second response. Another half of the participants read two pieces of information and then provide answer in the same page. The participants received the McDonald coupon after they finished the task.

Pilot test

A small scale pilot test was conducted with the aim to determine the attributes describing the hotel. Forty Internet users were interviewed to indicate important criteria when they evaluate a hotel. Finally, ten important attributes were derived and the top two attributes were used to describe the target hotel in experiment 1.

Manipulation

Two pieces of information derived from the pilot test, one in positive and one in negative terms, were presented to the participants in different order. The information describes the evaluation on the hotel provided by a popular travel website "travelcity.com" (a fictitious name). The positive information states that the price is 1/3 lower than other nearby hotels in the same level. The negative information address the limitation of room size and some of the travelers have constriction to stay in the room.

The presentation order was manipulated as (1) positive-negative (2) negative-positive. The response mode was manipulated in the way that half of the respon-dents were asked to provide answer immediately after each piece of information was given (the SbS procedure), while another half of the participants submit their final response after all of the information were provided. To be more specific, the four conditions were illustrated as follows:

1. Group 1: Positive message→R1→negative message→R2
2. Group 2: Positive message → negative message →R1
3. Group 3: Negative message→R1→positive message→R2
4. Group 4: Negative message → positive message →R1

Measurement

Participants were asked to rate their attitudes toward the hotel and their intention to stay there in the forthcoming journey. First, attitude was measured by three items on a 7-point semantic differential scale. The items included three pairs of adjectives: bad/good, unattractive/attrac-tive, and unlikable/likable. Further, subjects were asked to rate their intention to stay at the hotel on a 7-point Likert scale in terms of the following three questions: (1) I intent to stay at the hotel in the forthcoming journey; (2) I would suggest my friends to stay at this hotel if I know they were to travel Hualien; (3) I would stay at the hotel if I planned to travel in Hualien in future. For later analysis, ratings of the three items in attitude and intention to buy were averaged into a single item respectively.

Experiment 2

Separate samples of one hundred and seventy-nine undergraduate students were recruited as participants and each participant received a NT $100 (about USD $3) McDonald coupon for their participation. The experimental design, procedure and measurement in experiment 2 were identical to that of experiment 1 except that two more information pieces were provided to the participants.

The four pieces of information in experiment 2, were also derived from the above-mentioned pilot test, included information regarding the price, the room size, the attitudes of the service personnel, and the location of the hotel. Of the four information pieces, the price and attitudes of the service personnel are described in positive terms and the room size and the location are in negative terms. All the participants were exposed to four information pieces, but in different presentation orders and response modes.

Half of the participants were exposed to positive-positive-negative-negative information order, and the other half of the participants read the information in negative-negative-positive-positive order. The manipula-tion of response mode was similar to that in experiment 1 that half of the respondents were asked to provide answer right after each piece of information was given (the SbS procedure), while another half of the participants submit their final response after all of the information were provided.

RESULT AND DISCUSSION

Results: Experiment 1

Order effect

Two independent 2 (presentation order: +-/-+) × 2 (response mode: SbS/EoS) Analysis of variance (ANOVA) tests were performed, with the participants' final attitude and behavioral intention scores as dependent variables respectively. The analysis revealed significant main effects for information presentation order and two-way significant interaction effect for presentation order by response mode on both dependent variables, as illustrated in Table 1.

The significant main effect of presentation order reported in Table 1 enabled us to further examine the means, standard deviations for attitude and behavioral intention in positive-negative and negative-positive order conditions and the results were presented in Table 2. As indicated, the same information pieces presented in different order lead to different judgments. Thus, the order effect was observed. To be more specific, participants' responses are more consistent with the second information piece and messages presented in negative-positive order were evaluated significantly more favorable than messages presented in positive-negative order. This result indicated a recency effect.

Response mode

The ANOVA results in Table 1 showed a significant interactive effect for presentation order by response mode, suggesting that the order of information presen-tation may interact with the participants' response mode. We therefore conducted follow-up analyses within each

hualien.hl.gov.tw/en/index.jsp

Table 1. Two-way ANOVA tests result in Experiment 1.

Source	Dependent Variable	df	MS	F
Presentation order (A)	Attitude	1	16.813	14.550***
	Behavioral Intention	1	7.022	10.974***
Response mode (B)	Attitude	1	0.0786	0.068
	Behavioral Intention	1	0.299	0.467
A by B	Attitude	1	24.855	21.509***
	Behavioral Intention	1	17.651	27.588***

*** p<0.001.

Table 2. Means, standard deviation and F values for attitude and intention in different presentation order conditions (Experiment 1).

