


# The Effects of Navigation Cues and Involvement of Highly Innovative Consumers on Attitudes Toward Mobile Application Stores

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## ABSTRACT

In the e-commerce area, navigation cues play an important role that guides consumers while they are browsing products in online stores. Best-seller lists and product categories are typically used as navigation cues. With the rapid growth of smartphone penetration around the world, the role of navigation cues has become more critical to consumers who enjoy buying products and applications via mobile application stores. The purpose of this study is to investigate the relationships among navigation cues, attitudes, and involvement of users in mobile stores based on the elaboration likelihood model. A laboratory experiment was conducted, and the experiment results indicate that consumers with high involvement have better attitudes toward the product categories approach compared to the best-seller list approach. The fits of navigation cues and mobile consumer characteristics may contribute to the mobile application store design strategy.

## KEYWORDS

Attitudes, Mobile Application Store, Navigation Systems, User Involvement

## 1. INTRODUCTION

The number of available mobile applications has increased rapidly in recent years. Smart phones mainly offer communication service, entertainment, geographical positioning, ticket selling, mobile payments, and shopping (Watson et al., 2013); mobile applications such as games and those that offer business opportunities are among the most valuable services offered by smart phones. Consumers often use a navigation system to find, select, and buy application software in a mobile application store. Navigation systems are specifically designed for the facilitation of finding and examining online data (Webster and Ahuja, 2006). Text and icon link navigation cues offer consumers varying levels of control over online store navigation (Dailey, 2004). Tatiana and Artem (2021) found that

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navigation cues may reduce the cognitive load during the information search process. Navigation cues are an important research topic because they aid companies in improving customer experience and gaining competitive advantages.

Navigation cues are an essential element of online interaction between companies and consumers (Singh and Dalal, 1999). They can be used to explore, annotate, and interact with online objects (Wong and Elmqvist, 2014); they can introduce new products, trends, or fashions, while guiding customers to the products they seek. In practice, the two most commonly used navigation cues are product attributes and best-seller lists. Attitudes for measuring effective messages are important in traditional and online marketing communications (McMillan, Hwang, and Lee, 2003) as they are useful in predicting consumer behavior (Spears and Singh, 2004). Hence, attitudes toward navigation cues in mobile application stores are measured in this study.

Many online storefronts provide consumers with new product information to help them find new products. The speed and frequency with which a consumer buys said new products is called consumer innovativeness, and a highly innovative consumer enjoys buying novel and exciting products to feel special (Roehrich, 2004). Regarding mobile application stores, most users should be highly innovative because downloading new applications is an enjoyable activity.

Consumer involvement is the perceived relevance of a product based on the consumer's inherent needs, values, and interests (Wang et al., 2009). Consumer involvement indicates whether consumers understand and enjoy products in a specific product category. According to the elaboration likelihood model (ELM), different promotion strategies should be used for different levels of consumer involvement (Petty and Cacioppo, 1986). Because both central and peripheral cues affect the success of an online auction (Ko and Kim, 2015), appropriate navigation cues to introduce new products are an interesting topic in mobile application store management.

The effects of navigation cues, consumer involvement, and consumer innovativeness on mobile application store attitudes are investigated in this study. The two main research goals of this study are as follows: (1) compare consumer attitudes toward different store navigation cues, and (2) investigate the effects of combined navigation cues on store attitudes for consumers of different levels of involvement.

Previous studies regarding navigation systems have investigated the cover structure of navigation systems (Webster and Ahuja, 2006; Dailey, 2004; Danielson, 2002; Alkindi and Bouazza, 2010), metaphors in navigation systems (Yang, 2006; Benyon, 2001), rational and emotional appeals on web advertising effectiveness (Wang et al., 2009), web personalization (Tam and Ho, 2005), and best-selling rankings in a mobile application store (Carare, 2012). Although some studies, such as those of Wang et al. (2009), Tam and Ho (2006), Ko and Kim (2015), Wong and Elmqvist (2014), Bartosiak and Piccoli (2016), and Li, Jiang, and Wu (2014) have applied the elaboration likelihood model (ELM), the investigated topics were limited to web and personal computer environments. Therefore, the contribution of the current study is the integration of navigation cues and consumer characteristics in the mobile application store context. Furthermore, the applicability of the ELM theory in mobile commerce research is elucidated.

## **2. THEORETICAL BACKGROUND**

This section discusses previous studies pertaining to the ELM, navigation systems, attitudes, consumer innovativeness, and consumer involvement. The ELM, the theoretical foundation of the current study, is introduced. Navigation system design concepts and related studies, as the essence of the current study, are discussed. Attitude concepts in marketing, which are used to measure navigation systems in the current study, are introduced. And finally, two consumer characteristics are discussed: innovativeness and involvement.

## 2.1 Navigation Cues

Navigation is the process of guiding a person through an environment from a starting point to a destination (Cutmore et al., 2000). The concept of navigation is useful for information access (Isakowitz and Bieber, 1995). Navigation systems help people make decisions and take actions when they find and verify organized data in a computer-mediated environment (Watts-Perotti and Woods, 1999). Navigation systems often use product attributes for product categories; however, consumers prefer simpler cues such as best-seller lists and celebrity endorsements.

