



# Exploring Gender Differences in Online Consumer Purchase Decision Making: An Online Product Presentation Perspective

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## Abstract

Gender effects remain poorly understood in the E-commerce setting. Using the selectivity model, this research further investigates gender differences in consumer Web-based purchase decisions. Specifically, gender differences in the effects of interactivity, vividness, diagnosticity, and perceived risk on subsequent consumer attitude and online purchase intentions are investigated and explained. An empirical survey-based research study in the e-commerce context found that gender differences exist in the relative influence of each antecedent. Specifically, interactivity and perceived risk influenced attitude formation more for males than females, while vividness and diagnosticity influenced attitude formation more for females than males. In addition, attitude toward online product presentation influenced purchase intention more strongly for males than females. For e-Commerce web-site designers and brand managers, our results highlight the importance of being gender aware when developing their web presence. While some sites may benefit from a gender-neutral design, others may benefit from a design based on results reported here.

**Keywords** E-commerce · Online purchase decision · Gender · Gender differences · The selectivity hypothesis

## 1 Introduction

Understanding online consumer decision making is essential to the success of e-commerce. Online product presentation plays an important role in e-vendors' marketing strategy. Generally, e-vendors love to deliver detailed product information to their customers. The quality of product information is necessary for consumers to evaluate products, thus impacting their online purchase decisions. With the advancement of the Internet, new web-based multimedia technologies are actively used in online product presentations to provide more decisions

aids in consumers' product evaluations and purchase decision making (Jiang and Benbasat 2007; Wang and Benbasat 2009). E-vendors have been continuously improving the look, feel and performance of online product presentations and seeking to improve the quality of information presented to consumers.

However, increased competition in online sales has made product differentiation more difficult. Brand managers and e-vendors alike are paying increased attention to their Web presence. A common market segmentation task is to investigate whether market segments differ in their perception of and reaction to online product presentations. One of the most common market segmentation variables is gender. While new interactive human-computer interface (HCI) technologies and design functions are implemented in an attempt to increase the effectiveness of online product presentations, scant business research tests for gender differences in response to e-commerce web design. Similarly, scant research examines whether consumer decision processing of online promotional content differs across genders.

Brand managers attempt to tailor online product presentations for each major target market to facilitate information transfer and to encourage market demand. Continued research into how different target markets perceive online promotional materials is therefore warranted. The genders have been shown to differ in consumer decision making (Bakewell and

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Mitchell 2003, 2004; Mitchell and Walsh 2004), purchasing processes (Pahl 1990), and online consumer behavior (Ndubisi and Nelson 2006; Kim et al. 2007). However, prior HCI and e-commerce research fails to delve into and theoretically explain gender differences in HCI and e-commerce evaluations. While gender is a key segmentation variable in product development, how the genders differ in e-commerce purchase decision-making remains poorly understood.

Further, prior e-commerce research generally struggles to theoretically explicate any found gender differences in perceptions and reactions to online product presentations. To better understand gender-based differences in e-commerce product evaluations and explain further variance in important outcome variables, this research tests for gender differences in perceptions of e-commerce-based online product presentations. Gender is modeled as a moderator of the relationships between commonly modeled characteristics of online product presentations and pre-purchase consumer psychological constructs that have been shown to lead to online product evaluations and decisions to purchase. By investigating multiple ways that the genders may differentially perform pre-purchase product evaluations and form decisions to purchase, this research can serve to guide e-commerce vendors in their efforts to tailor web site designs and product presentations for each gender and target market.

In the Information Systems (IS) discipline, some notable studies have looked at gender issues in IS from various perspectives and gender-related theories (e.g. Ahuja and Thatcher 2005; Trauth et al. 2009; Adam et al. 2006; Trauth 2002; Venkatesh and Morris 2000). For instance, Trauth developed the individual differences theory of gender and information technology (IDTGIT) that extends social construction theory by further recognizing individual differences in the involvement of individuals with information technology (Trauth 2002, 2006; Trauth and Quesenberry 2007). Trauth et al. (2009) have elaborated IDTGIT in studying the influence of organizational factors on women's retention in the Information Technology (IT) field. IDTGIT meaningfully explain gender issues in IT discipline focusing on IT workforce and has been influencing several studies in this research stream (Adya 2008; Trauth et al. 2008). Moreover, Ahuja and Thatcher (2005) employed gender schema theory to study how gender moderates the influences on work environment and trying to innovate with IT. Venkatesh and Morris (2000) used gender essentialism theory to investigate how gender affects users' IT adoption decisions. In a more recent study, Lin et al. (2017) used social role theory to examine gender differences in users' social networking site continuance decisions. These studies have elaborate gender theories that can meaningfully explain gender issues in IT workforce and IT use.

Our study focuses on online consumer purchase decisions, which heavily depends on information processing and how it affects purchase decisions. To better explicitly explain such gender differences, it is necessary to elaborate how men and women process information differently. The selectivity

hypothesis posits that males and females are different in information processing strategies and how they evaluate the products based on different information concerning both the information quantity and product information (Meyers-Levy 1986). It is more suitable in theorizing gender issues and explaining gender differences in online consumer purchase decisions than the aforementioned gender-related theories. Therefore, the selectivity hypothesis is used as the theoretical lens through which we study gender and its impacts on the factors that affect consumers' purchase decision making. It has been used to study gender differences in marketing research (Meyers-Levy and Maheswaran 1991), and our paper extends this research stream by explaining gender differences in the context of e-commerce, more specifically, in PC-based online product presentation.

The research questions guiding this investigation are as follows:

1. Do the design characteristics of online product presentation impact consumer product evaluations and purchase intentions *differentially* across genders?
2. Do consumer's psychological perceptions regarding an online product presentation impact consumer product evaluations and intention to purchase *differentially* across genders?