Presentation order	Attitude	Behavioral intention
	Mean (SD)	Mean (SD)
Positive-Negative	3.46 (1.24)	3.71 (0.88)
Negative-Positive	4.30 (1.03)	4.27 (0.85)
df	1	1
MS	26.365	11.822
F	20.143***	15.724***

*** p<0.001

Table 3. Means, standard deviation and F values for attitude and intention in different response mode conditions (Experiment 1).

Response mode	Presentation order	Attitude Mean (SD)	Behavioral intention Mean (SD)
SbS	Positive-Negative	3.13 (1.20)	3.49 (0.80)
	Negative-Positive	4.65 (0.83)	4.63 (0.57)
	F	45.640***	56.896***
EoS	Positive-Negative	4.01 (1.13)	4.09 (0.90)
	Negative-Positive	3.86 (1.09)	3.84 (0.93)
	F	0.269	1.212

*** p<0.001.

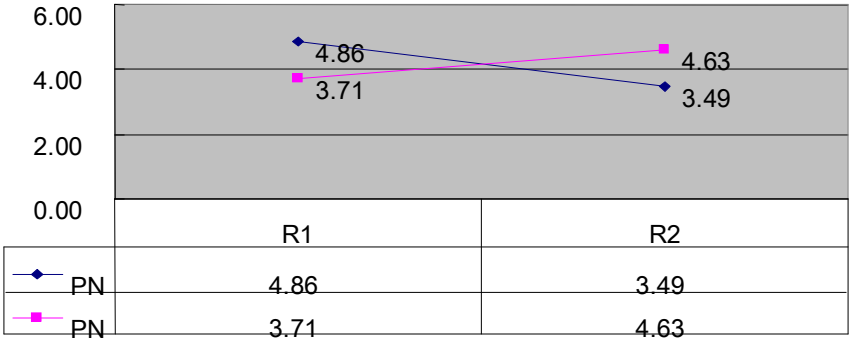
level of response mode to further examine the order effect. Table 3 reported the univariate F-values, means and standard deviations for each of the conditions in the study.

Table 3 indicated a significant order effect when the participants were asked to response in Step-by-Step procedure, while no order effect was observed when the participants were instructed to provide the responses once after two pieces of information were presented (End-of-Sequence procedure). In order to illustrate the variation of participants' responses in Step-by-Step procedure, data collected from two response stages in positive-negative and negative-positive order was depicted in Figure 1 for the average attitude and intention to stay at the hotel.

Figure 1 revealed recency effect as the responses in stage 2 are more consistent with the final message in two pieces of message. Specifically, participants in positive-negative group produced lower evaluation scores toward the target hotel because the final message provided negative information. In contrast, the participants who received the information in negative-positive order revealed higher evaluation score because the final message delivers positive information.

Results from experiment 1 provided empirical support for a significant order effect in Internet users' decision making. In addition, the moderating role of participants' response mode was also indicated. In order to examine

(a) Average attitude



(b) Average intention

Figure 1. Average attitude (a) and intention (b) in SbS procedure (Experiment 1).

the whether the increase of information affect the occurrence of order effect and the moderating role of response mode, second experiment was conduct in which the amount of information pieces increase to four.

Results: Experiment 2

Order effect

Two independent 2 (presentation order: +-/-+) × 2 (response mode: SbS/EoS) Analysis of variance (ANOVA) tests were performed. Significant main effects for information presentation order were observed on both attitude and behavioral intention responses (see Table 4). The ANOVA results also showed significant main effect of response mode and significant interaction effect for presentation order by response mode on attitude. Again, the significant effect of presentation order was further examined and the results were presented in Table 5. The result is similar to that observed in experiment 1 that a recency effect was indicated.

Response mode

The significant main effect for response mode in Table 4 indicated that when the participants were exposed to larger information amount, the way they provide responses will result in different attitudes. Thus, the main effect of response mode was examined and details were shown in Table 6. Results in Table 6 showed a significant difference on attitude between participants in SbS and Eos conditions. Attitude scores obtained after each piece of information is presented (SbS) are lower than that obtained after all the information is presented. This result suggested that an object will be more favorable when all the information pieces were evaluated in an aggregate level, disregarding the presentation order.

As the ANOVA results in Table 4 indicated a significant interaction effect for presentation order by response mode on attitude, follow-up analyses were conducted in within each level of response mode to further examine the order effect. Table 7 reported the univariate F-values, means and standard deviations for each of the conditions in the study.

Table 4. Two-way ANOVA tests result in Experiment 2.