Kotler (1973) first proposed the concept of store atmosphere to provide cues to intended customers. In the Internet era the research theme has been extended to investigate the store atmosphere in the e-commerce subject area. Chen and Walls (1999) uncovered that attitude toward the web site will gain a parallel status in evaluating effectiveness as e-commerce plays an more important role. Many researchers have however, focused on the impacts of website atmospheric cues on individual's online shopping behavior (Erglu, Machleit, and Davis, 2003; Richard, 2005; Davis, Wang, and Lindridge, 2008; Floh and Madlberger, 2013).

In an online store, navigation systems provide cues to consumers to help them find products (Dailey, 2004). Richard (2005) observed that the cues provided by a website have affected onto the consumer attitude. Thus, navigation system design is relevant to website traffic, consumer involvement, and purchase intention (Richard and Chandra, 2005). Wang et al. (2009) investigated how rational and emotional appeals affected online advertising. Erglu, Machleit, and Davis (2003) divided online environmental cues into the high and low task-relevant atmospheric cues. Floh and Madlberger (2013) found that E-store navigation is one of highly task-relevant cues and in fact, is a significant stimuli of shopping enjoyment.

## 2.2 Elaboration Likelihood Model

Petty and Cacioppo (1986) proposed a theory of persuasion called "elaboration likelihood model (ELM)." ELM introduces dual paths, central route, and peripheral route, to explain that one could be persuaded by others (Petty and Cacioppo, 1986). Consumers adopt the central route if they have the desire and capability to collect information about product attributes. Motivation and the ability to process information have direct effects on whether the central or peripheral route should be adopted (Petty and Cacioppo, 1986), and the adopted route affects information processing effectiveness (Tam & Ho, 2005). People tend to process the related information carefully and then generate their own opinions if the central route was used. On the other hand, the peripheral route may provide a quick decision without taking a deep consideration of the consequence and/or involvement.

ELM has used widely in social psychology and marketing (Bhattacharjee and Sanford, 2006). For example, Choi and Rifon (2002) explored the relationships between the web advertising credibility and consumers' attitudes toward the banner ad. Hollebeek et al. (2007), discussed the effects of consumer involvement on purchase intention. Holzwarth et al. (2006) and Wang et al. (2009), used involvement as a moderating variable. Li, Jiang, and Wu (2014) suggested that online retailers can meet consumers' information needs by providing the trust assurances posted on the appropriate webpages. Ko and Kim (2015) investigated the persuasion process during online auction and found that the central route has stronger effects on auction success than peripheral route. Lee and Hong (2016) illuminated the influence of emotion on attitude change based on ELM. Bartosiak and Piccoli (2016) compared the persuasiveness of computer-synthesized speech and text in online reviews. However, to date, it has seen only limited use in investigating the effects of navigation in the e-commerce and m-commerce areas.

## 2.3 Attitudes

Attitudes are an important topic for effective communication between companies and consumers (Ducoffe, 1996). In traditional marketing, Lavidge and Steiner (1961) proposed a hierarchical

model of consumer purchase behaviors: cognitive, affective, and conative. Mehta (2000) indicated that attitudes were twofold: intrusiveness and persuasion. Intrusiveness is the attractiveness of a message to consumers. Persuasion is the motivation of a consumer to purchase a product after viewing the message.

Attitudes can be defined as the degrees to which consumers favor a specific message in a specific context (Lutz, 1985). Attitudes can be classified as good, interesting, like, irritating, and favorable (Coulter and Punj, 1999; Yi, 1990). Attitude measurement has been applied in electronic commerce (Liu, 2014; Wang et al., 2009).

## **2.4 Consumer Innovativeness**

Feaster (1968) indicated that innovativeness is the requirement for change. Furthermore, consumer innovativeness is the willingness of consumers to change and the tendency of consumers to buy and prefer new products (Tellis et al., 2007; Roehrich, 2004).

Hurt et al. (1977) developed an innovativeness scale to measure personality and changing intentions. Li (2014) investigated the consumer adoption of new technologies, such as tablets, laptops, and smart phones from the perspective of innovation diffusion. Chen et al. (2009) discussed the acceptance of smart phones in logistics. These studies revealed that consumer innovativeness is an important research topic.

## **2.5 Consumer Involvement**

Differences in consumer involvement result in differences in behavioral motivation, consumer purchasing, and communication behaviors. Consumer involvement is a consumer's perception of the personal relevance of a particular product (Wang et al., 2009). Zaichkowsky (1985) argued that consumer involvement depends on three factors: personal, physical, and situational. The personal factor is the interests, needs, and values of the consumer; the physical factor is the characteristics of the product; and the situational factor is the context that temporarily increases the relevance of the product. However, it is worth noting that some types of media limit consumer involvement opportunities. Furthermore, the knowledge of and experience with a product may affect consumer involvement (Andrew, 1990).

## **3. RESEARCH METHODS**

Figure 1 depicts the proposed framework for attitudes toward navigation systems, which was used to investigate the attitudes toward navigation systems for high- and low-involvement consumers. This study excludes consumers with low innovation because most mobile phone users have innovative personalities (Jung et al., 2003) and most mobile application store consumers who install new applications in their phones are highly innovative users.