This paper is organized as follows. First, we provide a background on gender differences in the context of e-commerce. Next, we provide our theoretical foundations and present our research model, which lead to our justification of hypotheses. The chosen research methodology, data analysis and results are presented. Finally, we conclude with discussion of the research and practical implications.

## 2 Gender Differences in E-Commerce Literature

Gender differences have been studied in various IS domains such as perception and adoption of information technology (Gefen and Straub 1997; Ahuja and Thatcher 2005; Zhang et al. 2009; Venkatesh et al. 2004) and the IT workforce (Adam et al. 2006; Baroudi and Igarria 1994; TRAUTH et al. 2009). However, in the context of e-commerce, the literature on gender differences in consumer behavior and decision making is still very nascent. To our knowledge, there are few studies focusing on gender differences in online consumer behavior. Prior studies have shown that men and women have different psychological pre-disposition of web-based purchases (Wolin and Korgaonkar 2003): males were found to have more positive attitudes toward online shopping. This provides the support that gender will affect users' online purchase decision making in their reactions to technical and

sociological factors. For instance, the effect of trust on the intention to shop online is stronger for women than for men due to their different communication styles, with women being more network-oriented and men being more task-oriented (Awad and Ragowsky 2008). Such differences between males' and females' communication and roles in online shopping environments lead to different influences of e-commerce constructs on their decision making about online shopping. Similarly, the work of Slyke et al. (2010) reported that gender moderates the influence of relative advantage and compatibility on consumer's e-commerce adoption. In addition, gender differences have been shown in the influence of browsing frequency on online consumer's perceived control and patronage intentions in E-tail (Wang 2010). These studies indicate that men and women may differ in consumer e-commerce adoption and purchase decision making. Further evidence is provided by Pascual-Miguel et al. (2015). By integrating perceived risk and trust into the extended unified theory of acceptance and use of technology (UTAUT2), they found that effort expectancy and social influence on purchase intention are significantly stronger for female shoppers than for male shoppers. Also, product type affects the relationship between perceived risk and purchase intention in digital goods, where the influence is significantly higher for women. In addition, gender differences in e-commerce settings have been supported by the work of Chen et al. (2015), who found that gender moderates the impact of perceived benefit on people's intention to purchase and trust propensity, and jointly moderates role in affecting the impact of perceived benefit on people's intention to purchase. These studies align with the key finding of the work of Dittmar et al. (2004), that females are more strongly influenced by social and emotional factors in online shopping environments.

Gender differences in the influences of emotional factors have also been investigated. For example, Zhang et al. (2014) found that the moderating effect of inconsistent reviews in the relationship between emotional trust and purchase intention in the online shopping context is stronger for female consumers than for male consumers. Men and women have different perceptions about security issues in online shopping environment, resulting in different purchase behavior (Bartel Sheehan 2000, Garbarino and Strahilevitz (2004).

These studies indicate that prior research has examined social, psychological, and security constructs associated to e-commerce environments. A deeper understanding of gender difference in consumer e-commerce decision making is helpful for both researchers and practitioners to gain insights into online consumer purchase behavior. Investigating gender differences in e-commerce will also benefit to reducing barriers to online shopping behavior based on gender awareness. As such, this research explores gender differences using an online product presentation perspective including multiple levels of constructs. More specifically, we test the moderating role of

gender in the reaction to designed functions, e-commerce evaluation, and security-related constructs.

## 3 Theoretical Foundation and Research Model

### 3.1 The Selectivity Hypothesis

The Selectivity Hypothesis (Meyers-Levy 1986, 1988; Meyers-Levy and Maheswaran 1991) focuses on gender differences in information processing strategies. Briefly, it states that men and women evaluate products based on *different* amounts of information and *different* product information. According to the selectivity model, men are posited as "selective processors", who rely on overall message themes or schemas, whereas women are usually seen as "comprehensive processors", who focus on detailed elaboration of the message content when evaluating products. Moreover, men have higher attention and elaboration thresholds than do women (Meyers-Levy and Maheswaran 1991). Due to their lower elaboration thresholds, women will engage in more detailed and comprehensive message processing and try to process all available information when evaluating products. In contrast, men will not process all the available information before they make purchase decisions. Instead, men base their decision on a portion of all the available information. In addition, Meyers-Levy (1988) argues that males have a tendency to not process all available information as a basis for judgment and females rely on multiple sources of information before making a decision. Furthermore, the selectivity hypothesis suggest that males use self-generated information cues while females use both self-generated and many other information cues in rendering judgments.

Based on the previous research, the selectivity model is well suited to explain why men and women are different in information processing. In IS research, it has been used to explain the gender difference in the effects of involvement with decision aids on users' decision making outcomes (Hess et al. 2006). Specifically, women have been found to be more involved than men with a computer-based decision aid. In the e-commerce context, understanding more clearly how consumers perform information analysis has important implications for practitioners and academics. The way how men and women process the information and evaluate the product would result in gender differences in online consumer decision making.

### 3.2 Research Model

E-commerce firms strive to continuously improve the look, feel and performance of their web sites, and to increase brand loyalty and revenue (Chen et al. 2015; Lai et al. 2014; Andoh-Baidoo et al. 2012). They seek to improve the quality,

relevance and compelling nature of the delivered information. The format of the online product presentation needs to be optimized to convey information to consumers and the transmitted information itself needs to be tailored to target market preferences. Both the information itself and the technologies used in online product presentations are shown to influence consumer's purchase intention (Park et al. 2005; Jiang and Benbasat 2007).

