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The Cognitive Fit Between the Representation Format of Online Consumer Reviews and the Level of Consumer Involvement

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Abstract

The online consumer review, which is a positive or negative statement created by consumers, is an independent product information resource with growing popularity and importance. To maximize the effect of online consumer reviews, this study proposes two different review formats (list review format vs. matrix review format), and examines which representation format is efficient depending on consumer characteristics (involvement) from the perspective of information processing using the elaboration likelihood model and cognitive fit theory. In addition, this study shows that the effect of the cognitive fit between review format and consumer involvement is moderated by the number of reviews. The findings of this study help us understand the effects of online consumer reviews from the information-processing perspective, and have implications for practitioners on how to manage and deliver online consumer reviews.

Keywords: electronic word of mouth, online consumer review, cognitive fit theory, elaboration likelihood model, representation format, matrix, list, involvement

1. INTRODUCTION

Since the development of the World Wide Web on the Internet, an increasing number of companies have been trying to carry out electronic commerce. Through electronic commerce, a close customer relationship can be formed, and much of the operating overhead including time and money can be saved. In addition, people can perform business transactions anytime anywhere. Recently, the World Wide Web has been used as a new marketing channel to show recommendations from previous consumers. The online consumer review, one type of electronic word-of-mouth (eWOM), involves positive or negative statements made by consumers about a product for sale in Internet shopping malls. It is an independent product information resource with growing popularity and importance (Chevalier and Mayzlin 2006). There is recent evidence that consumer reviews have become important for product sales (Chevalier and Mayzlin 2006; Harmon 2004).

An online consumer review plays two roles – an informant and a recommender (Park et al. 2007). As an *informant*, online consumer reviews deliver additional user-oriented information. They include experiences, evaluations and opinions on products by former purchasers. As a *recommender*, they provide either a positive or negative signal of product popularity. If reviewers have an overall positive evaluation of a product, more reviews are likely to encourage consumers to infer that the product is popular.

It has been easily observed that some products have too many reviews to completely read in online shopping malls. For example, Chevalier and Mayzlin's study (2006) reported that the average number of reviews per book on Amazon.com in the May 2004 was about 68.31 and its standard deviation was 205.42. From the perspective of online consumer reviews as recommenders, a greater number of positive reviews seem better for a product. However, from the perspective of online consumer reviews as information providers, consumers may be confronted with too much review information, which results in unexpected negative outcomes such as information overload. Fortunately, for the same amount of information, consumers can perceive the quantity differently such as much, moderate or

little information depending on information organization. In one case that much information is well organized to fit with consumers' characteristics or information process strategies, consumers can feel the quantity moderate. Whereas, consumers can perceive the quantity as large if moderate information does not fit with consumers' characteristics or information process strategies. This study investigates how the effects of online consumer reviews can be maximized through review organization (i.e. review representation format) from the information processing perspective.

The representation format influences consumer information processing (Hong et al. 2004; Vessey and Galletta 1991). Online shopping malls have different review representation formats, and there are no studies in our knowledge that investigate which formats are efficient for potential consumers. In addition, there is generally no standard information format for a consumer to post a review in online shopping malls. They just show the opinions of former purchasers with their own formats and the general product evaluation score with star-ratings. Therefore, this study examines which representation format is effective depending on consumer characteristics, specifically the level of consumer involvement, from the perspective of information processing using the elaboration likelihood model (ELM) and cognitive fit theory.

On e-commerce Web sites, there are two popular formats to organize multiple product information on a web page: the list format vs. the matrix format (Hong et al. 2004). Although other formats are used to present product information, these are derived or mixed from the two formats. Online consumer reviews also can be presented with these two popular formats. That is, the list review format is to show the opinion of a former purchaser without a division by attributes. On the other hand, the matrix review format is to divide previous consumer opinions into several parts by attributes. Amazon.com uses the list review format while Shopping.com uses a format similar to the matrix review format with separate sections by pros and cons.