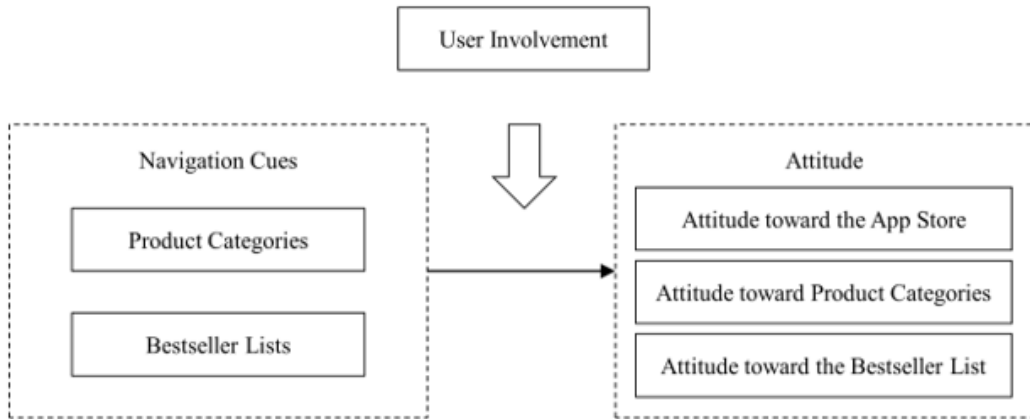
In Figure 1, the independent variables are the navigation cues: best-seller list and product categories. The best-seller list variable includes two nominal levels: weekly and yearly. The product categories variable includes two nominal levels: product type and new coming product and product type. The dependent variables are attitudes toward the application store, best-seller list, and product categories, which are based on the studies of Coulter and Punj (1999) and Yi (1990).

### **3.1 Hypotheses**

#### **3.1.1 Navigation Cues and Consumer Involvement**

According to the ELM (Petty and Cacioppo, 1986), high-involvement consumers who can and are willing to process product information prefer to use product features to select products. Low-involvement consumers, who have little or no interest or ability to process the product feature information, prefer to use simpler cues to select products, i.e., cues that do not include complicated

Figure 1. Research Framework



and domain-dependent information. Holzwarth et al. (2006) reported that, for Internet marketing, an expert avatar is more effective than an attractive avatar. Wang et al. (2009) revealed that, in online marketing for high-involvement consumers, a rational appeal is better than an emotional appeal. In this study, the domain knowledge of product features is used for product type categories and new products and product type categories. Yearly and weekly best-seller lists use selling quantity as a simple approach to rank products. According to the ELM (Petty and Cacioppo, 1986; Wang et al., 2009), using product attributes to classify products is better than using sales ranking for high-involvement consumers. As best-seller lists are simple and domain independent, they are more suitable for low-involvement consumers. According to the discussion above, Hypotheses 1 and 2 are proposed:

**H1:** High-involvement participants have better attitudes toward product categories than best-seller lists.

**H2:** Low-involvement participants have better attitudes toward best-seller lists than product categories.

### 3.1.2 Navigation Cues and Substitutes

Highly innovative consumers favor innovative products and enjoy reading about new products when browsing online (Tomaseti et al., 2004). In practice, online retailing websites, such as Amazon.com and the Apple App Store, often use two strategies to display new products: a recent best-seller list and a new product category in a navigational menu. Hence, the effects of best-seller lists and new product information are investigated in this study.

The two best-seller lists considered in this study are the yearly and weekly best-seller lists. The yearly best-seller list displays popular products in recent years. However, products on a yearly best-seller list may become unpopular during the following year. The weekly best-seller list displays the most popular products from the most recent week. Hence, a weekly best-seller list contains more currently relevant products. Highly innovative consumers typically enjoy buying new products that have new features (Tomaseti et al., 2004). Therefore, highly innovative consumers prefer to use a weekly best-seller list, and consumers with low innovation prefer to use a yearly best-seller list.

In practice, online retailing websites provide numerous navigation cues. Because some cues provide similar functionalities, navigation cues may potentially substitute for one another. Substitutes can replace the product or service and decrease the competitive advantage (Porter, 1979). In this study, the new product, product type categories, and weekly best-seller list provide new product information. Hence, new product and product type categories can be substituted for weekly best-seller list when consumers are seeking new products. In another case, if the product type categories which do not

provide new product information exist, the weekly best-seller list is more appropriate compared with the yearly best-seller list for application store users who are seeking new products.

Additionally, if the yearly best-seller list, which does not provide new product information exists, new products and product type categories are more appropriate compared with product type categories when consumers are seeking new products. Therefore, Hypotheses 3 and 4 are proposed:

**H3:** Participants using the weekly best-seller list have better attitudes toward the application store than those using the yearly best-seller list when they use product type categories.

**H4:** Participants using new product and product type categories have better attitudes toward the application store than those using product type categories when they use the best-seller list.

### 3.1.3 Combined Navigation Cues

Most online stores use both product categories and best-seller lists. Therefore, it is interesting to consider the effect of the combined strategies. Four stores that combine two product categories and two best-seller lists are investigated in this study: product type categories + yearly best-seller list, product type categories + weekly best-seller list, new product and product type categories + yearly best-seller list, and new product and product type categories + weekly best-seller list. Both the new product and product type categories + yearly best-seller list and the new product and product type categories + weekly best-seller list stores offer new product information. Therefore, high-involvement users favor the two abovementioned stores.