Internet-based interactive multimedia technologies enable e-commerce vendors to improve the interactivity and vividness of product presentations (Jiang and Benbasat 2007), thereby positively influencing consumers' purchase intentions. Both interactivity and vividness are interface design characteristics that influence the efficacy of product presentation, which jointly influence consumers' behaviors and decision making. According to a series of studies that developed and validated web site usability, design, and performance metrics (Palmer 2002), the amount and variety of product information are also found to be key factors that influence website success. In addition, consumer perceptions of transaction risk and resulting attitude are also two important factors affecting consumers' behavior in online shopping (Park et al. 2005).

Therefore, in this research, we examine the following previously identified important characteristics of online product presentation: interactivity, vividness, diagnosticity, perceived risk, and attitude towards the online presentation. We do not claim that our research model is exhaustive or a complete representation of the consumer information processing procedures. Rather, the goal of this exploratory research is to identify and explain gender differences on the impacts of these characteristics on consumer decision making. Our research model is shown in Fig. 1. In the next section, we review these factors of consumer decision-making, followed by an explanation of how these factors may affect consumer decisions differentially across genders.

## 4 Hypothesis Development

### 4.1 Interactivity

Interactivity has been defined as "the extent to which users can participate in modifying the form or content of a mediated environment in real time (Steuer 2006). Virtual product presentations can allow consumers to experience products virtually; however, consumers do not universally approve of more interactivity; some levels of interactivity are considered needless. Virtual product presentation could improve product demonstrations for the online sale of digital cameras (Jiang and Benbasat 2004), due to its effective conveyance of information to consumers. Schlosser (2003) argues that that an "object [s] interactivity should not be confused with other forms of user interaction with the machine, namely, interactivity in

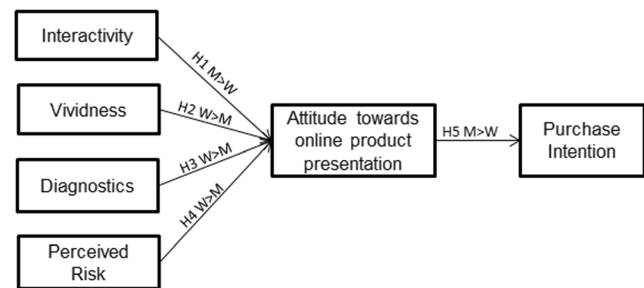


Fig. 1 Research model

instruction and navigation" (p. 185) and that interactivity can improve the effects of virtual product presentations leading consumers to more vivid mental images of the products. Prior research has confirmed the positive influence of interactivity on consumers' attitude toward the website (Coyle and Thorson 2001) and an online store (Fiore et al. 2005). Interactivity enables people to select the specific component and information they want to see from the online product presentation. In this paper, we investigate whether the genders differentially ascribe importance to the interactivity enhancing features of online product presentation during an e-commerce evaluation.

Prior studies report gender differences in technology adoption and usage, computer skills and experience, and attitude toward web advertising (Whitley 1997; Venkatesh and Morris 2000). The influences of technology-oriented factors on users' psychological perceptions and intentions to use information technology varies across genders. Males are more interested in learning and using computers and technologies and thus have developed better computer skills (Su et al. 2009). In addition, men have exhibited greater sex-role stereotyping of computers, higher computer self-efficacy, and more positive affect regarding computer usage than women (Whitley 1997). There is also evidence that men tend to have greater self-reported computer self-efficacy, lower computer anxiety, more positive attitudes towards the Internet, and longer use of the Internet than women (Dumrell and Haag 2002). These studies lead to our hypothesis that men will interact more with the online product presentations, appreciate a website's interactivity more, and base purchase evaluations more on the interactivity of a website. Interactivity as a functional design characteristic of online product presentation is more favored by male consumers, leading to their positive attitude towards the online product presentation (Dittmar et al. 2004). Further, interactivity allows online consumers to alter and customize a product's design features, background, context, viewing angle or distance, and to simulate the product's operation (Fiore et al. 2005). As such, interactivity enables consumers to select the way they want to interact with the online product presentation and choose the information they need in the evaluations of the product. This confirms the basic assumption of the selectivity hypothesis that men will only use a part of the available

information and self-generate information cues in evaluating a product (Meyers-Levy and Maheswaran 1991). The functional feature of interactivity will help consumers to make decisions based on the specific information they select, thus male consumers are more strongly influenced by this construct. Our hypothesis is:

H1: The positive relationship between interactivity and attitude towards the online product presentation *will be stronger for men than for women.*

## 4.2 Vividness

Vividness is an important website design factor, defined as “the representational richness of a mediated environment as defined by its formal features; i.e., the way in which an environment presents information to the senses” (Steuer 2006). In the context of designing online product presentation, vividness has been defined as the representational quality of product demonstrations and that “a vivid product presentation exposes consumers to more information cues about a product and stimulates more sensory channels than a pallid product presentation.” (Jiang and Benbasat 2007 P. 7). Moreover, vividness can provide multiple sensory cues that could affect initial impressions of products and allow customers to match the information available to their own decision making processes (Jiang and Benbasat 2004). In addition, the increasing use of vivid information in online product presentation could enhance its persuasiveness by affecting consumers’ attitudinal judgment (Kisielius and Sternthal 1984) and consumers’ emotion (Park et al. 2005), as vividness makes online product presentation more interesting and playful. As such, vividness enables people to view all the information and use multiple message cues in evaluating a product in online product presentation.

