

An Experimental Investigation of Regulatory Orientation and Post-Choice Regret in Online Product Selection

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Abstract:

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Keywords: peer endorsement system (PES) | product information uncertainty | post-choice regret | regulatory orientation

Article:

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AN EXPERIMENTAL INVESTIGATION OF REGULATORY ORIENTATION AND POST-CHOICE REGRET IN ONLINE PRODUCT SELECTION

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ABSTRACT

Delivering product information effectively is fundamental to customer satisfaction and e-retailer success. In this study we examine the way in which the presentation of online customer reviews in peer endorsement systems (PES) impact perceptions of post-choice regret. The theory of Regulatory Orientation is used to account for individual differences in the way that online review content is processed. Results of a laboratory experiment comparing two peer endorsement system formats show that PES content presentation significantly impacts perceptions of post-choice regret. These perceptions are found to be strong influencers of user intention to use the PES. The study's findings provide theoretical insights into how individual orientation and PES technology influence online decision-making with regards to product selection. As a result, the study has important implications for managers looking to get the most from investment in PES systems deployment and online web retail space design.

Keywords: peer endorsement system (PES), product information uncertainty, post-choice regret, regulatory orientation

1. Introduction

Websites today are crowded with product information and recommendations, company offers, and customer reviews, all of which vie for a customer's attention. It is important to make sure that each of these components adds value and improves the web shopping experience, without adding unnecessary "noise" to the ecommerce decision-making process.

Over the last five years, presentation of online customer reviews and opinions has occupied an increasingly large share of prominent website space. The emergence and growing popularity of systems for displaying these online customer reviews, or peer endorsement systems (PES) has created new opportunities for ecommerce companies to interact with and understand their customers. Today, these systems represent an important source of aggregate product information [Wang & Benbasat 2007], and play an integral part in conveying the product's strengths and weaknesses to potential customers [Mudambi & Schuff 2010; Ghose & Han 2009]. On account of the unique and valuable capabilities offered by PES, the technology has diffused to such a degree as to be ubiquitous on nearly all ecommerce sites.

Despite the potential value of PES, reading online customer reviews places certain demands on the cognitive load of customers [Ghose & Ipeirotis 2006]. This can pose a problem for decision making, for as customers' become overloaded with information they struggle to discern the important from the mundane [Keller & Staelin, 1987; Maes 1994; Wan et al. 2009]. When this happens, information vital to making informed purchase may go overlooked. Worse, customers may begin to question the value or accuracy of PES information, and as a result feel uncertain about the entire transaction [Pavlou et al. 2007]. This uncertainty leads to poor decision-making, customers buying unsuitable products, higher returns, and hence reduced customer satisfaction [Kuksov & Villas-Boas 2010; Larson & Czerwinski 1998; Lowengart & Tractinsky 2001]

Additionally, customers who experience uncertainty when selecting products may be more likely to regret their selections, leading to a decline in repeat business [Zeelenberg 1999; Lu, et al. 2012]. When competitors are only a click away, e-Commerce organizations can ill-afford to lose these customers. For this reason, understanding the role of PES content in online decision making has been an important area of research over the last few years [Mudambi & Schuff 2010]. Much of this research centers on how to effectively display or summarize online review content, so that customers are only asked to analyze useful information [Ghose & Ipeirotis 2007]. The research in this area can be divided into two groups. The first group considers online reviews in their entirety, and seeks to understand the characteristics of helpful reviews, with the goal of showing only the most helpful reviews to customers [Hu, Pavlou and Zhang 2006]. Mudambi and Schuff [2010], for example, identified characteristics common in reviews flagged as helpful by the Amazon.com community. Researchers in the second group look to actively manipulate PES content so that only helpful *pieces* of reviews are shown to customers [Dave, Lawrence and Pennock 2003; Ghose & Ipeirotis].

Despite the attention devoted to both understanding and summarizing PES review content, little research has actively tried to compare the performance of summarized and complete reviews in a systematic way. As a result, the extant research is fragmented. This study makes a contribution to these streams of literature by providing an experimental analysis of both PES presentation formats (summarized and complete reviews). Additionally, the paper makes a larger contribution by extending the level of analysis from the PES content to the individual characteristics that determine how this content is consumed by customers.

While there is no dearth of research examining the characteristics of PES reviews and systems, far less attention has been given to how behavioral differences in individuals impact the way that PES content is received. This study makes a significant contribution to address this gap in literature. Individuals often make decisions in radically different ways, and for this reason it is important to consider the factors that drive preference for information presentation and delivery [Park and Gretzel 2010]. Understanding these factors is one of the goals of this study. Specifically, we are interested in studying how personality and the format (i.e. summarized vs. whole reviews) of PES content impact a person's perceptions of uncertainty when selecting products online.

As the theoretical base for this research, we employ the theory of regulatory orientation [Higgins 2005]. The theory of regulatory orientation argues that people make better decisions when "their strategies for goal pursuit match their regulatory orientation" [Lee et al. 2010]. The theory distinguishes between two types of orientation. Prevention oriented individuals like to rely on structure and a precise method when making decisions, while promotion oriented individuals are less concerned with structure than overall effort [Higgins 2001; Higgins 2005]. The theory of regulatory orientation has gained popularity in the areas of marketing and psychology for its ability to provide explanations for the ways in which individuals interpret the same information in varied ways [Lee & Aaker 2004; Lee et al. 2010]. This study, to our knowledge, represents one of the first studies in IS research to examine the role of regulatory orientation in the context of PES data presentation. According to the theory of regulatory orientation, the fit between a person's orientation and the information problem they are faced with creates benefits for the individual. For example, one orientation may prefer summarized content when making many types of decisions. Someone else may prefer to simply read a large amount, in the hopes that the valuable information will "bubble up". The theory of regulatory orientation provides a means of assessing individual preferences for these and other problem solving strategies.