For the same contents, what differences exist between the list format and the matrix format from the perspective of information processing? The list format is useful for observing the general evaluation of a product, whereas it is hard to find the specific evaluations and messages by attributes. On the other hand, the matrix format is useful to find the specific evaluations and messages by attributes while it is difficult to find the general evaluation of the product because it needs further information-processing to average the separate evaluations to a general evaluation. Finally, it is different, depending on formats, what consumers can easily obtain and what they obtain through additional information processing.

The information-processing strategy is different depending on the level of consumer involvement (Petty and Cacioppo 1984). According to ELM, high involvement consumers tend to engage in thoughtful and effortful processing of review contents. They need specific information and want to evaluate the product themselves by compensatory attribute processing. They are likely to evaluate differences between reviews on each attribute and then combine them into an overall preference. This process requires them to exert a significant amount of effort in investigating each review by attributes and combining all evaluations. On the other hand, low involvement consumers using heuristic processing tend to accept the product-related cues or general evaluations from reviews. It is because they are not motivated to process information deeply.

The relationship between the level of involvement and review representation format influences the effect of online consumer reviews on product attitude, which can be explained by the cognitive fit theory (Vessey and Galletta 1991). The cognitive fit theory is a framework for understanding the relationship between performance, information presentation and problem-solving task. The theory posits relationships among different problem-solving elements and models these relationships to predict their effects on problem-solving performance. The purposes of this study are to find which information processing strategy fits with a review format, how it fits, and what the consequences of the fit are. Our study focuses on overall positive online consumer reviews to investigate the pure effects of cognitive fit because negative reviews can induce other compounding effects (hereafter, online consumer reviews mean positive online consumer reviews). We suggest several hypotheses and

conduct an experiment to address these questions in the context of overall positive online consumer reviews.

2. THEORETICAL BACKGROUND & HYPOTHESES

List Formats vs. Matrix Formats of Online consumer reviews

The information format is defined as the presentation and organization of information about the available alternatives and their attributes. Hong et al. (2004) reported that there are two popular formats to organize multiple product information on a web page. The first format is the list format for displaying only one product in each row. The second format is the matrix format for displaying more than one product in each row. These formats are divided according to product assortments.

This study adopts two formats for review messages. One is the review list format which presents review messages without any separation. This format is useful to deliver opinions from previous consumers directly. This format is used in popular e-commerce websites like Amazon.com or eBay.com. It is easy for consumers to understand the general evaluation of a product through this format. The other is the matrix format in which each row is by one reviewer and each column is categorized information of each review by attribute or 'pros and cons.' This format is useful for potential consumers to find specific information, and it allows consumers to evaluate the product themselves by averaging others' opinions. This format is not popular in online shopping malls (Shopping.com uses this matrix format: reviewer by 'pros vs. cons'), but it is not difficult to implement the matrix format review by requiring reviewers to write reviews by attribute. For example, online sellers can give the review format that has an itemized list by attribute when consumers want to post a review. After they evaluate the product by attribute, these itemized lists are presented in a matrix (reviewer × his/her attribute evaluation) on the webpage.

Consumer Involvement and the Elaboration Likelihood Model

Involvement is defined as the perceived personal relevance of a product based on the consumer's needs, interests, and values (Krugman 1966). According to ELM, high involvement consumers are more likely to engage in thoughtful and effortful processing of persuasive arguments and attend to the persuasive arguments, and then generate their own thoughts in relation to the arguments (Petty and Cacioppo 1986). However, low involvement consumers lacking motivation are more likely to process the information via the peripheral routes, which are mental shortcuts, by focusing on cues for a general idea not on the specific information. ELM researchers have found that, under high-involvement conditions, issue-relevant arguments and product-relevant attributes were more influential, while peripheral cues were more influential under low involvement conditions (Petty et al. 1983). Low-involvement consumers may only catch the general evaluations through skimming and scanning. Under high involvement conditions, consumers usually have a tendency to process all available information. As a result, they tend to use attribute centric information-processing focusing on specific information and generating their own thoughts in relation to the review messages.