In the product type categories + weekly best-seller list store, high-involvement users can use the weekly best-seller list to infer which product may be new and still currently popular. Therefore, the product type categories + weekly best-seller list store indirectly offers new product information in the best-seller list, whereas the product type categories + yearly best-seller list store does not provide any cue regarding new products. According to the discussion above regarding the ELM, high innovativeness, and the combined strategies of application stores, the product type categories + yearly best-seller list store users have worse attitudes compared with those using the other three application stores.

A best-seller list, which is consumer-driven, is important and simple information that affects the purchase decisions of low-involvement consumers according to the ELM (Petty and Cacioppo, 1986; Wang et al., 2009). Highly innovative consumers prefer to browse new and fashionable products while purchasing (Tomasetti et al., 2004). Low-involvement consumers typically use best-seller list cues instead of product feature cues according to the ELM. The best-seller list in both the product type categories + weekly best-seller list and new product and product type categories + weekly best-seller list stores provides information regarding new products that were popular in the previous week. Although the new product and product type categories + yearly best-seller list store reveals new product information, it is not sufficient evidence to convince users of the popularity of the new products.

According to the discussion above regarding the ELM and the combined strategies of application stores, the product type categories + weekly best-seller list and new product and product type categories + weekly best-seller list store users have better attitudes toward those stores compared with the product type categories + yearly best-seller list and new product and product type categories + yearly best-seller list stores for low-involvement users. Hence, Hypotheses 5 and 6 are proposed:

**H5:** High-involvement participants using the store that has both the product type categories and yearly best-seller list have worse attitudes toward the application store compared with those using the other three stores.

**H6:** Low-involvement participants using the two stores that have the weekly best-seller list have better attitudes toward the application store compared with the two stores that have the yearly best-seller list.

### 3.2 Design

A laboratory experimental method was employed to test and verify the proposed research model. We conducted the laboratory experiment in a university campus to carefully control conditions. University students, including Executive MBA students, were invited to participate in the research and were assigned to one of the four groups randomly. Four sets of paper instructions were available regarding the use of an application store prototype. The instructions direct participants to select a favorite game in the experiment task. After reading the instructions, the participants used their own smart phone browsers to browse an application store prototype. After browsing, they filled out a questionnaire regarding their favorite game, innovativeness, involvement, and attitude toward the navigation cues. The questionnaire was used to collect information regarding their experience using mobile application stores. Participants with low innovation and no experience using mobile application stores were excluded from the statistical analysis. Additionally, participants with no appropriate favorite game in the questionnaire were excluded from the statistical analysis to ensure manipulation validity. Group assignments were randomized to avoid group differences in gender, age, smart phone usage experience, and mobile application store usage experience.

### 3.3 Task and System

An Apple App Store-like store was developed for the experiment. Two navigation cues were used in each group: the first group used product type categories + yearly best-seller list, the second group product type categories + weekly best-seller list, the third group new product and product type categories + yearly best-seller list, and the fourth group new product and product type categories + weekly best-seller list; shown as Table 1.

Figure 2 shows that the navigation cues of product type categories reveal the product category according to the features of a game. Consumers select a product type, such as Adventure Game in Figure 2(a), and the adventure games in Figure 2(b) are shown. The design of new product and product type categories is similar to the design of product type categories. The user can press the “New Game” button in the upper portion of the screen in Figure 3(b) to browse new products for a particular product type in the game application store, such as new adventure games in Figure 3(c).

The design of the weekly best-seller list depicted in Figure 4 shows the best-selling products in the previous week. Consumers can select a specific product and read its description. The design of the yearly best-seller list depicted in Figure 5 is similar to that of the weekly best-seller list. The yearly best-seller list interface shows the best-selling products in the previous year.

**Table 1. Experimental Groups**

Classification	Best-seller list	
	Yearly	Weekly
Product type	Group (1) Product type Yearly best-seller list	Group (2) Product type Weekly best-seller list
New product and product type	Group (3) New product and product type Yearly best-seller list	Group (4) New product and product type Weekly best-seller list