In the marketing literature, the theory of regulatory orientation has proven robust and reliable for answering questions pertaining to customer trust, brand loyalty, and product and company satisfaction [Avnet & Higgins 2006; Das & Kerr 2010]. This study expands this research to address the problem of product selection uncertainty and post-choice regret. Post-choice regret is a negative emotion borne of valence between a choice made and the lost opportunity for other options that could have been chosen [Loomes & Sugden 1982; Miller & Taylor 1995]. As delivery agents for information used in online decision making, PES content plays an important role in customer perceptions of satisfaction and uncertainty around a particular transaction. For this reason, PESs have a significant role to play in mitigating, or compounding, the inherent uncertainty in an online transaction [Pavlou et al. 2007]. We are now ready to explicitly state the research questions used in this study. Specifically, we ask the following:

1. How does the presentation format used by a PES influence perceptions of product information uncertainty and post-choice regret in an online ecommerce environment?
2. How does regulatory orientation impact perceptions of product information uncertainty and post-choice regret?
3. Finally, what is the impact of post-choice regret on further use of the PES?

In this study we present data from an experiment that involves participants selecting products online while using two major PES formats. Participants in this study were also asked to comment on some open-ended qualitative questions to add richness and depth to the findings.

The study is organized as follows. First, we provide a background on the literature in the area of PES, and present our rationale for focusing on post-choice regret and product information uncertainty. With this foundation, we present a theoretical model of the nature of regret in ecommerce and the role of the theory of regulatory orientation. The experimental methodology is then discussed together with a detailed analysis of the fundamental differences in the PES formats that we considered. The data from this experiment are then analyzed using a multi-group structural equation modeling (SEM) technique. The results of this analysis are presented, followed by the additional qualitative analysis that took place immediately following the experiment. Finally, the implications of the study are discussed together with the impact of the findings and some directions for future research.

2. Background and Model Development

A PES is a searchable database designed specifically to let customers read about and share their experiences around a particular product or service [Mudambi & Schuff 2010]. Many PESs contain tools to help users identify helpful or high quality reviews, or lump reviews into categories based on an author provided product rating (e.g. 1 to 5 stars). Since PES pool together the opinions and experiences of a large number of users of a product, they have the potential to give a customer very rich and complete data about the nature of the product. Customers can then leverage this information to make informed purchasing decisions and compare the product against other available options.

Past academic research around PES has looked at the nature of use of these systems, and the impact of PES on product sales [Mudambi & Schuff 2010; Pavlou & Gefen 2004; Dave et al. 2003; Hu et al. 2001]. The presence of customer reviews on a site has been shown to influence buyer trust. Pavlou and Gefen [2004] found that sites that displayed many reviews were seen as more trustworthy than those that showed only a few for each product. Reviews may also impact perceptions of product quality [Hu et al. 2006], which may account for the recent findings of several studies that large numbers of positive reviews have a direct impact on increasing product sales [Clemons et al. 2006; Ghose & Ipeirotis 2007]. These findings show that online customers put much stock in what their peers think and say about products and services.

In addition to studies examining the characteristics and design of PES content presentation, academic researchers have also begun to examine what gives value to any one particular online customer review. In a recent article, Mudambi and Schuff [2010] examined some common elements of reviews (star ratings, length, etc.) to determine which were most likely to be flagged as helpful by the Amazon.com community. In this study, the authors found that the type of product seems to greatly influence the extent to which customers utilize reviews, and what types of reviews are deemed helpful. These studies are important because of the growing interest in the fields of computer-science and data mining in developing methods for the delivery of review content. As the work of Mudambi and Schuff [2010] shows, however, exactly how many reviews, and how much of each review, should be shown to customers is still largely undecided.

Despite the attention given to the study of PES in recent years, there are still significant gaps in this literature that have yet to be explored. This is due to the fact that, to date, the majority of PES research has been largely data and system driven. In other words, PES researchers have given significant attention to the study of both PES systems and PES content, while spending little time studying the individual characteristics of the people that use these systems, and consume this content. As a result, our understanding of the nature of helpful online reviews, and helpful online systems, has expanded, but there is still work that needs to be done to answer the question: helpful to whom.

This is the main gap addressed by this study. The theory of regulatory orientation offers an interesting and appropriate theoretical lens for understanding the way that people, reviewing the same information, develop contrasting views and opinions based on the information. The theory of regulatory orientation provides a framework for classifying the ways that people solve problems, and makes predictions about the types of problem-solving strategies that are most beneficial to people with a particular problem-solving orientation. Thus, by using the theory of regulatory orientation as the lens for this study, we are able to move the level of analysis back from system and content characteristics, to the study of individual antecedents that drive the way that these characteristics and content are perceived by PES users.

Specifically, we look at the way that regulatory orientation impacts the way online reviews are received, and the perceptions of regret that arise when using online reviews for decision making. This treatment of regret as a dependent variable is novel and, because research related to regret and its potential impact on ecommerce has received only limited attention in the IS literature, represents another contribution of the current study. Hung et al. [2007] attribute this lack of attention in part to the fact that regret occurs post-use, yet IS as an academic field has historically placed an emphasis on pre-use issues like technology adoption and implementation. This has begun to change in recent years as ecommerce companies have begun to focus on long term customer satisfaction and return

rates. Additionally, recent attention has been given to the problem of information deception and the manipulative practices used by some ecommerce organizations in order to entice customers to impulsively buy products without an understanding of their true value [Xiao et al. 2007].

3. Theoretical Model

3.1. Regulatory Orientation

Regulatory orientation is defined as the way that a person pursues goals, in accordance with their own personal values and beliefs [Avnet & Higgins 2006]. According to the theory of regulatory orientation, individuals experience benefits, or regulatory “fit” when “their strategies for goal pursuit match their regulatory orientation” [Lee et al. 2010]. The theory identifies two main types of orientations: promotional and prevention. Prevention oriented individuals favor what are known as vigilance strategies when solving problems. These individuals prefer to adopt a structured approach to problem solving and enjoy solving problems that let them stay within the established boundaries and rules of a problem domain. They typically value precise instruction, with clearly defined goals and concrete criteria for success [Higgins 2005]. Prevention-oriented people tend to minimize losses whenever possible. For this reason, Prevention oriented individuals tend to be more risk adverse [Avnet & Higgins 2006].

Promotion oriented individuals would rather use eagerness strategies. These individuals do not place such an emphasis on structured approaches to problem solving, but rather see general effort as the way to achieve results [Lee et al. 2010]. Promotion-oriented individuals tend to maximize gains, and so are generally more tolerant of risk and willing to take a chance.

