

2000

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George, Joey F., "The Effects of Internet Experience and Attitudes Toward Privacy and Security on Internet Purchasing" (2000). *ECIS 2000 Proceedings*. 165.

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The Effects of Internet Experience and Attitudes Toward Privacy and Security on Internet Purchasing

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Abstract - Using the Theory of Reasoned Action as the theoretical base, data collected through a semi-annual survey of web users was used to determine if beliefs about privacy and Internet security helped determine attitudes towards the Internet, which were thought to affect intent to make Internet purchases. Intent, in turn, was thought to affect actual purchasing behavior. Taking Internet experience into account, general support for the model was found, although security beliefs were stronger indicators of attitude than privacy beliefs.

INTRODUCTION

By now, it is well known to those who study the Internet, and to most everyone else, that the volume of on-line business-to-customer transactions is increasingly annually at a high rate. Sales for consumer e-commerce for 1998 were 7.8 billion USD [10]. Over 4 billion USD of that total occurred during the Christmas season, and 1999's Christmas sales were projected to exceed 12 billion USD [7]. Internet retail sales for the near future are expected to increase dramatically, growing to as much as 108 billion USD annually by 2003 [10]. At the same time, it is also well known that there is a considerable resistance among many Internet users to engage in business-to-customer transactions over the web due to concerns about security and privacy ([1], [16]). But how are these two generally accepted perceptions related to each other? How do individual beliefs about privacy and security and attitudes towards privacy on the Internet affect individual intentions to make Internet purchases and actual purchasing behavior? That is the subject of this paper.

The plan for this paper is as follows: First, ideas about privacy will be presented, followed by a discussion of the theoretical basis for the paper, the Theory of Reasoned Action (TRA) [2]. Ideas about security and experience will also be introduced, as both have been shown as important considerations in the decision to purchase on-line ([11], [14]). In the section that follows, the research model and hypotheses will be offered. This will be followed by presentations of the research method, data analysis and results, and a discussion of the findings and conclusions.

THEORY & PAST RESEARCH

Privacy

Privacy concerns have often been cited as one of the key reasons consumers do not make on-line purchases over the Internet. A recent survey reports that 87% of web users think they should have "complete control" over the demographic information captured by web sites [11]. Privacy concerns about the Internet can be classified into four primary areas: 1) improper acquisition of information (e.g., preference tracking), 2) improper use of information (e.g., third-party distribution), 3) privacy invasion (e.g., direct mailing), and 4) improper storage (e.g., no opting-out) [16]. Concerns about privacy have led some to begin to develop models of privacy for the Internet. Byford's extensive treatment of privacy issues related to cyberspace focuses on two different theoretical concepts of privacy [3]. The first is a social relationships view, in which privacy is understood as a balance to the development of social relationships. Only through a consideration of the self can clear development of the boundaries of social relationships be developed. Privacy is not so much the right to be let alone, as defined in American jurisprudence, as it is an important mechanism in social processes. This concept of privacy on the Internet would be manifested in anonymous interactions and assumed identities, as in chat rooms and MUDs, where social relationships among members of various Internet communities are being worked out.

A second concept of privacy is the better-known property view [3], in which individuals see privacy as the extent to which they control their own information in all types of Internet exchanges. The property view manifests itself in willing exchanges of personal information in exchange for valued services such as free e-mail or special discounts from merchants. Both concepts of privacy could influence individual attitudes toward the Internet, but the extent to which each view actually does influence attitudes is an open question at this time.

Theory of Reasoned Action

The Theory of Reasoned Action (TRA) is a general purpose theory that relates beliefs, norms, attitudes, and actual behavior [2] (see Figure 1). TRA has been used in many different studies in the information systems literature, the most famous of which might be the work of Davis and colleagues on user acceptance (cf. [7]). According to TRA, an individual's performance of a certain behavior is determined by his or her intent to perform that behavior. Intent is itself informed by attitudes toward and subjective norms about engaging in the behavior. Attitudes are informed by beliefs, and norms are informed by normative beliefs and motivation to comply. As a general theory, TRA does not specify the particular beliefs that are associated with any particular behavior, so determining those beliefs are left up to the researcher.

