

Trust and Other Cognitive Antecedents of Intention to Comply with Spam Email

Completed Research Paper

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Abstract

Because of the annoyance and counter-productivity that accompany spam email, significant resources are devoted to detect and block it. However, relatively little is known about factors that motivate compliance with its requests. This study reports a test of five cognitive factors that are hypothesized to motivate individuals to comply with spam email.

Keywords

Persuasion, social influence, compliance, computer-mediated communication (CMC)

Introduction

Spam email is defined objectively by collinsdictionary.com as *unsolicited e-mail, often advertisements, sent out over a computer network to many addresses, usually indiscriminately*. According to eSecurityPlanet.com (Goldman, 2013) close to 100 billion spam email messages are sent each day worldwide, and each message that slips through spam filters places some demand on the receiver's cognitive resources. Cognitive demands arise from the reality that individuals make their own *subjective* determinations regarding which messages they consider to be spam email. As Hershkop and Stolfo (2004, p. 3) note, "spam is in the eye of the beholder; the user is the one who decides what is really spam." Thus receivers of spam email are placed in the position to make a series of choices, culminating in the decision whether to comply with one or more actions that the message requests.

The potential for spam email to undermine productivity at individual and organizational levels motivates our interest in learning more about the process by which message receivers respond to it. In this paper, we focus our attention on that portion of the research domain in which spam email messages are opened and read by receivers. Our overarching objective in this exploratory study is to identify which perceptions of the message receiver are significant cognitive antecedents to the receiver's intention to comply with requests made by spam email.

BACKGROUND AND HYPOTHESES

The threat to productivity represented by spam email has generated a considerable amount of research and development in the area of technological spam filtering¹. However, few studies have addressed cognitive aspects of spam email filtering or, for that matter, filtering of advertising email that individuals have previously signed up to receive (Chang et al., 2013). Thus, although a great deal is known about methods for automatically detecting and blocking spam email before it reaches receivers, little is known about the cognitive processes that underlie receivers' responses to messages that they actually receive and read.

¹ C.f. a review by Caruana and Li (2012) of 102 papers on spam filtering published from 2001-2010.

One hallmark of spam email is a lack of message cues that can be used to unambiguously verify the *true nature* of the message, including the sender's actual identity and whether the message is specifically intended for the receiver or is being transmitted "indiscriminately" to a large list of receivers. Thus decisions whether to comply with requests made by spam email necessarily fit within the general frameworks of *decision making under uncertainty*—which incorporates economic utility models (Edwards, 1954) as well as psychological and managerial models of behavior (March and Simon, 1958; Simon, 1957; Tversky and Kahneman, 1981)—and *decision making under ignorance* (Hogarth and Kunreuther, 1995), in which individuals lack information about the relative economic aspects of alternative choices. Where individuals are uncertain or ignorant of ideal cues—such as in assessing the true nature of an email message—they often exhibit an *availability bias*, basing decisions upon those cues that are available to them (Chen and Lee, 2003; Schwarz et al, 1991; Tversky and Kahneman, 1973). In the case of spam email, we anticipate that some of the most readily available cues guiding compliance intentions will be the receiver's own cognitions, including perceptions and emergent beliefs regarding the message and sender.

Relatively few cognitive or behavioral studies focus on spam email, so we draw from research in related areas of online persuasion, advertising, and marketing to identify cognitive factors that plausibly contribute to receivers' responses. Our review identified five factors: Receivers' *benefit goals* and *cost goals* related to the message, perceptions of *trust* in and *social presence* of the message sender, and *perceived difficulty* of complying with the message request. We discuss the background literature and present our research hypotheses relating to these factors in the following sections.

Perception of Benefits and Costs

Expected utility theory suggests that individuals attempt to maximize their expected benefit-cost utility for any situation, keeping in mind the impact of each choice on the total economic value of the expected outcome (Edwards, 1954). The related subjective expected utility theory further suggests that benefit-cost decisions take into consideration an individual's beliefs, past observable choices, and assessment of alternative outcomes (Karni, 2013), factors that are particularly relevant in conditions of uncertainty or ignorance.