Figure 2. Design of Product Type Categories

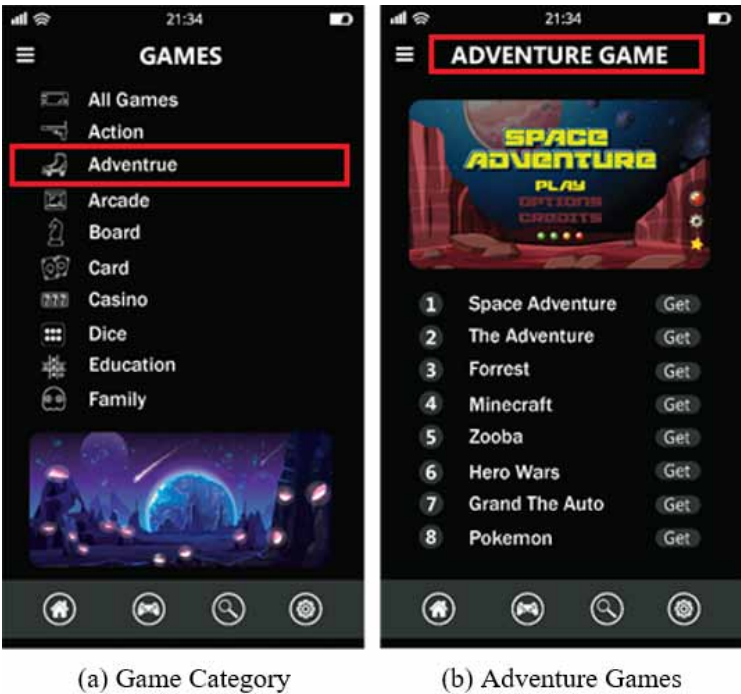


Figure 3. Design of New Product and Product Type Categories

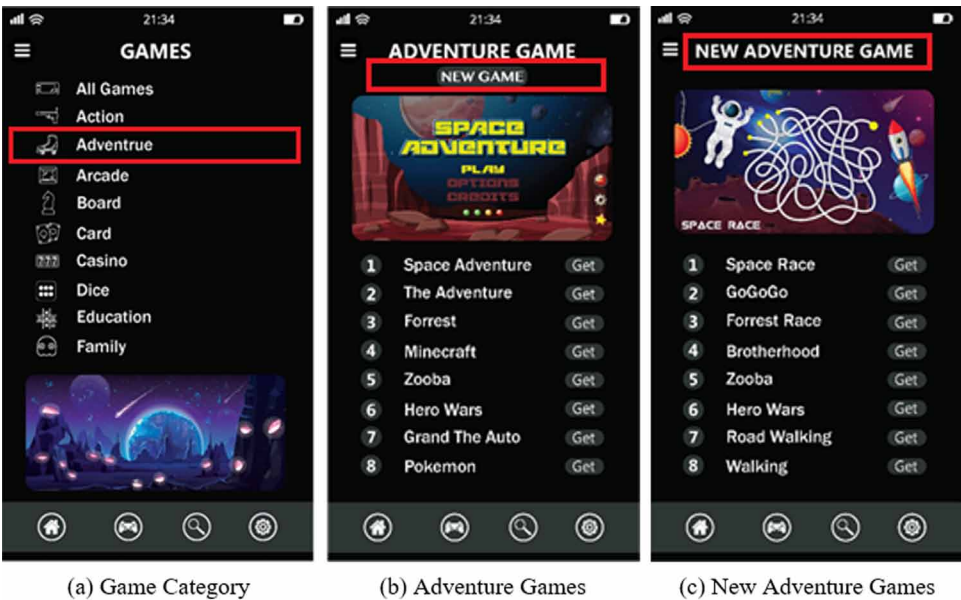




Figure 4. Design of weekly bestseller list

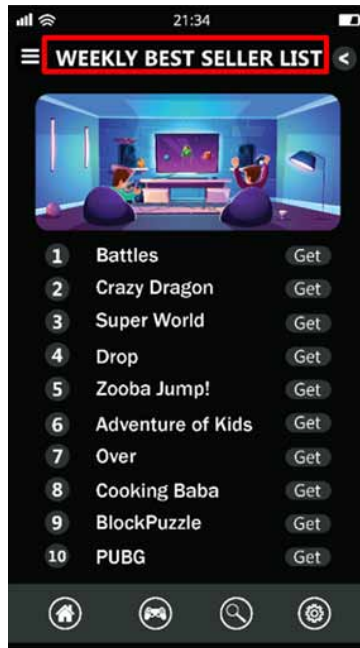
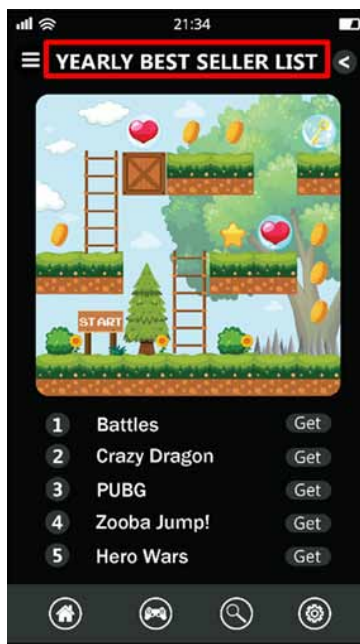


Figure 5. Design of yearly bestseller list



## 4. RESULTS

The laboratory experiment was conducted in a university campus with convenient populations of mobile phone users in Taiwan. A total of 318 participants were recruited. Those participants who had no mobile application store experience or provided incomplete questionnaire data were excluded from the statistical analysis. Therefore, the number of valid participants was 292. The first group (product type categories + yearly best-seller list) had 79 participants, the second group (product type categories + weekly best-seller list) 78 participants, the third group (new product and product type categories + yearly best-seller list) 67 participants, and the fourth group (new product and product type categories + weekly best-seller list) 68 participants. Table 2 summarizes the characteristics of the participants.

The SPSS software package was used for data analysis. The questionnaire items included five constructs: involvement, innovativeness, product categories attitude, best-seller list attitude, and overall store attitude. Cronbach  $\alpha$ -values were used to assess construct reliability. Table 3 shows that the Cronbach  $\alpha$ -values ranged from 0.817 to 0.939. All Cronbach  $\alpha$ -values for each construct exceeded 0.7, which satisfied the common reliability threshold.

Exploratory factor analysis (EFA) with varimax rotation was used to assess the convergent and discriminant validity of the constructs. Hair et al. (1995) suggested that the factor loading of a significant item should exceed 0.50. All constructs are first-order constructs. Table 4 shows that all items have high loadings on related factors and low loadings on unrelated factors, which support the convergent and discriminant validity of the constructs.