Vividness and the level of media richness may affect men and women differently (Dennis et al. 1999). Vividness can improve consumers’ purchase intentions by improving their first impressions of products, generating positive attitudes toward products, and reducing the perceived risk of products. Furthermore, prior research demonstrates a relationship between vividness and human experience with technology (Hoffman and Novak 1996). A consumer’s experience with computers and technology can affect how strongly the vividness of a product presentation influences their brand evaluation. Appreciating to the multiple information cues and the quantity of information conveyed by vividness of the online product presentation, female consumers may have better evaluations of the product to support their purchase decision making. This is consistent with the assumption of the selectivity hypothesis that the multiple information cues and channels featured by vividness are more favored by women than by

men. Females are shown to attend more diligently to message cues and males have been shown to encode fewer ad claims than females (Meyers-Levy and Maheswaran 1991). As such, vividness plays an important role in female consumers’ evaluations of the products, leading to their positive attitude toward the online product presentation. Therefore, we expect males to pay less attention to the presentation nuances and variety provided via vividness of an online web advertisement, and we hypothesize:

H2: The positive relationship between vividness and attitude toward the online product presentation *will be stronger for women than for men.*

## 4.3 Diagnosticity

The diagnosticity of website content measures the amount and quality of utilitarian information provided about a product (Aaker 2000). In online shopping, web site-provided information may include details such as physical specifications, price, warranty information, and features. This information can help consumers gain a further understanding of the product they are investigating, and can allow the consumers purchase in greater confidence. Diagnosticity has been found to be positively associated perceived usefulness of websites, which could influence online consumers’ product understanding (Jiang and Benbasat 2007). Online consumers’ high diagnosticity is helpful for them to understand and evaluate a product in an online product presentation.

We propose that a gender difference exists in the importance of information diagnosticity. The selectivity hypothesis (Meyers-Levy 1986) contends that males are selective, heuristic message processors, who respond to “simple ego-gratification emotional appeals” (p. 999). In contrast, females are more deliberate in their decision-making. Females, more so than males, should therefore attend to and appreciate diagnostic information. Thus, we expect:

H3: The positive relationship between diagnosticity and attitude towards the online product presentation *will be stronger for women than for men.*

## 4.4 Perceived Risk

Perceived risk is a consumer’s cognitive evaluation, defined concerning Internet shopping as “the subjectively determined expectation of loss by an Internet shopper in contemplating a particular online purchase” (Forsythe and Shi 2003). Considerable research has examined the impact of risk on traditional brick-and-mortar-store consumer decision making (Taylor 1974). While Internet shopping is more common now,

consumers perceive Internet shopping to have higher risk than in-store shopping (Donthu and Garcla 1999). As such, examinations of perceived risk in online shopping are important, and the negative impact of perceived risk on consumer's behavior has been confirmed in the context of e-commerce (Vijayasathy and Jones 2000). In this study, we test the moderating role of gender in the effects of perceived risk on consumer's attitude toward the online product presentation.

In the context of purchasing online, we contend that perceived risk may be more of a concern for females than for males. For example, females perceive a greater risk of their personal privacy than men when shopping online (Bartel Sheehan 2000). Perceived risk captures consumers' psychological perceptions and emotional responses to an online product presentation, which influences female consumers' online purchase decisions more strongly (Dittmar et al. 2004). This is evidenced by the work of Garbarino and Strahilevitz (2004), reporting that women perceive a significantly higher level of risk and higher level of negative outcomes in online shopping. Men and women have different perceptions of risks in online shopping environment. When facing such potential risks, women are usually believed to be less risk taking than men (Dwyer et al. 2002). Thus we hypothesize:

H4: The negative relationship between perceived risk and attitude toward the online product presentation will be stronger for women than for men.

#### 4.5 Attitude and Intention to Purchase

Attitude has been commonly investigated in behavioral business research as an antecedent of behavioral intention (Ajzen and Fishbein 1977; Macintosh and Lockshin 1997; Shim et al. 2001). Two important theories, the Theory of Reasoned Action (Fishbein and Ajzen 1975) and the Theory of Planned Behavior (Ajzen 1991), include the effects of attitude towards a behavior on that behavior itself. Based on certain beliefs, a person forms an attitude about a certain object, on the basis of which he or she forms an intention to behave with respect to that object (van der Heijden 2003). In the e-commerce setting, the outcome behavior, purchase intention, is affected by consumers' attitude toward the brand and attitude toward the ad (Mackenzie and Lutz 1989; Brown and Stayman 1992). In this paper, we test for gender differences in the influence of pre-purchase factors on attitudes toward the online product presentation. We utilize the label attitude toward the online product presentation as the research context was a pc-based online e-commerce setting.

Some studies have demonstrated that significant gender differences exist in attitudes towards shopping online (Van Slyke et al. 2002; Wolin and Korgaonkar 2003). Gender has been found to be a significant predictor of an individual's

intention to make a purchase on a website (Van Slyke et al. 2002). Males more so than females, reported higher intention to use the web for shopping and more favorable perceptions of the characteristics of web shopping. Moreover, males and females can differ significantly on several dimensions with males more than females reporting more positive beliefs and attitudes about Web advertising (Wolin and Korgaonkar 2003). While females spend more time shopping online (in the pre-purchase information gathering phase), males are more likely than females to purchase from the Web. Males typically use the web for more functional- and entertainment-oriented activities, whereas females are more likely to surf the Web for information gathering, but make the purchase at the shopping mall. As such, online shopping is generally considered as a more task-oriented, focused environment. Given that attitude towards the ad impacts consumer intention to purchase (Brown and Stayman 1992), and based on our socialized assumption that men favor individualistic and task-oriented environments, we posit that attitude toward the online product presentation is a more salient predictor of purchase decisions for males than females. Thus, we hypothesize:

H5: The positive relationship between attitude toward the online product presentation and purchase intention will be stronger for men than for women.

## 5 Research Method

### 5.1 Sample & Data Collection Procedure

An online survey was administrated which gathered data from undergraduate students ( $N = 318$ , 47% Male) who attended a large university in the United States in 2012. All of the subjects had prior experience in completing e-commerce purchases. In order to test the influence of interactivity and vividness, we used four websites ( $2 \times 2$  design) chosen by a panel of 5 researchers to exhibit varying levels of interactivity and vividness. In a controlled computer lab, subjects were randomly assigned into one of the website treatment groups. Each subject then reviewed live online web advertising of either a digital camera or an iPad. After a uniform 10 min exposure, subjects completed a survey for nominal course credit. Each respondent completed the survey (150 males and 168 females).