The differences between the two orientations can best be explained with an example. Higgins [2005] describes a student wanting to make an A in a course. Prevention-oriented students follow the syllabus carefully, believing that sticking to the rules and established “best practices” will yield results. Promotion focused individuals are less precise. They may read more material across a variety of topics, believing that overall effort, regardless of application, will lead to success [Higgins 2000].

Based on the natural uncertainty of the online environment, under the theory of regulatory orientation, promotion oriented individuals may perceive less uncertainty when making “messy” online purchasing-decisions. The unstructured practice of pulling data from numerous sources and the unstructured narrative format of many online customer reviews may lend itself more to eagerness promotional strategies. Thus we make the following hypotheses:

H1: Individuals with a promotional (prevention) regulatory orientation will report lower (higher) levels of post-choice regret.

H2: Individuals with a promotional (prevention) regulatory orientation will report lower (higher) perceptions of product information uncertainty.

3.2. Product Information Uncertainty

When shopping online, customer product choices always come with consequences that cannot be perfectly predicted [Pavlou et al. 2007]. Product information uncertainty can be defined as the level of unpredictability present in a making a decision in selection of products based on information presented in an online electronic environment [Das & Kerr 2010; Spreng et al. 1996]. Past research has shown that uncertainty is linked to perceptions of information quality and the accuracy of provided information as it relates to both the retailer and the product under consideration [Pavlou et al. 2007; Karimov et al. 2011]. When individuals are able to make decisions using complete and accurate information, they are able to make self-assuring assumptions as to the risk entailed in the decision. We propose that perceptions of product information uncertainty ultimately lead to decisions with less predictable outcomes. This creates a feeling of risk, which should raise perceptions of post-choice regret.

H3: Perceived product information uncertainty is positively associated with perceived post-choice regret.

3.3. Post-choice Regret and PES Usage Intention

We define post-choice regret as the presence of negative perceptions pertaining to the selection of one choice from a collection of possible alternatives. Perceptions of post-choice regret are thus intimately tied to the both the scope and depth of available information at the time of the decision. If an individual perceives that the available collection of alternatives is reasonably complete, and that the available information about these alternatives is accurate, then it is possible to rank the collection of alternatives in a systematic way. Early research on the economic impact of regret dates back to Loomes and Sugden [1982]’s regret theory. Under regret theory, regret is a negative perception that comes from a person taking a particular action, and then subsequently wishing that they had not [Tsiros & Mittal 2000; Loomes & Sugden 1982]. Psychological research classifies regret as a cognitive emotion comprised of elements such as; thoughts of opportunities lost, mistakes made, and the actions one might take to correct them if given a chance [Zeelenberg et al. 1998].

Regretting an online decision necessarily involves the quality of information used in decision-making. Individuals with access to more and better information are aware of more options, and better equipped to evaluate alternatives [Bell 1982; Simonson 1992; Shergill & Chen 2005]. Conversely, individuals making decisions based on poor information must settle for poorer evaluations of a selection's appropriateness [Keaveney et al. 2007].

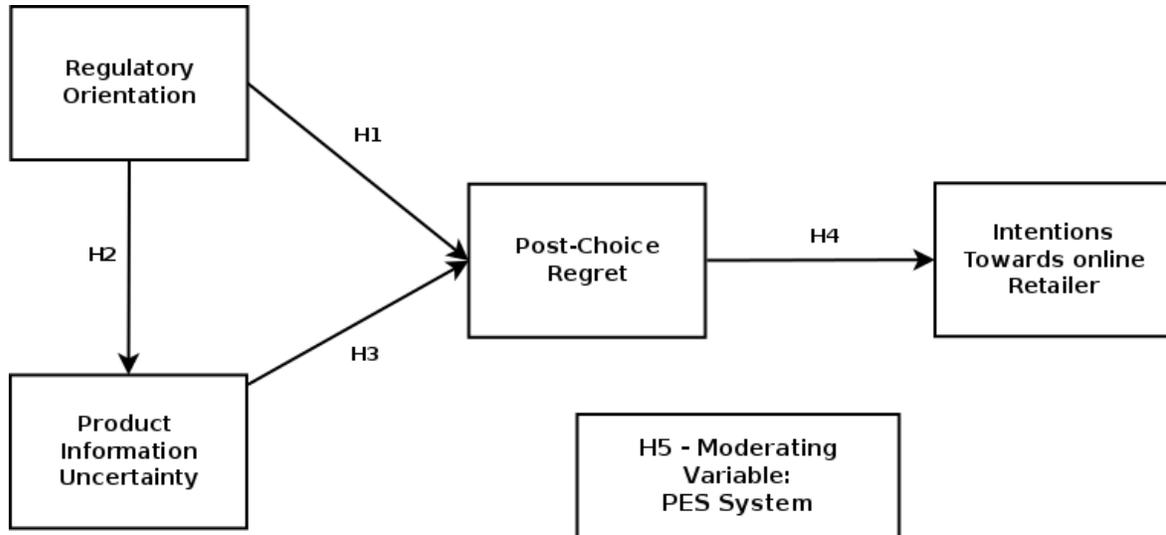


Figure 1: Theoretical Model of Regulatory Orientation and Product Information Uncertainty in Online Commerce

Behavioral Intention toward PES refers a purchaser's willingness to use a PES to select an additional product in the future. Understanding the patronage of online purchasing systems like PES, and identifying their antecedents, has long been an important part of e-Commerce research [Zhou et al. 2004]. Research in the extant regret literature identifies a negative relationship between regret and patronage intention [Tsiros & Mittal 2000].

We posit that in an online setting, the sheer number of customer reviews available for many products, and the large number of system-provided product comparisons, gives the impression that the maintainer of the PES has conducted an exhaustive information search, and the information format becomes the sales agent that actually convinces the customer which product to choose.

Since the PES is now providing the information mechanisms upon which purchasers inform their decisions, the extent to which customers are able to evaluate their decisions is largely dependent on the PES system, and thus any perceptions of regret should directly manifest in undesirable attitudes towards further use of the system. This is especially true in the experimental environment of this study, where the online customer reviews represent the only product information available to the customer. In such a setting, users are likely to attribute any negative outcomes of the decision to the peer endorsement system [Das & Kerr 2010]. Thus, perceptions of post-choice regret are hypothesized to directly influence future behavioral intention towards the PES.