**Table 2. Subject Demographics**

Gender		Smart phone usage experience (Year)	
Male	57.5%	Under 1	1.4%
Female	42.5%	1	21.9%
		2	24.3%
Age (Year)		Over 3	52.4%
Under 18	6.2%	Frequency of mobile application store usage	
19–23	58.2%	Everyday	23.6%
24–53	35.6%	Once every two to three days	23.6%
		Every week	28.1%
		Every month	13.7%
		No usage in recent three months	10.3%

**Table 3. Questionnaire Reliability**

Construct	Cronbach's Alpha
Involvement (INV)	0.932
Innovativeness (INNO)	0.817
Attitude toward product categories (APC)	0.932
Attitude toward bestseller list (ABL)	0.939
Attitude toward the application store (AAS)	0.931

Table 4. Factor Analysis

Construct Item	Factor 1 Involvement	Factor 2 Innovativeness	Factor 3 Attitude toward Product Categories	Factor 4 Attitude toward Bestseller List
INV1	<b>0.848</b>	0.152	0.13	0.058
INV2	<b>0.854</b>	0.112	0.106	0.046
INV3	<b>0.853</b>	0.160	0.137	0.055
INV4	<b>0.848</b>	0.131	0.149	0.085
INV5	<b>0.843</b>	0.221	0.074	0.169
INNO1	0.271	<b>0.803</b>	0.025	0.039
INNO2	0.191	<b>0.829</b>	-0.026	0.124
INNO3	0.084	<b>0.755</b>	0.089	-0.05
INNO4	0.057	<b>0.772</b>	0.045	0.048
INNO5	0.124	<b>0.609</b>	0.221	0.007
APC1	0.103	0.136	<b>0.718</b>	0.389
APC2	0.109	0.069	<b>0.789</b>	0.403
APC3	0.171	0.074	<b>0.810</b>	0.390
APC4	0.228	0.106	<b>0.742</b>	0.357
APC5	0.173	0.130	<b>0.757</b>	0.447
ABL1	0.050	0.029	0.324	<b>0.797</b>
ABL2	0.081	0.026	0.289	<b>0.857</b>
ABL3	0.098	0.069	0.292	<b>0.885</b>
ABL4	0.126	0.035	0.329	<b>0.801</b>
ABL5	0.063	0.070	0.366	<b>0.824</b>

The AAS construct items are excluded from the EFA and Table 4. The attitude toward the application store is the general and overall measurement for an online store that uses product categories and best-seller list cues. Therefore, the attitude toward the application store primarily depends on the attitudes toward the product categories and best-seller list and does not exhibit convergent and discriminant validity. However, since the purpose of this study is to measure the overall attitude of a store that uses combined strategies, the questionnaire items for the overall AAS are preserved.

A paired-sample t-test was performed to compare the attitudes between product categories (including product type categories and new product and product type categories) and the best-seller list (including yearly best-seller list and weekly best-seller list). Table 5 shows that the attitude toward product categories is better than that toward the best-seller list for the high-involvement participants [ $t = 2.116$ ,  $p = 0.018$ ; one-tailed test]. Therefore, H1 was supported.

For low-involvement participants, Table 5 shows that the  $p$  value [ $t = -1.224$ ,  $p = 0.112$ ; one-tailed test] does not reach a statistical significance. Therefore, H2 was unsupported. However, the Table 5 shows that the mean value for the attitude toward the best-seller list is better than that toward product categories.

Two-way ANOVA was used to examine H3 and H4. When product type categories exists in the application stores, the best-seller list  $\times$  involvement interaction [ $F = 6.903$ ,  $p = 0.009$ ] revealed that the best-seller list significantly affected the attitudes toward the application store for high-involvement participants [ $t = -2.447$ ,  $p = 0.008$ ; one-tailed test] but not for low-involvement participants [ $t = 1.427$ ,

**Table 5. Comparing Attitudes toward Product Categories and Attitude toward Bestseller List for High- and Low-Involvement Participants**

	Mean Value		Sample Size	P Value
	Attitude toward Product Categories	Attitude toward Bestseller List		
High-Involvement Participants	16.20	15.72	188	0.018*
Low-Involvement Participants	14.05	14.35	104	0.112