Cognitive Fit Theory and an efficient review format depending on involvement

The cognitive fit theory is a framework for understanding the relationship between performance, information presentation and the problem-solving task. The theory posits relationships among different problem-solving elements and models these relationships to predict their effects on problem-solving performance. Problem-solving elements are factors influencing mechanisms of problem-solving processes (Vessey and Galletta 1991). For example, how information is presented to users can influence their processing of information.

Vessey (1991) argued that the performance of a decision-making task will be enhanced when there is a cognitive fit or match between the information emphasized in the presentation type and the information required by the task type. This occurs when spatial tasks are supported with spatial problem presentations (graphs), and when symbolic tasks are supported with symbolic presentations (tables). Although problem-solvers can process information in any way they choose, they tend to do so in ways consistent with the presentation of the information. Spruijt and Jansen (1999) have compared reading comprehension of relatively independent chunks of factual information in linear or hypertext formats. They found that the hypertext format supported faster reading and was conducive to performing a specific, information-gathering task. The linear format seemed to better support a more open-ended information-gathering task - writing a summary - in which more massive quantities of information are desired. Subjects reading in the linear format who were also told the purpose before they read the text developed the most complete summaries.

The cognitive fit theory has been extended to include other problem-solving elements that affect problem solutions. These include tools or decision aids (Vessey 1994), problem-solving skills (Vessey and Galletta 1991), performance requirements (Vessey 1994), information load (Umanath and Vessey 1994), individual differences (Smelcer and Carmel 1997; Strong 1999), and experiences and localization (Dunn and Grabski 2001). MIS studies examine the design of information systems, including user interfaces. Due to mixed results in studies of cognitive fit, many authors have suggested including other factors such as individual cognitive style (Smelcer and Carmel 1997), and prior knowledge (Strong 1999). There is no study, in our knowledge, to consider consumer involvement as a problem-solving element in the literature on cognitive fit theory though consumers have different information processing strategies depending on the level of involvement.

We suggest two review formats: the matrix review format and the list review format. The list format has an advantage in that it is easy to find the general evaluations from previous consumers, but a disadvantage in that it is difficult to find specific information and evaluations by attribute. On the other hand, the matrix format has an advantage in that it is easy to find specific information and evaluations by attribute, but a disadvantage in that further information-processing of averaging attribute centric evaluations is required in order to understand the general evaluations.

This study proposes that low-involvement consumers fit with the list review format because they have little motivation to process all available information and want to catch the main point of each review easily. According to the cognitive fit theory, information processing strategies of low involvement consumers that match the list format minimize cognitive effort because, if reviews are presented in the matrix format, using a different process requires them to expend more effort to transform the reviews presented with the matrix format into the list format. When they process the matrix format, they may feel more confused and experience an even greater information load. On the contrary, we propose that cognitive fit occurs when consumers under high involvement face the matrix format. They want to process all available information, so that the review information categorized by attribute helps them understand detailed information with fewer cognitive resources. That is, their effort will be minimized if they use a cognitive processing strategy that decomposes the whole matrix into separate properties. If they are given the review presented in the list format, they need different additional resources to divide the reviews by attributes in their mind. These hypotheses are explained by the results of Hong et al. (2004). They developed a research model to investigate the effects of the information format and the shopping task on both performance outcomes and perceptions of the shopping experience. A laboratory experiment was conducted to examine the effects of both information formats (list versus matrix) in the context of two types of shopping tasks (searching versus browsing). The list format better supports browsing tasks which low-involvement consumers usually do in online shopping malls, while the matrix format facilitates searching tasks which high-involvement consumers usually do in online shopping malls (Hong et al. 2004).

This study deals with overall positive online consumer reviews. As consumers process positive review information more through the cognitive fit, they may have a greater the number of favorable

associations to its advocacy (Petty and Cacioppo 1984). This leads to a more favorable attitude toward the product. We propose following hypotheses.