An underlying premise of the current study is that beliefs about privacy inform attitudes toward the Internet. TRA provides a robust theoretical basis for testing such a premise, along with a framework for testing whether attitudes are indeed related to intent to engage in a particular behavior, which itself should be related to the actual behavior. In their studies of user acceptance, Davis and colleagues [7] did not investigate the role of subjective norms and the beliefs that were associated with them, as this is one of the least understood aspects of TRA. For that reason, and also due to the limitations in the exploratory study described here, subjective norms will not be investigated.

Although individuals can hold different attitudes about different aspects of the Internet, the attitude that is salient here is the individual's attitude toward making purchases over the Internet. Much of an individual's attitude toward making Internet purchases can be thought of in terms of trust. Trust has been defined in various ways, but a particularly straightforward definition is "that one believes in, and is willing to depend on, another party ([13], p. 474)." Trust occurs only when those involved "are assured of others' willingness and ability to deliver on their obligations ([14], p. 314)." Typically, researchers investigating phenomena through the use of TRA do not measure attitude directly but rather synthesize attitudes through their measures of beliefs. I will depart from that norm by using direct measures of attitudes toward Internet trustworthiness in this study.

Many consumers do not trust Internet providers enough to engage in relationship exchanges with them [11]. One way to determine if consumers would be willing to engage in exchanges with Internet merchants is whether the consumers would be willing to provide credit card information on-line. One factor related to individual views of Internet security is subjects' wariness over giving their credit card numbers over the Internet [12].

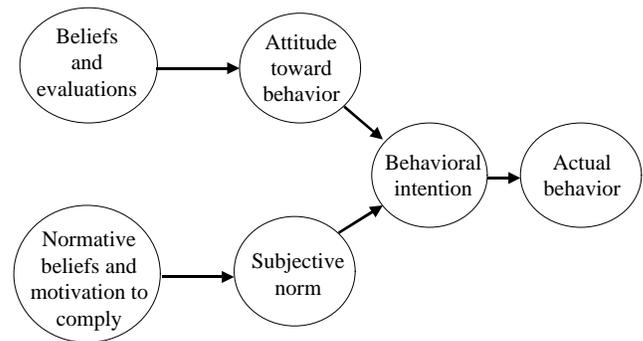


Figure 1: Theory of Reasoned Action

Security

Other beliefs related to conducting consumer business over the Internet might also affect individual attitudes toward the trustworthiness of the Internet. Internet security and transaction security have been identified as the two most significant areas plaguing successful implementation of e-commerce over the Internet [14]. The former deals with general levels of security related to network, application, and system components of the Internet, while the latter deals with requirements for secure transactions over the Internet. Security is often cited as a major roadblock to realizing web's commercial potential [1]. Specific threats often cited include data theft, service theft, data corruption, and computer viruses. To underscore how consumers view the security of the Internet, a recent laboratory experiment found that subjects perceived Internet shopping as more risky than print catalog shopping [12]. Beliefs about security should also have an impact on consumer attitudes toward the Internet.

Experience

Another factor of interest is experience with the Internet. Experience with the Internet is an important consideration in making on-line purchases [11]. They found that consumer concerns over control of personal information actually increase with Internet experience, while concerns over functional barriers to shopping online decrease. Tan found that subjects who had never bought anything through the Internet were more risk averse than those who had done so [15]. In TRA, all other factors that relate to the behavior in question do so only indirectly by influencing attitudes or subjective norms or the beliefs that help determine them [2]. The analysis will depart somewhat from TRA orthodoxy by considering both the indirect impact of experience on purchasing behavior through attitudes and the direct impact of experience on intent to purchase. Ajzen and Fishbein ([2], p. 50) state that intentions formed without direct experience

may change when individuals are confronted with the target of the behavior, in this case, purchasing over the Internet. Experience, they say, helps intentions remain stable, providing the basis for the expectation of a direct relationship between experience and intent.