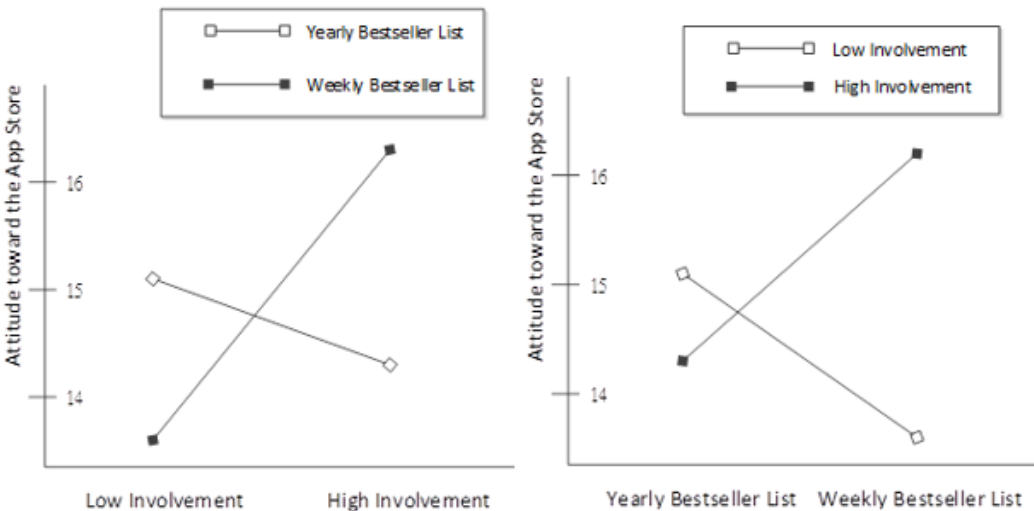
\* indicates  $p < 0.05$

$p = 0.08$ ; one-tailed test]. When new product and product type categories existed in the application stores, the best-seller list  $\times$  involvement interaction [ $F = 1.059$ ,  $p = 0.305$ ] was not statistically significant. Weekly best-seller list resulted in a significantly better attitude toward the application store when product type categories existed as compared with yearly best-seller list for high-involvement participants, thereby partially supporting H3. Figure 6 graphically illustrates the interaction on the attitudes toward the application store with best-seller list  $\times$  involvement. Table 6 reports the means, sample sizes, and standard deviations.

The product categories  $\times$  involvement interaction when yearly best-seller list existed in the application stores [ $F = 1.016$ ,  $p = 0.315$ ] was not statistically significant. Furthermore, the product categories  $\times$  involvement interaction when weekly best-seller list existed in the application stores [ $F = 0.072$ ,  $p = 0.789$ ] was not statistically significant. Although the product categories  $\times$  involvement interactions were not statistically significant, new product and product type categories generated a significantly better attitude toward the application store than product type categories when yearly best-seller list existed in the application stores for high-involvement participants [ $t = -2.178$ ,  $p = 0.016$ ; one-tailed test]. Therefore, H4 was supported. Table 7 shows the means, sample sizes, and standard deviations.

One-way ANOVA was used to compare the attitude of the four stores for high-involvement participants. Each store has two navigation cues and was used by a different experimental group.

**Figure 6. Effects of Two-way Interaction on Attitude toward the Application Store when Product Type Categories Exists in the Application store**



**Table 6. Effects of Bestseller List and Involvement on Attitude toward the Application Store**

		High-Involvement Participants			Low-Involvement Participants		
		#	Mean	SD	#	Mean	SD
Product Type Categories	Yearly Bestseller List	50	14.30	4.19	29	15.07	3.97
	Weekly Bestseller List	48	16.20	3.48	30	13.63	3.75
New Product and Product Type Categories	Yearly Bestseller List	41	16.24	4.83	26	15.04	3.45
	Weekly Bestseller List	49	16.27	4.41	19	13.42	3.95

**Table 7. Effects of Product Categories and Involvement on Attitudes toward the Application Store**

		High-Involvement Participants			Low-Involvement Participants		
		#	Mean	SD	#	Mean	SD
Yearly Bestseller List	Product Type Categories	50	15.12	4.18	29	14.21	3.62
	New Product and Product Type Categories	41	17.02	4.11	26	14.77	3.14
Weekly Bestseller List	Product Type Categories	48	16.35	4.13	30	13.67	3.27
	New Product and Product Type Categories	49	16.47	3.98	19	13.42	2.78

Comparison results show a significant difference among the four stores (Significance = 0.011). Table 8 shows the descriptive data.

The least significant difference (LSD) was used in this study for multiple comparisons of attitudes in the four stores. Table 9 shows that store 1 (product type categories + yearly best-seller list) has a worse attitude toward the application store compared with store 2 (product type categories + weekly best-seller list), store 3 (new product and product type categories + yearly best-seller list), and store 4 (new product and product type categories + weekly best-seller list). Therefore, H5 was supported.

One-way ANOVA was used to compare the attitudes of the four stores between highly innovative and low-involvement participants. The ANOVA results showed no significant difference among

**Table 8. Descriptive Data Regarding the Effects of Four Stores on Attitudes toward the Application Store for High-Involvement Participants**

Store	Combined Navigation Strategies	#	Mean	SD
Store 1	Product Type Categories + Yearly Bestseller List	50	14.32	3.91
Store 2	Product Type Categories + Weekly Bestseller List	48	16.02	3.75
Store 3	New Coming Product and Product Type Categories + Yearly Bestseller List	41	16.24	4.52
Store 4	New Coming Product and Product Type Categories + Weekly Bestseller List	49	16.65	3.65

**Table 9. Attitude toward the Application Store: Multiple Comparisons on Four Stores in High-Involvement Participants**

Store I	Store J	Mean Difference(I-J)	Sig.
1	2	-1.70	0.017*
	3	-1.92	0.011*
	4	-2.33	0.002***
2	1	1.70	0.017*
	3	-0.22	0.396
	4	-0.63	0.216
3	1	1.92	0.011*
	2	0.22	0.396
	4	0.41	0.313
4	1	2.33	0.002***
	2	0.63	0.216
	3	0.41	0.313

\* indicates  $p < 0.05$ ; \*\* indicates  $p < 0.01$ ; \*\*\* indicates  $p < 0.005$

the four stores (Significance. = 0.111). The descriptive data are showed in Table 10. Therefore, H6 was unsupported.