Hypothesis 1: *High-involvement consumers are likely to take less time/effort/energy with matrix format reviews than with list format reviews.*

Hypothesis 2: *Low-involvement consumers are likely to take less time/effort/energy with list format reviews than with matrix format reviews.*

Hypothesis 3: *The product attitude of high-involvement consumers is more favorable with matrix format reviews than with list format reviews.*

Hypothesis 4: *The product attitude of low-involvement consumers is more favorable with list format reviews than with matrix format reviews.*

High involvement consumers have a propensity to stick to an original, basically satisfied or dissatisfied position (Gordon et al. 1998). Oliva, Oliver, and Bearden (1995) showed that high involvement consumers are stickier in their preferences than low involvement consumers. It is possible that the preference difference between matrix format and list format is greater for high involvement consumers than low involvement consumers. Thus, whether consumers cognitively fit with the format or not is likely to be more important for high involvement consumers than for low involvement consumers.

This study deals with overall positive online consumer reviews. As consumers process positive review information more through the cognitive fit, they may have a greater the number of favorable associations to its advocacy. This leads to a more favorable attitude toward the product. We propose following hypothesis.

Hypothesis 5: *The effect of cognitive fit on product attitude is greater for high-involvement consumers than low-involvement consumers.*

The number of positive online consumer reviews increases consumer product attitude (Park et al. forthcoming). The number of reviews represents the product popularity through the online word-of-mouth effect because it is related to the sales volume of the product (Chatterjee 2001). The more reviews there are, the more popular and important the product is. Also, the number of reviews is likely to lead consumers to rationalize their purchasing decision by telling themselves, "Many other people also bought the product" in conformity with previous consumers. Reference to word-of-mouth (other people's comments) is a risk reduction strategy which can do much to eliminate the uncomfortable feeling of risk exposure (Buttle 1998).

The cognitive fit between the review format and the consumer's information processing strategy helps consumers to process review information easily. As the number of reviews increases, consumers experience a greater information load. At this time, if review formats fit with their information processing strategies, consumers can process messages more easily and have the greater number of favorable associations from positive reviews. Finally, it is predicted that the effect of the number of positive reviews on product attitude is stronger when there is cognitive fit between the review format and consumer information processing strategy. Thus, we propose the following hypotheses.

Hypothesis 6: *For high involvement consumers, the effect of the number of reviews on product attitude is greater with matrix format reviews than with list format reviews.*

Hypothesis 7: *For low involvement consumers, the effect of the number of reviews on product attitude is greater with list format reviews than with matrix format reviews*

3. RESEARCH DESIGN AND METHOD

Subjects, design and the experiment product

To test these hypotheses, a $2 \times 2 \times 2$ between-subjects design was employed. Three hundred and fifty-two participants were recruited in the current experiment in exchange for a $5 stationery gift. Their mean average age was 29.5 years and 182 were males.

Eight positive reviews were created on the basis of actual consumer reviews on a target product posted at well-known online shopping malls. Only positive online consumer reviews were considered in our experiments as the presence of negative reviews could generate unnecessary confounds such as negativity bias. Included in each positive review were a review title, a poster's name, and review contents. The contents of each review consisted of three different arguments in favor of a target product. The length of each review was controlled at three lines as it could affect the quantity of information provided.

The PMP (Portable Multimedia Player) was chosen for our target product. PMP is a portable next generation multimedia player that plays digital music and video files. Three reasons guided our choice of the target product. First, electronic products are frequently purchased in online shopping malls. Second, consumers tend to rely on the comments from previous users due to the fact that electronic products have complicated user manuals. Third, PMP is a brand-new product as well as an unfamiliar one for general consumers. Thus, consumers processed the suggested information with few stereotypes about the brand and its brand category.