### 5.2 Measurement

The measures in this paper were adapted from prior studies. Most items were measured using a seven-point Likert-type scale with the "strongly agree/disagree" anchors. Items for

Interactivity were adapted from (Peng et al. 2004; Campbell et al. 2011); Vividness from (Jiang and Benbasat 2007); Diagnosticity from (Aaker 2000); Perceived Risk from (Featherman and Wells 2010); Attitude towards the online product presentation was based on (Mackenzie et al. 1986); and Intention to Purchase from (Coyle and Thorson 2001). The detailed measurement items are shown in Table 1. In addition to the constructs of interest, age was included as a control variable in the model. Before formally collecting data, a pilot test was performed to validate the instrument. The subjects were asked to comment on the items to ensure no errors were present. The pilot test found no issues with the instrument, so all items were kept.

In addition, descriptive statistics of each construct were calculated and are displayed in Table 2. The ratio of sample size to independent variables, including gender, is 45:1, which exceeds the rule of thumb of 10 for the sample size requirement in a regression analysis (Vittinghoff and McCulloch 2007). Scatter plots for each construct indicate that the observations are free from nonlinear patterns. In addition, the skewness values for all the distributions are between -1 and +1; the Kurtosis values are between -3 and 3 as measured in SPSS v20. Therefore, the assumptions for linearity and normality were met.

## 6 Analysis and Results

### 6.1 Analysis Method

Structural equation modeling was utilized to analyze the items, variables, the overall research model and the hypothesized relationships. A confirmatory factor analysis was utilized to ensure sufficient reliability and validity for the measures, followed by the structural model analysis using SmartPLS 3.0 (Ringle et al. 2015). PLS-SEM has been demonstrated as sufficient to assess the reliability and validity of construct measures (Chin et al. 2003; Ringle et al. 2012). Additionally, common method bias (CMB) was investigated using Harman’s single-factor method and by determining the variance inflation factors (VIFs). Harman’s test found six distinct factors, explaining 60.3% of the variance, supporting a lack of CMB. The VIF values, which represent the degree to which standard error has been increased due to collinearity, are well under the threshold of 5 (see Table 3), also supporting a lack of CMB (Hair et al. 2016).

To statistically test the hypotheses, we used multiple-group PLS (Qureshi and Compeau 2009) and followed the well-established data analysis procedure demonstrated in prior gender difference research (Keil et al. 2000; Slyke et al. 2010; Lin et al. 2013). Specifically, the structural research model was tested separately for both male and female sub-groups and the path coefficients are compared across these two groups.

The following formula provided by Keil et al. (2000) was used to calculate the t-values and to evaluate the significance levels of beta differences between male and female groups.

$$S_{pooled} = \sqrt{\frac{N_1-1}{N_1+N_2-2} \times SE_1^2 + \frac{N_2-1}{N_1+N_2-2} \times SE_2^2}$$

$$t = \frac{PC_1 - PC_2}{S_{pooled} \times \sqrt{\frac{1}{N_1} + \frac{1}{N_2}}}$$

Where

- S<sub>pooled</sub> pooled estimator for the variance
- t t-statistic with N<sub>1</sub> + N<sub>2</sub> - 2 degrees of freedom
- SE<sub>i</sub> standard error of path in structural model of gender i
- PC<sub>i</sub> path coefficient in structural model of gender i

### 6.2 The Results of Measurement Model Testing

Factor loadings and average variance extracted were used to test the convergent validity and reliability of each variable in this study. We used established reliability and validity criteria to test the measurement instrument (Hair et al. 2006), Reliability of the survey instrument was established using Cronbach’s alpha (see Table 4) to measure each scale’s internal consistency. The alpha values of each construct’s internal consistency exceeds the 0.7 threshold, indicating that the construct validity is acceptable. Table 5 shows the cross loadings of indicators for this study. The factor loadings of all indicators load highest on their respective constructs and are above the .70 value required (McMillan 2005; Chin 1998).

ATT = Attitude; DIAG = Diagnostics; INTERACT = Interactivity; PINT = Purchase intention; PRISK = Perceived risk; VIVID = Vividness.

To satisfy discriminant validity, the square root of AVE should be greater than the inter-scale correlation (Chin 1998). Table 6 shows the latent variable correlations for this study. The AVE for each construct is above 0.7 (Kline 2000), which indicates that the latent factors can explain at least 70% of the measured variance. In addition, none of the construct correlations are above .5 and are within .1 of the square root of the AVE values, demonstrating discriminant validity.

### 6.3 The Results of Structural Model Testing

Figure 2a and b show the statistical models for the female and male groups respectively. The control variable of Age had no significant effect in either model. To examine the gender differences, we calculated the differences between the standardized path coefficients (the beta values in Table 7) in the structural model for women to the corresponding coefficients in the model for men. Table 8 shows the results of this analysis.