Table 11 summarizes the hypothesis testing results above. The ELM indicates that high-involvement consumers prefer to receive messages regarding product characteristics from a central route, such as product categories, which supports H1, i.e., the attitude toward product categories is better than that toward the best-seller list for high-involvement online consumers. Therefore, this study confirmed that high-involvement consumers preferred the central route in the ELM.

The ELM indicates that low-involvement consumers prefer to receive messages using simple cues that are irrelevant to product characteristics from the peripheral route, such as a best-seller list. However, this does not support H2 indicating that the attitude of the best-seller list and product categories are similar for low-involvement online consumers. Therefore, the results do not conform to the consumer preference regarding the peripheral route in the ELM. Wang et al. (2009) reported that attitude does not significantly differ between informational appeal (the central route) and emotional appeal (the peripheral route) in low-involvement online consumers. The ELM was originally used in an offline environment. An interesting topic is whether the peripheral route exists in the online environment.

Generally, H3, H4, H5, and H6 imply that mobile application store users prefer new product information only if they are high-involvement consumers. This shows that the involvement factor should be considered in the attitude toward new product information. New product information can

**Table 10. Descriptive Data Regarding the Effects of Four Stores on Attitudes toward the Application Store for Low-Involvement Participants**

Store	Combined Navigation Strategies	#	Mean	SD
Store 1	Product Type Categories + Yearly Bestseller List	28	15.18	3.03
Store 2	Product Type Categories + Weekly Bestseller List	29	13.72	3.19
Store 3	New Coming Product and Product Type Categories + Yearly Bestseller List	25	15.12	3.17
Store 4	New Coming Product and Product Type Categories + Weekly Bestseller List	18	13.94	3.44

**Table 11. Hypothesis Testing Results**

Hypothesis		Results
H1:	High-involvement participants have better attitudes toward product categories than best-seller lists.	Supported
H2:	Low-involvement participants have better attitudes toward best-seller lists than product categories.	Not supported
H3:	Participants using the weekly best-seller list have better attitudes toward the application store than those using the yearly best-seller list when they use product type categories.	Partial supported
H4:	Participants using new product and product type categories have better attitudes toward the application store than those using product type categories when they use the yearly best-seller list.	Supported
H5:	High-involvement participants using the store that has both the product type categories and yearly best-seller list have worse attitudes toward the application store compared with those using the other three stores.	Supported
H6:	Low-involvement participants using the two stores that have the weekly best-seller list have better attitudes toward the application store compared with the two stores that have the yearly best-seller list.	Not supported

be considered a product characteristic. Furthermore, this result confirms the consumer preference for the central route in the ELM.

## 5. DISCUSSION AND CONCLUSION

The experiment results in Table 5 indicate that the attitude toward product categories is better than that toward the best-seller list for high-involvement application store users. The attitudes toward product categories and best-seller lists did not differ for low-involvement users. Furthermore, the attitudes of low-involvement users are worse than those of high-involvement users. The experiment results imply that other cues should be used if the target market is low-involvement consumers.

The results in Table 6 reveal that application store users who exhibit high-involvement characteristics prefer the weekly best-seller list when the product type categories exist in the stores. Table 6 shows that users who exhibit high-involvement characteristics prefer both the yearly best-seller list and the weekly best-seller list when new product and product type categories exist in the application stores. This implies that application store users who exhibit high-involvement characteristics prefer the weekly best-seller list regardless of the pairing of various classification cues.

The statistical results in Table 7 show that users who have high-involvement characteristics prefer new product and product type categories when paired with the yearly best-seller list. This implies that online stores should show new products when they provide only yearly best-seller lists. Online application stores and online retailing companies can use the results and discussions above to design online store interfaces according to user involvement.

Table 10 indicates that the store that has both product type categories and yearly best-seller list receives worse attitudes compared with the other three stores that provide new product information explicitly or implicitly for application store users who possess high-involvement characteristics. This implies that online stores should provide new product information if the target mobile application store users exhibit high-involvement characteristics.

In this study, the effects of navigation cues on attitudes were investigated while considering consumer involvement. Marketing literature and personal characteristics were used as the basis of the research model. Experiment results indicated that the attitudes toward product categories were better than that of best-seller lists in high-involvement users. High-involvement users generally preferred

the weekly best-seller list. Additionally, high-involvement users preferred new products and product type categories when the yearly best-seller list existed in the same application store.

Several limitations of this research were discovered. First, this research focused on the attitudinal response of consumers to navigation strategies. Because behavioral measures were not investigated, the conclusions of this study were limited to the attitudinal perspective. Next, self-selection was unavoidable in the experiments because users were recruited to participate. Finally, only game applications were presented in the experiment, which limited the generalizability of the results.

The ELM theory was originally used in an offline environment. In terms of theoretical contributions, this study confirmed that the central route revealed by the ELM theory did exist in the online mobile environment. The results of this study, which did not show a peripheral route in the online environment, conformed to those of Wang et al. (2009). More investigation is necessary to adapt the ELM theory to the online environment.

In practice, online stores provide various navigation strategies to satisfy the requirements of users with diverse personal characteristics. An online store's interface becomes complex and difficult to use if it attempts to satisfy various consumers. The screen size of smart phones is smaller than that of conventional personal computers, and it is difficult to implement numerous navigation cues on a small screen. This study provided useful information applicable to online stores for developing appropriate navigational interfaces according to user characteristics.

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