Wilson and Lu (2008) tested effects of benefit and cost communication goals in online persuasion based upon the goals-planning-action (GPA) model proposed by Dillard (1990). The GPA model was developed to explain the behaviors of message senders within a two-tiered goal structure in which *primary goals* are considered to be instrumental to the sender's task and *secondary goals* encompass motivations to manage the sender's identity, level of arousal, and the relationship and interactions with the receiver. Wilson and Lu theorized that message receivers utilize a similar two-tiered goal structure in which obtaining benefits and avoiding costs are the primary goals in forming a response to email messages. They report that benefit goals and cost goals appeared frequently in their students subjects' stated rationales for responding to requests made in email messages related to university activities, and that both factors were significant contributors to the receiver's intention to comply with a request. These findings suggest that benefit goals and cost goals could be important predictors of responses to spam email, and these relationships are tested in our first two hypotheses.

H1: Greater goals of obtaining benefits related to the message (benefit goals) increase message receivers' intention toward compliance with a spam email request.

H2: Greater goals of avoiding costs related to the message (cost goals) decrease message receivers' intention toward compliance with a spam email request.

Trust

Trust is "a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another" (Rousseau et al., 1998, p. 395). Numerous studies have addressed the role of trust in online settings, finding that trust improves responses toward advertising, advice, and requests by reducing perceptions of risk in online transactions (Heijden et al, 2003; Nicolaou and McKnight, 2006). Trust of online sellers, e-commerce marketplaces (such as eBay), and members of the marketplace are reported to increase intentions to purchase (Everard and Galletta, 2006; Lu et al., 2010; McKnight et al., 2002; Pavlou and Gefen 2004, 2006; Weisberg et al., 2011). None

of these studies addresses the role of trust in relation to spam email, however, development of trust has been linked to peripheral aspects of online advertising, including design and structural elements (Wang and Emurian, 2005). Based on these findings, we anticipate trust can arise during receivers' viewing of email spam messages and, where trust is developed, it will tend to overcome perceived risks of responding to spam email similar to the manner that is reported with other online transactions. This anticipation leads to our third hypothesis.

H3: Greater trust in the message sender increases message receivers' intention toward compliance with a spam email request.

Social Presence

Social presence is the perception that real partners are present in communication, a perception which individuals develop through processing information cues that are provided by the communication medium (Short et al, 1976). A sizable research stream addresses the role of social presence in online group work, especially in distance education (c.f. Kreijns et al., 2003). However, studies investigating effects of social presence on individual attitudes and behaviors have been slower to emerge. Choi et al. (2001) conducted a study which found that including an animated agent in online advertising was associated with concomitant increases in both social presence and intention to purchase. Following Pavlou et al. (2007, who demonstrated a mediated relationship between social presence and purchase intention, subsequent researchers report that social presence is a *direct* contributor to purchase intention, intention to continue using online recommender systems (Choi et al., 2011), and intention to continue using Twitter (Park and Lee, 2010). Choi et al. (2001) observe that "as consumers perceive their experience in the Web site to be more personal, warm, sociable, and responsive, they are more likely to develop a favorable attitude". We expect this observation also will be true for receivers of spam email, leading to our fourth hypothesis.

H4: Greater perception of social presence of the message sender increases message receivers' intention toward compliance with a spam email request.

Perceived Difficulty

Perceived difficulty is defined as perception of the ease or difficulty of performing a behavior (Yzer et al., 2004) or, alternatively, as perception of task complexity, a characteristic which is expected to vary among individuals (Nadkarni and Gupta, 2007). In a study where subjects attempted to use an airline website to schedule several flights, Reynolds and Ruiz de Maya (2013) found perceived difficulty to be an important antecedent inhibitor to subjects' intention to revisit the site. Because humans are highly capable of evaluating subjective difficulty of most actions, we anticipate that perceived difficulty could be an important determinant of responses to spam email, as this perception is readily available in the absence of other information that is likely to be missing from spam email, e.g., verifiable evidence of the sender's identity. This leads to our final hypothesis.