The review format was manipulated by providing participants with either the matrix or list format. We prepared reviews in the list format from real online shopping malls. To make the reviews using the matrix format, we divided each review by attribute. Four attributes information were extracted from each review. Each row was by the individual reviewer and each column was the categorized information of each review by attribute. The number of online consumer reviews was manipulated by providing participants with either three or eight positive online consumer reviews. The situational involvement was employed for involvement manipulation by embedding role playing in the introductory page (Maheswaran and Sternthal 1990; Meyers-Levy and Peracchio 1995). Involvement was dichotomized into high and low levels. The two involvement situations differed in the amount of goal directedness. The high-involvement respondents were asked to imagine a scenario where they should buy a PMP product for their business since they worked in the multimedia industry. These instructions created a high level of goal directedness, with respondents focusing their attention on PMP-related issues. In addition, subjects were told "You were specially selected for this study. Your answers will be treated as being important. We will have an interview in the second experimental session and offer free gifts after the session." (Maheswaran and Sternthal 1990) However, the role-playing instructions in the low-involvement situation completely lacked goal directedness. Low-involvement subjects were simply asked to imagine that they were browsing a website for fun and were also told that this experiment was going on in every university and individual answers were one part of the results (Maheswaran and Sternthal 1990; Meyers-Levy and Peracchio 1995). Through this manipulation, the high-involvement subjects read and processed the product information more carefully while the low-involvement subjects did not.

Experimental Procedure and Measure

At the beginning, participants were manipulated to imagine the different scenarios in terms of involvement. They were randomly assigned to either the low involvement scenario or the high involvement scenario. Next, participants were presented with product information about the PMP in a web page that resembled the look of a well-known internet shopping mall. The product information included a brand name, an image, five product benefits, and twelve technical specifications, followed

by either three or eight online consumer reviews from consumers who had purchased the target product. These reviews were framed in either the matrix format or the list format. After exposure to the PMP information, participants were asked to evaluate the target product on five 7-point bipolar items (e.g., dislike-like, bad-good, unfavorable-favorable, low-high quality, useless-useful). These items represented a single reliable factor for product attitude ($\alpha = 0.97$), and therefore were averaged to form a product attitude score where higher numbers indicated more favorable evaluations. Participants then completed three items for cognitive fit ($\alpha = 0.95$) between consumer involvement and review format (e.g., "To read reviews takes a lot of time," "To read reviews takes a lot of efforts," "To read reviews takes a lot of energies"). The cognitive fit test was followed by some additional questions including two that served as manipulation checks (Park et al., forthcoming) for the perceived quantity of the online consumer reviews (e.g., "There are lots of online consumer reviews," "The amount of review information is large"), and four that served as manipulation checks for consumer involvement from "self-reported cognitive effort" measurements of existing ELM research (Petty and Cacioppo 1983) (e.g., "I tried hard to evaluate the product," "I thought a lot about information including online consumer reviews and product information in this website," "I made a lot of effort to evaluate the information," "I read carefully all information including online consumer reviews"). These items were averaged to form a perceived quantity ($\alpha = 0.96$), and consumer involvement ($\alpha = 0.95$), respectively. Next, to measure control variables, five items for review quality ($\alpha = 0.90$), two items for review positiveness ($\alpha = 0.90$), five items for advertisement quality ($\alpha = 0.97$) and one item for subjective product knowledge were measured. Finally, participants completed demographic items, and were then debriefed and thanked.

4. RESEARCH RESULTS

Manipulation and Control Checks   A 2 (review format) × 2 (the number of reviews) × 2 (consumer involvement) ANOVA was conducted to check participants' perception of cognitive fit, their perception of review quantity, and their level of involvement. Our analysis showed the significant main effect of the perceived review quantity, indicating that participants found a greater number of reviews in the 8 review condition (M = 4.83) than in the 3 review condition (M = 2.92, $F_{(1,344)}$ = 506.13, $p < .001$). The analysis of "self-reported cognitive effort" measurements used to check manipulation of involvement revealed that participants in the high involvement condition (M = 4.95) took more effort for review processing than in the low involvement condition (M = 3.14, $F_{(1,344)}$ = 417.93, $p < .001$). These results demonstrated that both manipulations were successful.

All groups equally accepted the degree of positiveness of reviews on the product ($F_{(7,344)}$ = 0.26, p <0.96). There were no significant differences in perceived review quality and perceived advertisement quality between the groups ($F_{(7,344)}$ = 1.23, p <0.29; $F_{(7,344)}$ =, p < 0.86, respectively). Finally, subjective product knowledge was not different between the groups ($F_{(7,344)}$ =0.24, p <0.97).