Source	Dependent variable	df	MS	F
Presentation order (A)	Attitude	1	8.007	7.826**
	Behavioral Intention	1	7.714	13.378***
Response mode (B)	Attitude	1	5.058	4.943*
	Behavioral Intention	1	0.970	1.683
A by B	Attitude	1	7.153	6.991**
	Behavioral Intention	1	0.908	1.575

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

Table 5. Means, standard deviation and F values for attitude and intention in different presentation order conditions (Experiment 2).

Presentation order	Attitude	Behavioral Intention
	Mean (SD)	Mean (SD)
Positive-Negative	4.475 (0.105)	4.310 (0.079)
Negative-Positive	4.900 (0.109)	4.727 (0.082)
df	1	1
MS	8.007	7.714
F	7.826**	13.378***

*** p<0.001.

Table 6. Means, standard deviation and F values for attitude in different response mode conditions (Experiment 2).

Response mode	Attitude
	Mean (SD)
SbS	4.48 (1.02)
EoS	4.96 (1.07)
df	1
MS	6.319
F	5.778*

*p<0.05

Table 7. Means, standard deviation and F values for attitude and intention in different response mode conditions (Experiment 2).

Response mode	Presentation order	Attitude
		Mean (SD)
SbS	Positive-Negative	4.11(0.84)
	Negative-Positive	4.93 (1.04)
	F	16.475***
EoS	Positive-Negative	4.84 (1.06)
	Negative-Positive	4.87 (1.09)
	F	0.011

*** p<0.001

Figure 2. Average attitude in SbS procedure (Experiment 2).

A similar result to that in experiment 1 was observed in Table 7. Order effect occurred in Step-by-Step response mode, but not in End-of-Sequence mode. In SbS condition, participants in positive-negative group produced lower attitude scores than participants in negative-positive condition and thus a recency effect was suggested. Participants' responses in terms of attitude toward the hotel collected from four response stages of positive-negative and negative-positive order was depicted in Figure 2.

Figure 2 revealed similar recency effect observed in experiment 1. The target hotel is evaluated as less favorable by participants in positive-negative group, where as the same hotel received more positive responses from participants in negative-positive order condition.

CONCLUSION AND DISCUSSION

This study tests the influence of information presentation order on Internet users' judgment. Two experimental studies were conducted. Experiment 1 included two pieces of information, and in the second experiment four information pieces were included. Participants in both experiments were exposed to the same series of information but presented in different order (either in positive-negative or negative-positive sequence). Results from experiment 1 and 2 indicated that the same series of information presented in different order significantly influence Internet users' attitude and behavioral intention toward a hotel. Thus the order effect was observed.

This paper provides contribution to message framing research in Internet user behavior context. When Internet users are surfing the web, they were exposed to multiple pieces of information and made the final judgments based on the information pieces they received. In current study we test the order effect of two and four pieces of information, and similar results were observed: the presentation of multiple information pieces lead to recency effect. That is, information that presented last has greater influence on the participants' final judgment.

This result provide suggestions for the web content organizer that positive information presented after the negative information is expected to result in more favorable responses than information presented in reverse order.

Further, the participants' response mode revealed as a moderator in order effect when there are only two information pieces. Results in experiment 1 indicated that SbS procedure induces recency effect, while EoS response mode produced no order effect. This result provides some implications for the web content providers. First, if the information was displayed in separate pages and thus the Internet users' judgment was made when information in each page was processed, negative information should be followed by positive information, as the later information have larger influence on consumers' decisions. By contrast, if all the information was provided in the same page, then the order of positive and negative information will not result in different responses.

However, findings in experiment 2, which involves four pieces of information, suggested that response mode produced no moderating effect, but main effect. Thus, the way Internet users form their evaluation will have significant influence on their final judgment. People who process all the information at the same time form more favorable evaluations than people who made decisions when each piece of information is presented in different web pages. Implication derived from this result is that, for web site designers, when there are more information pieces, the organization of several information pieces in

the same web page will result in more favorable responses than present the information in each web page. One of the possible reason might be that when all the information were presented in the same web page, the negative messages will be counterbalanced by the positive messages and thus the responses formed by the consumers will not be extremely negative.

There are a few limitations to this study that should be noted. First, only the consumers' response mode was considered as the moderator. Future research is encouraged to help expand the findings in current study by incorporating other factors that may moderate the order effect. For example, the role of individual cognitive differences (i.e., need for cognition) among consumers may be the next step in the process. Second, although two experiments were used to examine the order effect under different information amount, the occurrence of order effect when participants were exposed to more information pieces are worth to be examined. Thus, will the amount of information pieces influence the order effect is an interesting future research direction.

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