H4: Perceived post-choice regret is negatively associated with behavioral intention towards use of an online PES system.

The theoretical model is presented in Figure 1 and Table 1 below shows the constructs, its definitions and sources used.

3.4 PES Presentation Format Comparison

In the proposed theoretical model, the relationships between constructs are moderated by the PES presentation format. In this section, we identify and describe the two PES formats considered in this study. These formats were selected based on two criteria. First, they are representative of best-of-breed technologies. PES1 (Amazon.com) is probably the best-known PES system in use today. PES2 (Google Products) is newer than PES1, but also well-known due to its association with the Google corporation. The other factor driving the selection of these systems was their contrasting philosophy in terms of online review presentation. PES1 favors complete, unaltered reviews as written by PES users, while PES2 makes use of Google's textual search core competency to summarize PES content and present a summary of online reviews from numerous sites and sources. Figure 2 presents the PES format used by (PES1). PES1 allows customers to view peer-authored reviews for any of its millions of products. Within this system, each product may have any number of reviews, with some products garnering literally thousands of reviews

from the community. Each review includes as much open-ended response as the reviewer cares to provide, together with a “star” rating of 1 to 5. All the star ratings for a product are pooled together and the cumulative rating is displayed prominently on the product’s main page. We compare this format with Google’s PES offering, Google Products (PES2), presented in Figure 3. PES2, which became available to the public in 2009, uses Google search technology to provide a summary of PES content that is compiled from numerous e-retailers.

Table 1: Constructs Used in Theoretical Model, with Definitions and Sources

Construct Name	Definition	Source
Perceived Product Information Uncertainty	Participant perceptions of the amount of unpredictability in the outcomes of a certain product selection decision based on information	[Keaveney et al. 2006]; [Tsiros & Mittal 2000]
Perceived Post-choice Regret	Participant perceptions of the likelihood that their decision in having chosen a particular product will be regretted at some later time	[Lin & Huang 2006]
Regulatory Orientation	The tendency of a participant to use either eagerness (promotional) or vigilance (prevention) strategies when approaching problem solving situations	[Higgins 2001]
Behavioral Intention towards a PES	The participant's intention to use a particular PES again	Keaveney et al. 2006]

PES1 incorporates a star rating system representing the reviewers’ overall assessment of product quality (1 to 5 scale, 1 the lowest (Figure 2-A). PES1 also provides a horizontal bar chart of the products’ star rating, grouped by number of stars (Figure 2-B). PES1 does not collect reviews from external sources, relying instead on reviews provided by its own customers. A unique feature of PES1 is the “helpfulness” score applied to individual reviews. This one feature has been discussed at length by other IS researchers [Mudambi & Schuff 2010). The system asks customers to rank the usefulness of any reviews they read, so that the most helpful reviews, as voted by the community, bubble to the top. To aid with this, review helpfulness is then used as the default sorting method for PES1 content (Figure 2-D). The positive and negative reviews voted to have the greatest utility are subsequently displayed side-by-side, offering contrasting opinions of the product being reviewed (Figure 2-C).

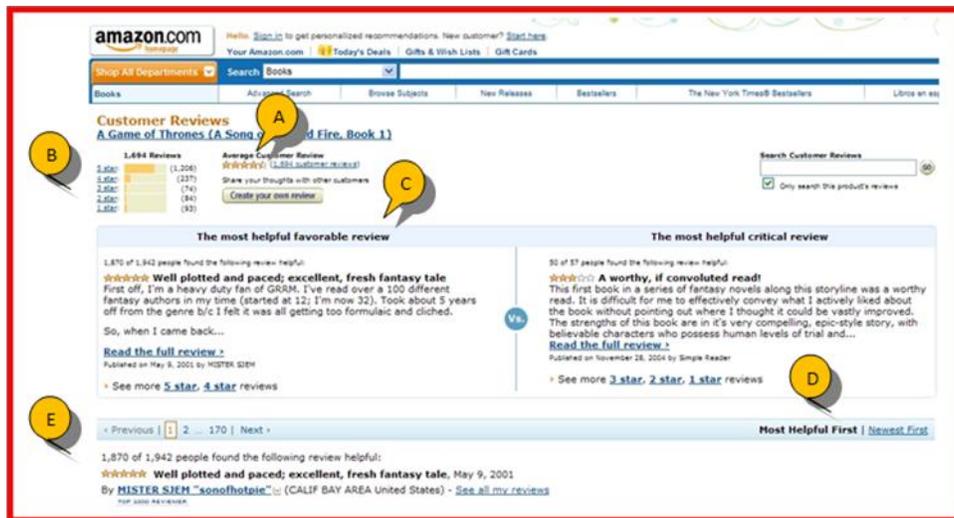


Figure 2: Typical Example of PES 1 Review Content

Full reviews are displayed at the bottom of the page (Figure 3-E). For products with a large number of reviews, selection of the most useful review is biased by this sort order. A customer shopping for a product is unlikely to read every review when the number of reviews is large. Thus, reviews near the top of the list are likely to be most frequently read, and are most likely to garner the most votes regarding their utility.

PES2 has several unique features that set it apart from PES1 and the majority of PES systems in use today. PES2 has the ability to aggregate peer and editorial reviews from multiple sources. Review sets are grouped by their source of origin (Figure 3-A). PES2 also incorporate a star rating system that represents reviewers' overall assessment of the product's quality on a 1 to 5 scale, with 1 being the lowest. The product's summary score, in stars, is prominently displayed at the top of the page (Figure 3-B). Additionally, a stacked bar chart is employed to graphically represent star scoring within each rank, 1 to 5 (Figure 3-C). Unique to PES2, the bar chart is color-coded, with red representing the lowest reviews and green representing the highest reviews. To generate additional summary content, PES2 mines interior comments from individual reviews, and aggregates them into product appropriate topical categories (Figure 3-D). The positive or negative tone of these topical comments is graphically represented by stacked bar charts employing the same red and green color scheme, with a representative comment displayed alongside each bar of the chart. Full product reviews from the selected review set are displayed at the bottom of the page (Figure 3-E).