**Table 1** Constructs and measurement indicators

Constructs	Measurement indicators
Interactivity	IN1 There are a lot of possible ways to manipulate the online product presentation
	IN2 The functionality in the online product presentation allowed me to do many things
	IN3 There were many different ways to use this online product presentation.
Vividness	VI1 The product demonstration on this website is animated
	VI2 The product demonstration on this website is lively
	VI3 I can acquire product information on this website from different sensory channels
	VI4 This website contains product information that is exciting to senses
Diagnosticity	DIA1 The content I viewed today made me understand how the product works
	DIA2 Overall, how helpful was the content you evaluated today, to judge the quality and performance of the product you reviewed? (1 not at all helpful/7 very helpful)
	DIA3 I was exposed to enough information today to make any evaluation of the product I reviewed
	DIA4 I learned enough about the product today to be able to decide whether I want to use it
Perceived risk	PR1 The website I reviewed may not process transaction correctly and create problems for me (performance risk)
	PR2 Using the website I reviewed made me frustrated
	PR3 People who are important to me would think I am foolish to use the website I reviewed (social risk)
	PR4 Using the website I reviewed would cause me to waste a lot of time (time risk)
	PR5 My personal information would be less confidential (less private) if I purchased from the website I reviewed (privacy risk)
	PR6 Overall using the website I reviewed is risky (overall risk)
Attitude towards online product presentation	Please rate your reactions to the website you have just reviewed:
	ATT1 Very much dislike (1) - very much like (7)
	ATT2 Very unfavorable (1) - very favorable (7)
	ATT3 Very worthless (1) - very valuable (7)
	ATT4 Very bad (1) - very good (7)
Intention to purchase	PI1 It is likely that I will buy this product.
	PI2 I will purchase the product the next time I need such a product.
	PI3 Suppose that a friend calls me to get my advice in his/her search for the same product, I would recommend him/her to buy this product.
	PI4 I will definitely try this product.

**Table 2** Descriptive statistics for each construct (mean and SD)

	All		Women (N = 168)		Men (N = 150)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Interactivity	5.038	1.075	5.029	1.143	5.049	.997
Vividness	4.444	1.388	4.424	1.496	4.467	1.260
Diagnostics	4.516	1.196	4.545	1.194	4.483	1.201
Perceived risk	3.371	1.232	3.416	1.199	3.319	1.272
Attitude	4.543	1.400	4.642	1.391	4.429	1.406
Intention to purchase	4.095	1.411	4.170	1.374	4.010	1.453



**Table 3** Variance inflation factors for each path

Path	VIF
Interactivity → Attitude	1.493
Vividness → Attitude	1.537
Diagnostics → Attitude	1.317
Perceived Risk → Attitude	1.018
Attitude → Intention to purchase	1.000

The  $R^2$  shows that the research model accounts for 56.6% of the variance in attitude towards online product presentation and 38.1% of the variance in purchase intention for the female group. In contrast, for male group, it explains 40.8% of the variance in attitude towards online product presentation and 40.8% of the variance in purchase intention. The big difference of the variance in attitude towards online product presents indicates that gender explains the extra variance in consumer's attitude toward online product presentation.

With one exception, the results support the gender-differences hypotheses. More specifically, gender moderates the influences of interactivity, vividness, diagnostics, and perceived risk on consumer's attitude as well as the impacts of attitude on purchase intention. Interactivity has greater influences on attitude for males than females, while vividness and diagnosticity have greater influence on attitude for females than males, supporting H1, H2, and H3. In addition, the research results indicate that there are strong gender differences on the hypothesized set of influences of consumer attitude toward online product presentation, which supports H5. However, H4 is not supported. Though gender was found to moderate the relationship between perceived risk and attitude, interestingly, the relationship is opposite the hypothesized direction. For this sample and context, we found that perceived risk does not have a significant impact on female's attitude toward the online product presentation. This needs further investigation in future research. One possible explanation is the work of Bartel Sheehan (2000), which proposes that women rarely adopt protective behaviors when privacy risks become concerns in online shopping environments. This may reduce the influences of perceived risk on female consumers' attitude.

**Table 4** Cronbach's alpha

Construct	Number of items	Cronbach's alpha
Interactivity	3	0.861
Vividness	4	0.898
Diagnostics	4	0.902
Perceived risk	6	0.936
Attitude	4	0.96
Intention to purchase	4	0.925

## 7 Discussion

Grounding on the selectivity hypothesis, our research explored gender differences in the effects of factors that impact consumers' attitudes toward online product presentation, which in turn impact their purchase intention. The research results provide strong evidence that gender differences exist in online consumer behavior and purchase decision making. We conclude our contributions to both theory and practice as follows.

### 7.1 Theoretical Contribution

First, gender difference literature is under-represented in the IS discipline (Lin et al. 2012). The found gender differences in the relationship between factors and online consumer's behavior indicate that consumers based their online purchase decision on different factors and on different weights of the same factors in the context of e-commerce. Few studies have focused on gender differences in online consumer's decision making, thus, our findings here are valuable for IS researchers to understand role of gender in online consumer behavior and provide some directions for future research. Siding on this point, our research helps to advance gender differences research by extending it to online consumer's purchase decision making. On the other side, we bring the gender perspective into consumer's behavior research in e-commerce. Gender, an important market segmentation factor, is an essential marketing strategy for online business to reach their target customers. Future research should continue discovering gender-affected differences in online shopping environments.

Second, our study investigates gender differences in the influences of both functional and psychological factors on consumers' purchase decisions. The results support gender differences in the influences of all constructs studied on consumer's purchase decision making. Specifically, gender moderates the influence of interactivity, vividness, and perceived risk on the attitude toward online product presentation as well as the influence of attitude on consumer purchase intention. These results confirm that both the designed functions of online product presentation and consumer's psychological perceptions differently influence online consumer purchase decisions across genders. Comparing to a key finding of prior studies (e.g. Dittmar et al. 2004) that men are comparatively more motivated by functional factors and women are more motivated by emotional and social factors in online shopping environments, our research results reveal something different but interesting. For example, interactivity has greater influences on attitude for males than females, while vividness have greater influence on attitude for females than males. Interactivity and vividness, as the key design functions, do not both influence consumers' attitude more strongly for males than females. This indicates that female consumers are