RESEARCH MODEL & HYPOTHESES

The research model used in the study, shown in Figure 2, is based on TRA. The behavior in question is purchasing over the Internet. The antecedent construct is intent to make Internet purchases, and its antecedent is attitudes toward Internet trustworthiness. There are three sets of beliefs that are posited to help determine attitudes toward Internet trustworthiness: 1) beliefs about Internet security; 2) beliefs about privacy from the property perspective; and 3) beliefs about privacy from the social relationships perspective. Experience is also posited to have a direct effect on attitudes and intent.

The seven hypotheses embodied in the model are listed below. The directionality stated in each hypothesis is derived from the prior discussion on privacy, security, experience, attitudes, intent and behavior.

H1: The more an individual views privacy from a property perspective, the more positive the individual's attitudes toward Internet trustworthiness.

H2: The more an individual views privacy from a social relations perspective, the more positive the individual's attitudes toward Internet trustworthiness.

H3: The more secure an individual believes the Internet to be, the more positive the individual's attitudes toward Internet trustworthiness.

H4: The more experienced an individual is with the Internet, the more positive the individual's attitude toward Internet trustworthiness.

H5: The more positive an individual's attitudes toward Internet trustworthiness, the stronger the individual's intent to make consumer purchases over the Internet.

H6: The more experienced an individual is with the Internet, the stronger the individual's intent to make consumer purchases over the Internet.

H7: The stronger an individual's intent to make consumer purchases over the Internet, the more likely the individual is to engage in Internet purchasing behavior.

METHOD & RESULTS

This study is exploratory, in that it tests ideas about what factors are important to decisions about Internet purchases, and in that it relies on secondary data analysis to test the research model. As such, the effort has been made to find measures of constructs after the data have been collected. The author did not design a questionnaire to explicitly measure the constructs in the model and send out a questionnaire accordingly. The data to test the model were collected as part of the 10th WWW User Survey, conducted in October 1998, by the Graphics, Visualization & Usability (GVU) Center at Georgia Institute of Technology. These data are freely available to anyone who wishes to further analyze them and are used by permission (see acknowledgement). GVU has collected data from worldwide web users twice per year for the past five years, and while the data are not collected randomly, some researchers consider them to provide important insight into web users views and behaviors [11].

The GVU effort involves several different survey instruments. Data used in this analysis were pulled from three instruments: General Demographics, Online Privacy and Security, Web and Internet Use. Only responses from individuals who had completed all three questionnaires were used. The sample size was 1194.

Data analysis was conducted in the following sequence: First, the GVU questionnaires were studied for items that seemed to measure the constructs in the model. Next, an exploratory factor analysis was run to see if the face validity of the items discovered during studying the model held. The items and their loadings, using principle component analysis and varimax rotation, are shown in Table 1.

Reliability tests were run to see if the items that loaded together in the factor analysis held together as potential scales. The Cronbach's alpha for the items thought to measure the social relations view of privacy was low, at .5,