Figure 3: Typical Example of PES 2 Review Content

Since uncertainty is directly tied to customer expectations derived from available information, improving information quality is one method for reducing the unpredictable variables in a transaction. We therefore propose that a PES presentation format that reduces information noise, allowing only the most relevant product story to come through, provides the greatest chance of ensuring that the customer is aware of the most relevant data for making intelligent informed decisions. A PES operating this way takes much of the guesswork out of the product selection process. This is desirable, as the large selection of products available online provide customers with a huge number of adverse scenarios involving the selection of a product that fails to meet their needs. This is hypothesized to decrease perceptions of uncertainty, giving us the following hypothesis:

- H5a: The PES presentation format will moderate the impact of regulatory orientation on perceptions of product information uncertainty.
- H5b: The PES presentation format will moderate the effect of regulatory orientation on perceptions of post-choice regret
- H5c: The PES presentation format will moderate the effect of product information uncertainty on perceptions of post-choice regret.

H5d: The PES presentation format will moderate the effect of perceptions of post-choice regret on intention to use PES.

4. Research Methodology

4.1. Method

To examine the research model presented in this study, we conducted a laboratory experiment that involved the observation and survey of participants as they used either Amazon (PES1) or Google Products (PES2) to view customer reviews for a selection of three digital cameras. Participants for the experiment were selected from a pool of typical ecommerce users enrolled in undergraduate or graduate courses at a large university in the southeastern United States. Prior studies [Ahuja et al. 2003; Nie & Erbring 2000] demonstrate that online consumers are generally younger and more educated than are conventional consumers. While students represent only a portion of the online shopper population, they however do represent a disproportionately large segment of the broader online population [Kim 2005]. “A number of studies have utilized students as subjects with the expectation not only that they represent an important segment of the broader online population, but also that they are likely to be representative of that broader population” [Kim 2005, p. 8]. Participants were randomly assigned to one of two treatment groups.

After participants were assigned to groups, each treatment group was shown both formats in order. The experiment employed a repeated measures design. Repeated measures designs have three useful advantages. First, because the participants essentially serve as their own control group, the risk of confounding effects is minimized. Second, because each subject is treated and observed twice, fewer subjects are needed to achieve similar results with single measure tests. Finally, the positive correlation between treatments gives the test a high statistical power. Table two provides an overview of the experimental design.

Table 2: Overview of Experimental Design

	Treatment 1		Treatment 2	
Group 1	Products shown using Amazon.com PES (PES1)	Observation	Products shown using Google Products PES (PES2)	Observation
Group 2	Products Shown using Google Products PES (PES2)	Observation	Products shown using Amazon.com PES (PES1)	Observation

4.2. Setting

The experiment proceeded as follows. As a first step, participants answered the provided demographic questions and completed the eleven item Regulatory Focus Questionnaire [Higgins et al. 2001]. Next, participants were shown a set of three web pages containing customer review content for three different digital cameras. The specific treatment group to which the participant belonged determined whether the pages came from PES1 or PES2. Each page presented some general product information together with customer review data. No restrictions were put on the way that participants were able to view the system; however, they were not allowed to leave the general area of the three products. Participants were not given any instruction in the use of either system, or the merits or limitations of the individual systems were not emphasized in any way. Each participant was then asked to select a product by placing it in their virtual shopping cart. After a short amount of time, participants then completed a short survey instrument containing measures for decision uncertainty, perceptions of post-choice regret, and PES behavioral intentions.

In the second stage of the experiment, the treatments were flipped, and participants viewed the same three products using results from the unseen format presentation format. Participants who originally used PES1 were shown the same products as presented by PES2, and vice versa. After viewing the products a second time, participants again placed a product in their cart, and then then retook the survey instrument, answering the same questions format as before, this time in the context of the second PES presentation format.

As a last step, we asked each participant several qualitative questions that had them comment on comparisons between the two formats, the suitability of the different systems for different kinds of products, and their general preference of one system over the other.

4.3. Measures

Data collection at each observation involved the use of survey measures, all of which were taken from existing, previously validated instruments and adapted for use in this study. A measure of each participant's regulatory orientation was taken using the Regulatory Focus Questionnaire developed by Higgins et al. [2001]. In line with the

author's recommendations, the construct was operationalized in the following way. Each person was asked a total of five questions. Each of these measured a person's tendency towards a promotional orientation to problem solving. If the sum score of these items was higher than four, the participant was coded as a "1" (promotionally oriented), else "0" (prevention oriented).

Items for product information uncertainty were adapted from Keaveney et al. [2006] and Tsiros and Mittal [2000]. Instrument items for post-choice regret were adapted from Lin and Huang [2006]. Finally, questions related to consumer intention were adapted from Keaveney et al. [2006].

Because the study used repeated measures, there is the potential for the presence of a carry-over effect. A carry-over effect is a measured effect of a treatment taken at a previous time on the treatment administered at the current time. Grizzle [1965] presents a suitable test for checking for the presence of a carry-over effect [Grizzle 1965]. Following this method, we conducted an ordinary least squares (OLS) analysis of variance to determine whether treatments were impacted by any direct carry-over. We failed to detect any learning effect for the variables of interest (Uncertainty (p-value=0.160); perceived post-choice regret 0.166). Based on these results we can conclude that the order of treatments, in this case PES1 to PES2 or PES2 to PES1, does not have a significant impact on the observed results. This allows us to treat the 121 participants multiple measures as one complete data set, giving us a final $n=242$.

5. Data Analysis

The majority of participants in the study were full-time students (57%), while 27% also working either part time of full time. The group consisted mostly of individuals with some college education at either the undergraduate (38%) or graduate (31%) level. Additionally, the participant group reported a high level of familiarity with online transactions and the internet. More than 90% of participants used the internet over one hour a day, and almost all (97%) had completed at least one online purchase, with most reporting that they buy things online on a weekly basis.