**Table 5** Factor cross loadings

	ATT	DIAG	INTERACT	PINT	PRISK	VIVID
ATT1	<b>0.947</b>	0.552	0.447	0.613	-0.193	0.52
ATT2	<b>0.956</b>	0.55	0.402	0.586	-0.171	0.568
ATT3	<b>0.933</b>	0.513	0.39	0.558	-0.135	0.486
ATT4	<b>0.946</b>	0.534	0.424	0.582	-0.179	0.55
DIAG1	0.501	<b>0.853</b>	0.363	0.415	-0.091	0.405
DIAG2	0.505	<b>0.874</b>	0.34	0.405	-0.162	0.336
DIAG3	0.492	<b>0.893</b>	0.341	0.451	-0.078	0.372
DIAG4	0.5	<b>0.897</b>	0.386	0.47	-0.091	0.408
INTERACT1	0.27	0.242	<b>0.798</b>	0.136	0.081	0.398
INTERACT2	0.474	0.412	<b>0.918</b>	0.36	-0.137	0.548
INTERACT3	0.378	0.387	<b>0.925</b>	0.283	0	0.462
PINT1	0.514	0.431	0.235	<b>0.897</b>	-0.131	0.34
PINT2	0.561	0.474	0.298	<b>0.922</b>	-0.093	0.399
PINT3	0.629	0.502	0.367	<b>0.908</b>	-0.16	0.487
PINT4	0.518	0.368	0.216	<b>0.886</b>	-0.017	0.38
PRISK1	-0.076	-0.042	0.066	-0.042	<b>0.821</b>	0.035
PRISK2	-0.174	-0.135	-0.083	-0.09	<b>0.872</b>	-0.018
PRISK3	-0.084	-0.065	-0.036	-0.007	<b>0.881</b>	0.028
PRISK4	-0.166	-0.15	-0.044	-0.111	<b>0.847</b>	-0.024
PRISK5	-0.189	-0.098	-0.049	-0.156	<b>0.884</b>	-0.015
PRISK6	-0.169	-0.086	-0.019	-0.106	<b>0.904</b>	0.002
VIVID1	0.434	0.331	0.417	0.351	0.053	<b>0.871</b>
VIVID2	0.529	0.405	0.498	0.404	0.007	<b>0.914</b>
VIVID3	0.427	0.343	0.505	0.339	-0.019	<b>0.813</b>
VIVID4	0.558	0.422	0.478	0.46	-0.052	<b>0.9</b>

Bold are used to indicate the loading are for the corresponding construct, and the other values are for crossfactor loadings

ATT = Attitude, DIAG = Diagnostics, INTERACT = Interactivity, PINT = Purchase intention, PRISK = Perceived risk, VIVID = Vividness

becoming more comfortable with technology use in the online environment, which weakens the gender differences due to such psychological perceptions of technology usage as computer anxiety. The point explaining gender differences is the usefulness of design features in information processing, assist in consumers' evaluations of products. That is why we chose the selectivity hypothesis in explaining gender differences in this study. As expected, the research results well support prior

research (Meyers-Levy 1986) that found that males prefer more engaging content and females, being more deliberate in decision-making prefer more diagnostic content, which for females of this study, meant less interactive and more informational. Males of this study also need diagnostic information to make product purchase decisions, and perhaps ascribed higher levels of diagnosticity to the interactive information. In addition, attitude influences purchase intention

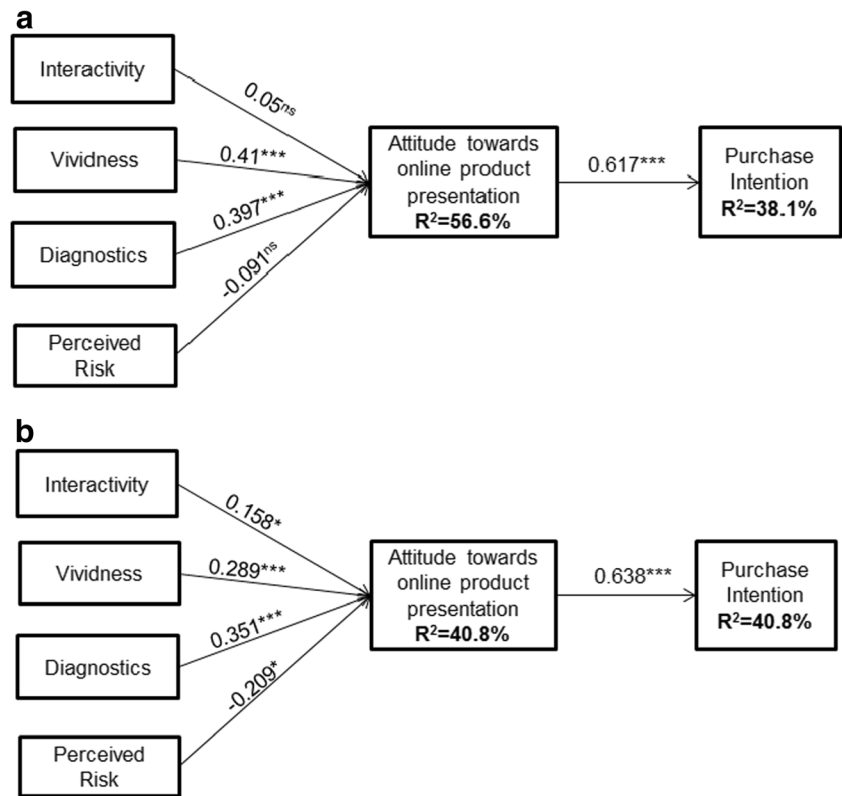
**Table 6** Latent variable correlations

Construct	AVE	CR	1	2	3	4	5	6
1. Attitude	0.894	0.971	<b>0.946</b>					
2. Diagnostics	0.773	0.932	0.569	<b>0.879</b>				
3. Interactivity	0.779	0.913	0.440	0.407	<b>0.888</b>			
4. Perceived Risk	0.755	0.947	-0.180	-0.120	-0.043	<b>0.869</b>		
5. Purchase Intention	0.816	0.949	0.619	0.495	0.314	-0.114	<b>0.903</b>	
6. Vividness	0.766	0.929	0.563	0.432	0.542	0.449	-0.006	<b>0.875</b>

Square Root of AVE shown in bold as the diagonal

AVE – Average Variance Explained. CR – Composite Reliability

**Fig. 2** **a** Statistical model – female sample. **b** Statistical model – male sample



more strongly for males than females, which suggests other pre-purchase factors are also weighed by females.