Cognitive fit   A 2 (review format) × 2 (the number of reviews) × 2 (consumer involvement) between-subjects ANOVA was conducted to test Hypotheses 1 and 2. As Table 2 shows, our analysis revealed the significant interaction effect of consumer involvement × review format on the use of cognitive resources. Participants in the high involvement condition used lower cognitive resources when reviews were framed in the matrix format than in the list format (M_{matrix} = 3.40, M_{list} = 4.58, $F_{(1,344)}$ = 52.99, p<.001), and participants in the low involvement condition used lower cognitive resources when reviews were framed in the list format than in the matrix format (M_{matrix} = 4.52, M_{list} = 3.41, $F_{(1,344)}$ = 43.811, $p < .001$). Other effects were not significant. Information processing strategies that matched the information presentation minimized cognitive effort. Thus, Hypotheses 1 and 2 are accepted.

	Low Involvement		High Involvement	
	List Format	Matrix Format	List Format	Matrix Format
3 reviews	3.51 (1.11)	4.59 (1.07)	4.59 (1.08)	3.20 (1.00)
	n = 42	n = 42	n = 42	n = 42
8 reviews	3.32 (1.12)	4.45 (1.12)	4.56 (1.22)	3.56 (1.04)
	n = 44	n = 44	n = 46	n = 50

Table 1. Descriptive Statistics of the Perceived Use of Cognitive Resources

Source	F-value	P-value
Number of reviews	.001	.990
Review format	.135	.714
Involvement	.006	.938
Number of reviews * Review format	.894	.345
Number of reviews * Involvement	1.990	.159
Review format * Involvement	96.488	.001
Number of reviews * Review format * Involvement	.502	.479

Table 2. Three-way ANOVA results on Perceived Use of Cognitive Resources

Product Attitude   A 2 (review format) × 2 (the number of reviews) × 2 (consumer involvement) between-subjects ANOVA was conducted to test our hypotheses. As Table 4 shows, our analysis revealed the significant main effect of the number of reviews on product attitude ($M_3 = 3.13$, $M_8 = 3.99$, $F(1,344) = 82.847$, $p < .001$). A previous study on online consumer reviews showed that review quantity positively affected consumer product attitude when reviews were positive overall (Park et al. forthcoming). The review format also had a main effect on product attitude ($M_{matrix} = 3.89$, $M_{list} = 3.25$, $F(1,344) = 42.030$, $p < .001$), which came from the significant interaction effect of review format × involvement. The interaction effect of review format × involvement indicated that high involvement consumers had a more favorable attitude when reviews was framed in the matrix format than in the list format ($M_{matrix} = 4.57$, $M_{list} = 2.65$) while low involvement consumers had a more favorable attitude when reviews were framed in the list format than in the matrix format ($M_{matrix} = 3.17$, $M_{list} = 3.91$). From these results, Hypotheses 3 and 4 are accepted.

It also revealed that the difference in product attitude from the cognitive fit was greater for participants under the high involvement condition than the low involvement condition ($M_{matrix-list \mid high\ involvement} = 1.92$, $M_{list-matrix \mid low\ involvement} = 0.74$, $F(1,344) = 210.016$, $p < .001$). The result meant that the effect of cognitive fit on product attitude was greater for high-involvement consumers than low-involvement consumers, resulting in accepting Hypothesis 5.

To test Hypotheses 6 and 7, we explored the different effects of the number of reviews and the review format under the low and high involvement conditions. It was possible to perform these analyses because the three-way interaction effect of review format × number of reviews × consumer involvement was significant ($F(1,344) = 10.475$, $p < .001$). Under high involvement conditions, a 2 (review format) × 2 (the number of reviews) between-subjects ANOVA was conducted. Participants under the high involvement condition had a more favorable attitude toward the product as the number of reviews increased ($M_3 = 3.10$, $M_8 = 4.05$, $F(1,176) = 48.975$, $p < .001$). They also had a more

favorable product attitude when reviews were presented in the matrix format than in the list format (M_{matrix} = 4.57, M_{list} = 2.61, $F(1,176)$ = 222.674, $p < .001$). Our analysis revealed that the interaction effect of review format × number of reviews was significant, indicating that the effect of the number of reviews on product attitude was greater when the matrix format of reviews was offered than when the list format of reviews was offered ($M_{8-3|matrix}$ = 1.21, $M_{8-3|list}$ = 0.59, $F(1,176)$ = 5.822, $p > 0.017$). Thus, Hypothesis 6 is accepted.