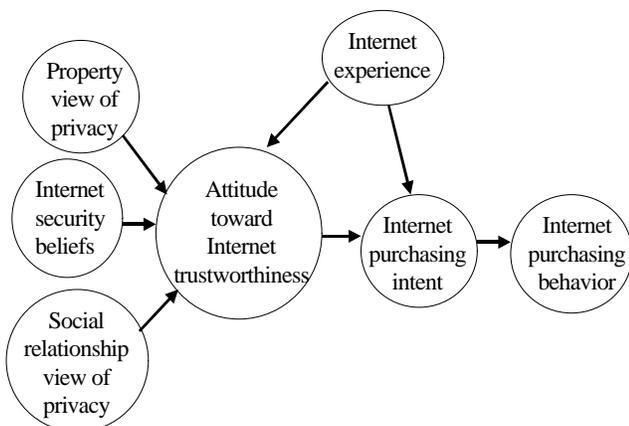


Figure 2: Research Model

Table 1: Items & Factor Loadings

Item	Security	Property	Attitudes	Experience	Social Rel
Q1: Concerned about internet security?	.769	.009	.151	-.002	-.010
Q2: Concerned about security re web purchasing?	.706	.007	.267	-.137	.008
Q13: Convenience or privacy most important?	.636	.151	.104	-.007	-.114
Q11: Would you bank on the web without a security statement?	.549	.003	-.009	-.005	.010
Q64: Magazines can sell my information	.007	.835	.008	-.005	-.001
Q62: Content providers can sell my info	.009	.826	.003	-.149	.008
Q71: Third parties can compile my web usage behavior & sell it	.131	.662	.004	.006	-.004
GQ80: I don't trust my information will be kept private	.207	.118	.771	-.004	-.006
GQ73: I don't trust my credit card number will be secure	.221	.007	.753	-.186	.008
GQ78: The web is not a secure way to make purchases	-.007	-.009	.729	-.005	.006
Skill: Scale of 12 internet-related skills	-.004	-.004	-.215	.810	-.131
GQ10: Length of time of internet use	-.005	.002	.007	.788	-.006
UQ81: Your cookie policy	.140	.009	.007	-.658	-.004
Q68: I like visiting sites anonymously	-.003	-.008	.007	.007	.715
Q67: I ought to be able to assume aliases on the internet	.005	.005	.005	-.234	.669
Q70: I prefer anonymous internet payment systems	-.001	.003	-.002	-.003	.628
Q69: No one should be able to read my communication content	-.168	-.005	-.009	.001	.529

but the alpha would not improve with the deletion of any one item, so all items were retained for the scale. Deciding not to use item UQ81 for Internet experience resulted in an improvement in alpha from -.24 to .51, so UQ81 was dropped from the analysis. For the property view of privacy, Internet security beliefs, and Internet attitudes scales, removing one item from each scale would have resulted in very small improvements in Cronbach's alpha, so all of the items were kept for further analysis. The Cronbach's alphas respectively were .69, .62, and .66. Intent and purchasing behavior were both measured with one item each, willingness to use a credit card on the web, and frequency of Internet purchases, respectively.

Once the measures of the constructs were refined, the model itself was tested using the Partial Least Squares (PLS)

approach, using PLSGraph software ([4], [5], [6]). Partial results of the measurement model test are listed in Table 2. After examining the average variance extracted (AVE) for each construct, it was decided to drop the social relationship view of privacy from the model completely, as its AVE of 24% was far below 50%, the level recommended for AVEs [5]. The AVE for Internet security beliefs was also low, at 48%. However, one of the indicators for Internet security beliefs, item Q11, loaded at .385 on the construct. It was decided to drop Q11 from the model, and this may have some impact on AVE for the construct. Similarly, item GQ78, an indicator for Internet attitudes, was dropped from the model, as it had a loading of .581. Two other indicators in the model had loadings below .7, Q71 for the property view of privacy (.645) and Q13 for Internet security beliefs (.677). Given that both were close to .7, neither indicator was dropped [6].

Table 2: Correlations and Average Variance Extracted (on diagonal in bold)

	Property	Security	Social	Attitudes	Intent	Experience	Purchasing
Property	.623						
Security	.264	.485					
Social	.082	.077	.243				
Attitudes	.178	.370	.114	.599			
Intent	.169	.231	.097	.410	1.000		
Experience	.109	.188	.248	.280	.426	.732	
Purchasing	.135	.191	.110	.338	.523	.445	1.000