The covariance structure of the collected data was analyzed using structural equation modeling through LISREL (Jöreskog and Sörbom 1993). Data analysis proceeded in two stages. First, a measurement model was tested using confirmatory factor analysis. The purpose of this stage was to test the performance of survey items and the appropriateness of measures used to capture the constructs under observation. This was done as a precursor to the second stage of the analysis, which included a structural analysis conducted with LISREL.

5.1. Measurement Model

As a first step in examining the performance of these survey items, we assessed item validity. The data was analyzed using confirmatory factor analysis (CFA) through LISREL. The model converged to an acceptable solution and showed strong evidence of model orientation (Chi-square 209.937 (p-value < 0.00, RMSEA=0.060, NFI = 0.969, CFI = 0.985, SRMR = 0.0343), Convergent reliability was assessed by looking at the individual factor loadings, as well as the Cronbach alpha measures for each group of items. Alphas for all items are within the acceptable > 0.7 range. Factor loadings are all above .50. Table 3 shows a summary of these validity measures and Table 4 shows construct means and correlations.

5.2. Structural Model

Having established the appropriateness of the measurement model, the structural model was tested. Structural model estimation allows for hypothesis testing and estimation of path coefficients. In this stage we are able to specify the direct and indirect causal relationships among the constructs and examine the strength of these relationships. This initial full model converged to an acceptable solution, with strong evidence of model fit (X^2 312.58 $p < 0.01$, RMSEA=0.076, NFI = 0.956, CFI = 0.974, SRMR = 0.0472). All but one of the hypotheses was supported. The relationship between regulatory orientation and post-choice regret (H1) was supported (0.08; $p < 0.05$). As individuals reported a greater leaning towards adopting a promotional approach to problem solving, they were more likely to regret their actions. The relationship between regulatory orientation and perceived product information uncertainty (H2) was not supported, implying that a person's self-reported orientation did not influence their base level of uncertainty with the experimental treatments. H3, the relationship between uncertainty and post-choice regret, was supported (0.97; $p < 0.01$). Those participants that had a higher level of uncertainty reported greater post-choice regret. Finally, the relationship between post-choice regret and intention towards an online PES (H4) was significant and negative (-0.85; $p < 0.01$), as expected. As individuals reported more post-choice regret they tended to report negative perceptions towards the retailer. Figure 4 shows the LISREL estimation coefficients for each path and their respective significance levels.

Next, the structural invariance was tested for each of the relationships in the model. Significant differences were found for two of the four relationships in the model. The relationship between regulatory orientation and post-choice regret was found to differ significantly by format grouping ($X_D^2 = 10.65$; $p < .001$). The relationship between post-choice regret and intentions towards a web retailer also varied by format ($X_D^2 = 22.73$; $p < .001$). The

relationship between regulatory orientation and uncertainty was not supported (t-value -0.86). Full results of the multi-group analysis are presented in Table 5.

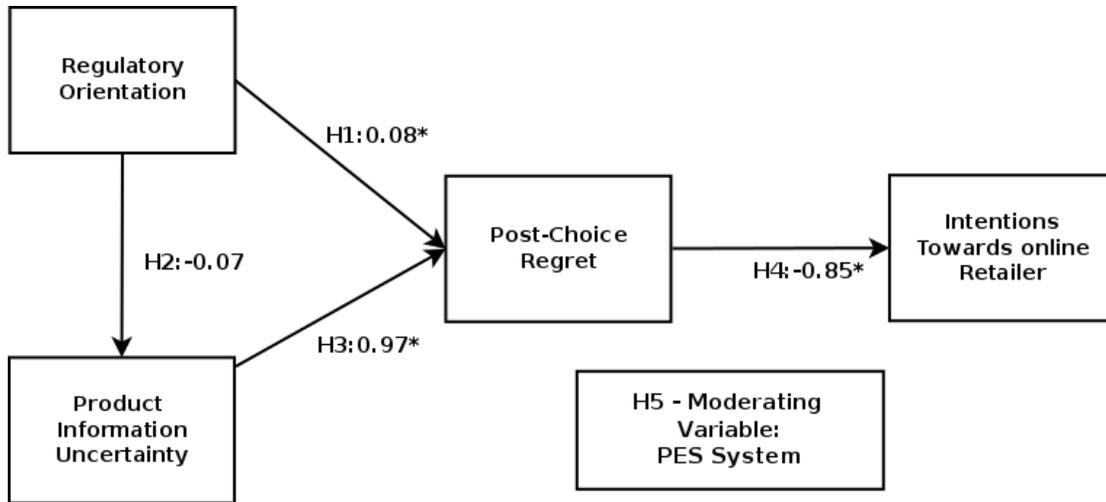
Table 3: Confirmatory Factor Analysis of All Constructs

Construct Name	Symbol	Completely Standardized Factor Loadings	R ²	Alpha
Regulatory Orientation	reg1	0.63	0.401	0.754
	reg2	0.60	0.359	
	reg3	0.54	0.294	
	reg4	0.75	0.559	
	reg5	0.56	0.319	
Intention towards PES Use	int1	0.90	0.805	0.879
	int2	0.90	0.807	
	Int3	0.74	0.541	
Perceived Post-choice Regret	rgrt1	0.90	0.813	0.754
	rgrt2	0.90	0.812	
	rgrt3	0.64	0.415	
Product Information Uncertainty	uncert1	0.81	0.663	0.926
	uncert2	0.89	0.784	
	uncert3	0.85	0.719	
	uncert4	0.83	0.696	
	uncert5	0.75	0.561	
	uncert6	0.82	0.674	

Table 4: Means, Standard Deviations, and Correlations between Constructs

Mean	Std. Dev.	Construct Correlations				
		RGRT	INT	UNCERT	REG	
3.99	0.58	1.000				
3.43	0.90	-0.853	1.000			
2.65	0.89	0.963	-0.822	1.000		
2.68	0.90	0.018	-0.016	-0.066	1.000	

**REG = Regulatory Orientation; INT = Intentions to Use PES; UNCERT = Product Information Uncertainty; RGRT = Perceived Post-choice Regret



Model Fit statistics: $\chi^2 = 312.58$ $p < 0.01$, RMSEA=0.076, NFI = 0.956, CFI = 0.974, SRMR = 0.0472
 Figure 4: Results of LISREL Structural Analysis.