Under low involvement conditions, a 2 (review format) × 2 (the number of reviews) between-subjects ANOVA was conducted. Participants under the low involvement condition had a more favorable product attitude as the number of reviews increased (M_3 = 3.15, M_8 = 3.92, $F(1,168)$ = 34.612, $p < .001$). They also had a more favorable product attitude when reviews were presented in the list format than in the matrix format (M_{list} = 3.91, M_{matrix} = 3.17, $F(1,168)$ = 31.711, $p < .001$). Our analysis revealed that the interaction effect of review format × number of reviews was significant, indicating that the effect of the number of reviews on product attitude was greater when the list format of reviews was offered than when the matrix format of reviews was offered ($M_{8-3|list}$ = 1.05, $M_{8-3\,|\,matrix}$ = 0.49, $F(1,168)$ = 4.696, $p > .032$). Thus, Hypothesis 7 is accepted.

	Low Involvement		High Involvement	
	List Format	Matrix Format	List Format	Matrix Format
3 reviews	3.38 (0.96)	2.92 (0.76)	2.30 (0.78)	3.91 (0.96)
	n = 42	n = 42	n = 42	n = 42
8 reviews	4.43 (0.95)	3.41 (0.74)	2.89 (0.88)	5.12 (0.84)
	n = 44	n = 44	n = 46	n = 50

Table 3. Descriptive Statistics of Product Attitude

Source	F-value	P-value
Number of reviews	82.847	.001
Review format	42.030	.001
Involvement	.047	.829
Number of reviews * Review format	.024	.877
Number of reviews * Involvement	.540	.463
Review format * Involvement	210.016	.001
Number of reviews * Review format * Involvement	10.475	.001

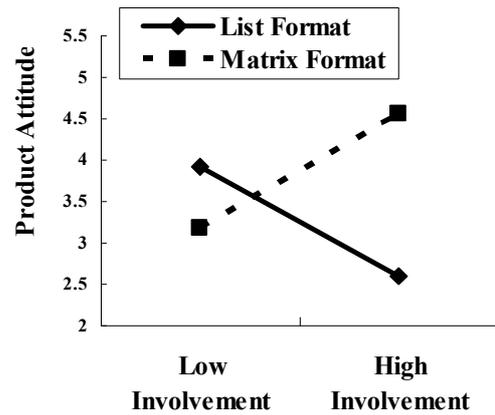*Table 4. Three-way ANOVA results on Product Attitude*

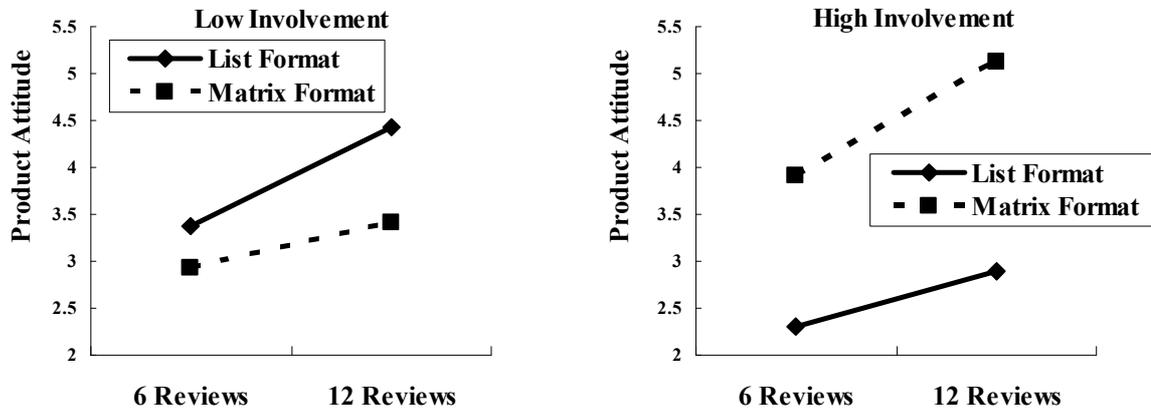*Figure 1. Two-way Interaction of Review Format × Involvement*