Third, we successfully employed the selectivity hypothesis to explain gender differences of consumer’s purchase decisions in the context of e-commerce. The selective hypothesis proposed by Meyers-Levy (1986) lies in marketing discipline and focuses on explaining gender differences in information processing. This study indicates that this theory could be used to explain the role of gender in IS research. Now in today’s “information age”, understanding how people process information and use information is essential for IS success (Petter et al. 2012). The selective hypothesis will bring some important insights by explaining gender differences involving in processing information for both individual usage and business usage. However, prior studies have drawn upon other theories in explaining gender differences. For example,

Chai et al. (2011) employed social role theory to study gender differences in bloggers’ knowledge sharing. This may suggest that the selection of the theories may vary across different context of the focus of the study. When studying gender differences, future research should be very careful about selecting the right theory.

### 7.2 Practical Contribution

First, our results indicate that online vendors could better promote their products by being gender aware and by providing different versions of their website when the gender of website visitor is known (such as when they log in). E-commerce businesses should position their pages/product offerings differently based on which (if any) gender they are targeting. Gender (when combined with age) may be viewed as a

**Table 7** Summary statistics for the female and male models

Path	Women			Men		
	β	T	S.E.	β	T	S.E.
Interactivity – Attitude	0.05 <sup>ns</sup>	0.617	0.082	0.158 <sup>*</sup>	2.403	0.066
Vividness – Attitude	0.41 <sup>***</sup>	4.912	0.083	0.289 <sup>***</sup>	3.37	0.086
Diagnostics – Attitude	0.397 <sup>***</sup>	4.783	0.083	0.351 <sup>***</sup>	4.094	0.086
Perceived Risk – Attitude	-0.091 <sup>ns</sup>	1.545	0.059	-0.209 <sup>*</sup>	2.003	0.104
Attitude – Purchase Intention	0.617 <sup>***</sup>	8.456	0.073	0.638 <sup>***</sup>	12.664	0.05

\*0.05 Significance, \*\*0.01 Significance; \*\*\*0.001 Significance; NS = not significant

**Table 8** Results of hypothesis tests for path differences

Hypotheses	Hypothesis	Direction	T	Sig.	Results
H1	Interactivity-Attitude	W < M	-12.84	***	Supported
H2	Vividness-Attitude	W > M	12.76	***	Supported
H3	Diagnosticity-Attitude	W > M	4.85	***	Supported
H4	Perceived Risk-Attitude	W < M	12.61	***	Not supported
H5	Attitude-Purchase Intention	W < M	-2.96	***	Supported

\*0.05 Significance, \*\*0.01 Significance; \*\*\*0.001 Significance; NS = not significant

summary variable which is a proxy for several contributing factors. Further unpacking of gender effects is warranted and increased insight into how and when gender moderates the impacts of various factors prevalent in the ecommerce marketplace is needed. The underscored gender differences in evaluating product provides further insights for online vendors when trying to better convey the product information to their targeted groups and design the online product presentation more efficiently. By focusing on the correct cues that the targeted gender most appreciates, the probability of making that all-important sale is increased. As such, being aware of gender differences in online shopping environment may help marketing management develop the right marketing strategy.

Second, the research results indicates gender moderates the influences of interactivity, vividness, diagnostics, and perceived risk on consumer's attitude as well as the impacts of attitude on purchase intention. Interactivity and perceived risk have greater influences on attitude for males for males than females, while vividness and diagnosticity have greater influence on attitude for females than males. These findings suggest that for male-oriented websites the interface should use more risk-reducing information, and more interactive, engaging content. For female-oriented websites, following Meyers-Levy and Maheswaran (1991), the interface should use highly diagnostic information presented in a rich format. Taking advantages of these findings, marketers could better promote their products by implementing more-effective designed features of online product presentations. For example, for women-oriented products, designers may improve the level of vividness of online product presentation to better convey the information for their targeting customers. In constructs, for men-oriented products, designers may improve use high level of interactivity to better present product information for their targeting customers.

### 7.3 Limitations and Suggestions for Future Research

The limitations of this study provide some salient ideas for future research. First, our subjects were college students of different ages. Although they have experience with online shopping, it could still be a limitation of this study because students typically lack for money. This limitation may influence purchase decisions making. To better generalize the

research findings, future research should consider diverse subjects from all economic backgrounds. Additionally, other control variables should be tested in the model, including amount of experience with online shopping, average amount spent in online shopping, and income. Second, we used two categories of products (digital cameras and iPads). Students may be familiar with these two products, thus negatively influencing their perception of perceived risk. In future studies, researchers should consider more product characteristics such as category of products, the price of products, and familiarity of products. Third, researchers may build on our research by investigating gender differences in other contexts such as IS adoption and usage.

## 8 Conclusion

Men and women are different. As has been the topic of many discussions, the genders differ in many things. Drawing on the selectivity hypothesis, in this study, we have found support for these differences pervading the e-commerce realm as well. To influence their purchase intentions via their attitudes, men are more affected by the interactivity of a website than women are. In contrast, women are more affected by vividness, diagnosticity of the information, and perceived risk. E-commerce businesses who are looking for an edge over their competition should consider these findings when designing their pages. It may be the difference on making that all-important sale.

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