5.3. Multi-group Analysis

To test the hypothesis of group differences attributable to the PES presentation format (H5:a-d), we next performed a multi-group SEM analysis using LISREL to determine if the constructs and relationships changed based on which format the participant was using [Wang 2010]. For this analysis, we divided our data into two sets based on whether the data was collected while the participant viewed PES1 on PES2. This raw data was analyzed, and the structural models were compared for both sets. The first step involved setting equality constraints and testing whether the structural coefficients were similar for the two formats. This model gave a chi-square statistic of 203.64, d.f (11). These structural constraints were then relaxed and the coefficients were freely estimated. This time, the chi-square difference test showed a significant result ($\chi^2_D = 35.64$; p -value < 0.001).

Table 5: Results of Multigroup SEM Analysis.

	Chi-square	Df	Diff stat	Change df	p	Supported
Unconstrained	168.06	7				
Constrained						
1. Structure Weight	203.64	11	35.64	4	0.000*	
2. Structure Weight by Path						
H5a: Regulatory Orientation to Product Information Uncertainty	166.69	8	1.37	1	0.241	No
H5b: Regulatory Orientation to Post-choice Regret	178.71	8	10.65	1	0.001*	Yes
H5c: Product Information Uncertainty to Post-Choice Regret	170.78	8	2.72	1	0.091	No
H5d: Post-choice Regret to Intentions towards PES Use	190.79	8	22.73	1	0.000*	Yes

6. Discussion

Based on these statistical results, it seems that regulatory orientation has an impact on perceptions of regret and uncertainty in ecommerce decision-making. When the data were analyzed together, before taking PES format into account, we observed that as people reported a higher level of promotional regulatory orientation, they tended to regret their actions more. This is consistent with some of the findings of past researches that promotional oriented

individuals are concerned with missing out on possible opportunities [Lee & Aaker 2004; Higgins 2005]. Promotional individuals may feel that an inability to consume all available information creates a perception of “missing out” on potential gains or deals when selecting products.

In addition, it seems that PES design has a role to play in user satisfaction. Our multi-group SEM results provide statistically significant evidence that the proposed model performed differently for Google Products and Amazon users. In particular, format seemed to strongly influence the relationship between perceptions of post-choice regret and intention towards PES use. Users that used the summarized reviews provided by the Google Products format exhibited lower intentions towards PES use. From this we can reasonably conclude that the summarized review content was viewed as an inferior format based on this data. Format did not appear to influence the relationship between uncertainty and post-choice regret, though it was influential in determining the way that a person’s regulatory orientation led to greater tendencies towards post-choice regret. The multi-group analysis also provided further evidence for the impact of regulatory orientation. As stated earlier, when individuals reported a promotional regulatory orientation, they tended to experience more post-choice regret. After taking format into account, we see that the impact is more pronounced. The promotionally-oriented users of Google products, with its summarized review content, reported even higher levels of post-choice. This provides some evidence that the structure and summary features of this type of PES may not be suitable to all users, specifically those with a promotional regulatory orientation. This finding is not altogether surprising. As past research has argued, promotionally-oriented individuals are less concerned with structure and predefined methods of problem solving. It is reasonable to assume that these people would not find value in a process that summarizes review content, while sacrificing its original narrative format.

Interestingly, we did not find support for the relationship between regulatory orientation and perceived product information uncertainty. This implies that a person’s self-reported regulatory orientation may not impact their base level of uncertainty with a particular situation. This result is interesting in that it goes against some established literature that argues a relationship between regulatory orientation and risk tolerance [Higgins et al. 2001; Lee & Aaker 2004]. For Example, some researchers have shown that, in general, individuals with a promotional regulatory orientation are willing to take some risk to maximize a gain [Lee et al. 2010]. It is possible that this construct may operate differently in an online setting where individuals have a tendency to scan information as opposed to reading deeply. The impact of regulatory orientation online may therefore be more subtle than one would think. As this is one of the first studies to look at regulatory orientation in an online setting, instrument refinement is likely to be necessary and expected. It may also be that uncertainty operates in a somewhat different manner online [Pavlou et al. 2007], given the unique aspects of risk [Pavlou & Gefen 2004] and trust [Wang & Benbasat 2007] that have been identified for online environments.

In order to enrich our understanding of the relationship between the PES Format and post-choice regret, participants were asked to contrast the two formats employed in this experiment across three open-ended questions. The first asked “Which format (Amazon or Google Products) did you prefer over the other, and why?” With regard to which 133 respondents expressed a preference for the Amazon format, while 51 preferred that of Google Products. Of the users expressing a preference for the Amazon format, 37 stated they were previous Amazon customers more familiar with its format. Only 6 participants viewed the Amazon and Google Products formats with ambivalence. Clear user preference among the formats is expected given the significant relationship between PES format and post-choice regret. In answering the why, many participants who favored the Amazon format characterized it as containing more detail. They described it as containing “quite detailed information, reviews and comparative analysis”, and “more informational”. One participant described it as containing “more information that seems easier to access.” Another wrote, “I like the page set up and the more detailed information provided”. In contrast, many users who preferred the Google Products format described it as cleaner and less cluttered. Illustrative comments, such as “more organized and visually appealing”, “cleaner, better partitioned with use of white space”, “not as cluttered”, “cleaner and more precise”, and “less cluttered/better organized” reflect their point of view.

The second set of questions asked participants “What information were you able to find on either Amazon or Google Products that was not seen on the other?”, and “Was this information helpful to you in your information search?” Many participants identified the “What people are saying” feature of the Google Products format as unique to that format. However, comments regarding its helpfulness were largely negative, as exemplified by the following: “Google extracted quotes relevant to various topics, which could be helpful, but mostly seems to me to give the illusion of information without actual substance, since without the context the meaning might be skewed”, and “it is programmed to look only for the keywords, and sometimes you don’t need to use the actual word “plot” to talk about the efficacy of the plot, therefore, I couldn’t help but think that there was likely a review out there that would better analyze the book’s potential appeal. This frustrated me.” Most participants, however, focused on the character and organization of reviews. They drew contrast between Amazon’s presentation of the most helpful

favorable and critical user reviews and Google products' index of reviews by source. One user noted "the thing that really stood out to me on Amazon was the way they had their review page set up, with the most helpful favorable review and the most helpful critical review right at the top. That was very helpful, and Google products did not have anything comparable". However, others noted the availability of professional reviews and summary product information in the Google Products format, with comments such as "some of the reviews on Google actually gave an overview of what kind of story one of the books was concerning gods, animals, fantasy which would have probably changed my mind on my original pick", and "the range of professional reviews on Google Products was helpful". Several others commented on the overall ratings regarding product attributes in the Google products format, writing "Google did show the overall rating in categories such as writing style and plot", and "Google products had a simple pros and cons list, there was no wading through people talking about how they used this camera at a wedding".