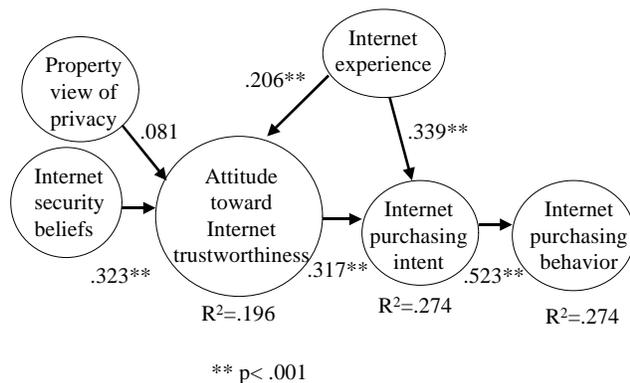


Figure 3: Evaluated Model

Finally, the structural model was run. Without the dropped indicators, the AVE for Internet security beliefs increased to 61%, and the AVE for Internet attitudes increased from 60% to 77%. The jackknife procedure was used to determine the statistical significance of the model's path coefficients. A jackknife size of 10 was used, resulting in 119 samples (df = 118). One path, from the property view of privacy to Internet attitudes, was not statistically significant, but all others were at $p < .001$. The evaluated structural model is included in Figure 3.

DISCUSSION & CONCLUSIONS

Five of the seven hypotheses, H3 through H7, were supported. Beliefs about the security of the Internet (H3), along with experience using it (H4), both have an impact on attitudes toward the trustworthiness of the Internet for consumer purchasing. Together, these two constructs explain almost 20% of the variance in these particular Internet attitudes. Attitudes (H5) and experience (H6) have an impact on the intent to make purchases over the Internet. These two constructs explain over 27% of the variance in purchasing intent. Intent is strongly related to actual purchasing behavior (H7), explaining more than 27% of the variance in purchasing behavior. These findings are all in line with expectations derived from using TRA to explain the connections between Internet beliefs, attitudes, intent, and behavior related to Internet consumer purchasing. The two other sets of beliefs posited to be a part of the model, beliefs about privacy (H1 & H2), turned out not to be important determinants of attitudes toward the trustworthiness of the Internet for making consumer purchases. Whether one views privacy primarily in property or social relationships terms, beliefs about privacy do not seem to be important determinants of people's attitudes toward the trustworthiness of the Internet for making purchases. Although privacy concerns are often cited as reasons consumers are wary of using the Internet for making

purchases, it seems that security concerns and experience with the Internet are more salient factors.

Clearly, the volume of web-based purchases continues to increase ([7], [10]). Hesitancy to engage in retail exchanges over the Internet does seem to be decreasing for many consumers. If beliefs about security are more salient to the formation of attitudes toward Internet trustworthiness than are beliefs about privacy, as this analysis indicates, merchants can use this information to encourage more hesitant web users to make Internet purchases. It may be easier for a merchant to influence a consumer's beliefs about the security of a website in particular and the web in general than it may be to influence consumer beliefs about the site's and the web's privacy. Using secure servers, having third parties audit the security of the site, and other measures may help convince consumers a particular site is safe [1]. Merchants may also want to use one or several risk relievers, such as reference group appeal, focus on the retailer's reputation, brand image, and warranty, given that consumers perceive the Internet to be riskier than traditional purchasing channels [15]

The findings from this analysis hold for the almost 1200 people who took the initiative to visit the GVU website and complete all three questionnaires used here. However, it is impossible to generalize these findings to any other population beyond these 1200 people, given that all respondents were self-selected. The GVU data do provide an important insight into Internet and web use, but the data are not strictly representative [11]. We do not know how those who responded are different from the larger population of web users, nor do we know what larger population, if any, they may represent. However, the findings from this analysis are suggestive of how web users generally may view Internet security and the trustworthiness of the web when deciding whether or not to make purchases using the Internet. That the general TRA model was supported lends some credence to the analysis and its findings. To a large extent, this study can be viewed as a pilot for a follow up study, using the same GVU questions but with a random sample data collection strategy. Clearly, additional research is called for to investigate the factors influencing consumer decisions to make purchases over the Internet.

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ACKNOWLEDGMENTS

Data copyright 1994-1998 Georgia Tech Research Corporation. All rights reserved. Source: GVU's WWW User Survey www.gvu.gatech.edu/user_surveys. Thanks to Harrison McKnight for comments on an earlier version of this paper.