Figure 2. Three-way Interaction of Number of Reviews × Review Format × Involvement

5. CONCLUSION

This study found that high-involvement consumers take less time/effort/energy when the matrix format is offered while low-involvement consumers take less time/effort/energy when the list format is offered. These results showed which format cognitively fits depending on the level of consumer involvement. Subsequently, our study investigated the effect of cognitive fit on consumer product attitude. We found that the consumer product attitude is more favorable when there is the cognitive fit between the review format and the information processing strategy. That is, the high-involvement consumers have a more favorable attitude toward product with the matrix format, while the product attitude of low-involvement consumers is more favorable with the list format. These effects of cognitive fit on product attitude are greater for high-involvement consumers than low-involvement consumers. Finally, the three-way interaction effect of review number × review format × involvement was revealed, indicating that the effect of the number of reviews on product attitude is greater when there is cognitive fit between the review format and the information processing strategy. In other words, the effect of the number of reviews on product attitude of high involvement consumers is greater with the matrix format while the effect of the number of reviews on product attitude of low involvement consumers is greater with the list format.

This study has several theoretical contributions. First, from the perspective of cognitive fit theory, this study focused on consumer involvement which is not considered in the previous studies on cognitive fit theory. Considering consumer involvement as a moderator, which is an important variable in marketing literature, this work shows the effect of cognitive fit on the perceived use of cognitive resources, subsequently the cognitive fit is linked to the product evaluation in the context of online consumer reviews.

Second, this study integrates two theories from different domains. We combined ELM and the cognitive fit theory to find the relationship between involvement and review format. According to ELM, consumers use different strategies to process information depending on the level of involvement. As consumer involvement increases, consumers want to process detailed information and evaluate the product on their own effort. In that case, we found that it is better when information is framed in the matrix format by attribute.

Finally, the number of review messages is investigated as another moderator to affect the relationship between involvement and review format. It is found that the number of reviews makes the relationship more clear. This result means the effect of cognitive fit also has a size effect in terms of the number of review messages.

This study makes several practical contributions. First, we proposed two different review formats. The list format is already popular in online shopping malls, while the matrix format is not. Some online sellers offer the matrix review format to show the reviews, but few online sellers provide the matrix format by attribute. Consumers usually tend to evaluate the product by attribute and average each evaluation. This tendency may increase when consumers are highly involved with a product. It is necessary for online sellers to suggest an adequate review format to help their information processing. This study proposes two simple review formats, but the findings can be expanded to find the best format to represent reviews. Nowadays, since the web and database technology are generally improving, online sellers can recognize what characteristics individual consumers have. Involvement can be detected through click stream data. Online sellers can detect their level of prior product involvement through the information which he/she gave when registering on the web site. These are linked to the importance of personalization of the review format. Second, online sellers cannot control or modify the review contents, but they can determine the format. When there is a cognitive fit, consumers elaborate the review messages better and the effect of reviews is greater. When the reviews are positive overall, consumer product attitude is more likely to increase. In contrast, negative reviews are more likely to decrease consumer product attitude. Online sellers can control the effect of reviews by changing the format.

There are some limitations to this study. First, this study focuses on positive reviews only. We expect that our results can be expanded when the reviews are negative overall, and empirical testing is necessary. Second, we propose only two review formats. There are many formats online. To find the relationship between review format and involvement, we chose two popular formats from previous MIS research. It is necessary to investigate different formats to find the best format for reviews. Finally, the experiment of this study considered one product. The results of this study can be generalized more if hypotheses are tested in the context of different products.

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