The final question set posed to participants was "What types of products do you feel are best suited to the Google Products format?", and "Which are best suited to the Amazon.com format?" Here the distinction between the two formats becomes more pronounced—broadened by the type of good being purchased. The predominant view expressed by participants is one of Google products format being best suited to the purchase of search goods, with the Amazon format being best suited to the purchase of experience goods. One participant observed, "Google's format is probably best suited to items with a lot of technical specifications/qualities (like cameras, computers, etc). Amazon's is well designed for items about which people form highly subjective opinions that can't be easily categorized (like books & other media)." Another reasoned, "Google is better suited for technical products and Amazon is better for products that are judged by opinions." Yet another respondent explained high-technology products are best suited to Google Products format, as "layman reviews for cameras and computers, etc are no good, because they usually aren't educated enough to give a helpful review...and Amazon for those things that are more low-tech." Similarly, another suggested, "high-tech products are suitable to the Google Products format, while culture-items are suitable to the Amazon.com format." Participant opinion regarding the suitability of these formats to market particular products seems to be derived from a difference in the way they value user versus professional reviews, rather than any difference attributable to the format itself. Nonetheless, the appropriateness (or inappropriateness) of the PES format for a particular product speaks directly to the ability of that format to impact post-choice regret.

6.1. Theoretical Implications

This study contributes to a growing body of literature in the area of product information uncertainty. Consistent with the work of Pavlou et al. [2007], the results of this study conclude that the level of uncertainty in a transaction may be dependent on the quality of the information available to the individual. The current study makes an important contribution by finding support for the hypothesis that uncertainty may manifest itself in post-choice regrets. Too often, regret has been ignored in the IS literature, perhaps due to its post-adoption nature. In this study we showed that it is possible to capture perceptions of post-choice regret at the time of the decision, and our finding of the strong link between decision and product anxiety and post-choice regret shows that it may be possible to identify and minimize the potential for future negative perceptions at the time of purchase. This finding places the current study in the context of some of the latest IS literature that looks to explain the way in which the quality of information presentation impacts user perceptions of website and company integrity [Xiao et al. 2011].

A second important theoretical implication involves the contrast of Amazon.com's PES with that of Google Products. This study provides some evidence that summarizing review content, in an effort to cut down user cognitive load, may not lead to better decision making or information processing. Many users felt that the summation features of Google Products were useful, but that this benefit was lessened by the fact that Amazon did not preserve the narrative context of the reviews as in Google Products. This would imply that the value of a particular review may be more than the sum of its parts. This finding should prove useful for researchers looking for new techniques for information presentation as well as mining content.

Finally, the study is one of the first in the information systems literature to consider the role of regulatory orientation in online decision making. The finding that a person's regulatory orientation and the PES format combine to lessen perceptions of post-choice regret is fascinating. While this first study found only partial support for the combined effect of format and regulatory orientation, we have provided a good starting place for future researchers to examine the nature of this complex and promising phenomenon.

6.2. Managerial Implications

The study offers several important implications for managers looking to capitalize on PES investment and the potential of online customer review data. As websites become more complicated, it is vital that web designers get maximum value from any information displayed on a page. As a result, the general trend over the last several years has been to summarize review data so that customers can consume a large body of reviews in a short period of time [Dave et al. 2003; Ghose & Ipeirotis 2007]. The finding in the current study that narrative context may be vital to the

usefulness a PES urges caution in these endeavors. It may be the case that users read a few reviews at a deep level, rather than scanning large numbers of reviews for surface level keywords. Managers may want to use caution when altering the narrative context of reviews through summation, when such alterations disrupt the emotional storytelling intended by the review author.

Another managerial implication concerns the role of regulatory orientation as a framework for website design. Though in its early stages in IS research, the theory of regulatory orientation offers some interesting implications for website customization and personalization. As this study found, a person's regulatory orientation impacts the way in which they receive and process online information. This is consistent with the research of Das and Kerr [2010], who found that by matching an individual's regulatory orientation to a problem domain, retailers can increase customer satisfaction and perceptions of product quality [Lee et al. 2010]. The increased adaptability and personalization of online environments may make it possible for web designers to eventually customize review content to the individual, and thereby realize some of these benefits.

6.3. Directions for Future Research and Conclusion

The study presents a number of opportunities for future research. First, more research is needed around the nature of regulatory orientation in an ecommerce environment. While the theory of regulatory orientation has become very popular with researchers in the areas of psychology and marketing, there are numerous problems in the realm of IS that could potentially benefit from the types of explanations that regulatory orientation can provide. As we have shown in this initial study, regulatory orientation plays a complex and subtle role in some aspects of ecommerce decision making. Obtaining a deeper understanding of this role and thereby realizing the benefits of tailoring problems to individual orientation would be very beneficial for both academics and practitioners in the IS field.

Future researchers should also examine the implications of product type on information search and PES performance. Though beyond the scope of this study, much work has been conducted in the IS field around the differences between search and experience goods, for example [Mudambi & Schuff 2010]. Experience goods, which place unique demands on the search efforts of individuals, may lead to different results and performance related to some of the constructs examined in this study.

Finally, the treatment of uncertainty in this study was necessarily limited so as to accommodate the other variables of interest in a manageable way. Recent research in the IS community, however, has begun to examine the antecedents and core components of product information uncertainty as it relates to purchasing decisions, opinion formation, and online information manipulation [Pavlou et al. 2007; Xiao et al. 2010]. A future study could examine the impact of some of these aspects of uncertainty on post-choice regret, and regulatory orientation.

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