H5: Greater perception of difficulty in complying with a spam email request reduces message receivers' intention toward compliance with it.

RESEARCH METHOD

We conducted an online survey study that asked subjects to evaluate a message portrayed as email sent to them by a person with the address of "bdayo@texts2africa.com" (see Figure 1). This message was designed to be relevant to college-age students while fitting central objective characteristics of spam email, i.e., unsolicited email that is sent to a large number of addresses.

After subjects viewed the message, they were then asked to rate their *benefit goals* and *cost goals* associated with the message, perception of *trust* in and *social presence* of the sender, the degree of *perceived difficulty* they associated with complying with the sender's request to donate used textbooks, and their *intention to comply* with the request. Administration order of all rating items was individually randomized for each subject by the survey administration software, as recommended by Wilson and Lankton (2012). Following administration of the rating items, the subjects' age and gender demographic data were collected, and the survey was concluded.

Received: 11/24/2013 11:23:19 AM
From: bdayo@texts2africa.com
Subject: Need your help

African students need your used textbooks.

Students in African countries like Zambia and Nigeria have little money to pay for college textbooks, and they need your help. When you finish your coursework this semester you can make a big difference in their lives by donating your used textbooks to deserving African students instead of reselling them to book buyers. Textbooks are needed in all subject areas.

Here's how to donate.

First, reply to this message to pledge a donation of one, two, or all your used textbooks. When you are finished using your textbooks for the semester, carefully package them and ship them to:

Texts2Africa
P.O. Box 43502
Brooklyn, NY 10024

Our volunteers will be waiting to accept your donation in fulfillment of your pledge.

I look forward to receiving your reply and really appreciate your help in this good cause.

Figure 1. Spam Email Message Treatment

Subjects

Subjects were 248 students attending undergraduate business communications and information systems courses at a large university in the Midwest U.S. Gender distribution of subjects is 131 males (53%) and 117 females (47%), with average age of 20 years. By voluntarily participating in the study or completing an alternative assignment, subjects earned extra course credit.

Students who had signed up to participate in the study were notified via an email message that contained participation instructions and a hyperlink to access the online survey. The survey was available for completion during a period of one week following notification, and subjects who had not completed the survey after five days were sent a follow-up reminder message via email.

Rating Measures

Benefit goals and cost goals were assessed using measures developed and validated by Wilson and Lu (2008). Trust measures were drawn from Gefen et al. (2003), social presence used measures developed by Short et al. (1976), and perceived difficulty used items adapted from prior studies to fit the spam email research context (Nadkarni and Gupta, 2007; Reynolds and Ruiz de Maya, 2013). New items were developed to measure intention to comply with the message request based on the conceptual definition of behavioral intention (Warshaw and Davis, 1985). All responses to rating measures were collected using seven-point end-marked scales (see Table 1).

Constructs and Measurement Items*	1	2	3	4	5	6
Benefit Goals						
B1. I feel complying with this request would actually be good for me.	0.986	-0.155	0.008	0.048	0.035	0.021
B2. I am looking forward to positive things resulting from this message.	0.995	0.019	0.082	-0.045	0.000	-0.013
B3. I am interested in benefits the message might have for me.	0.985	0.14	-0.095	-0.001	-0.037	-0.008
Cost Goals						
C1. I am concerned about personal costs of complying with this request.	0.241	0.941	-0.02	0.188	0.139	-0.039
C2. I am concerned that complying with this request might be bad for me.	-0.219	0.964	-0.047	-0.085	-0.059	0.101
C3. I worry about the downsides for me that this message might produce.	0.020	0.992	0.06	-0.065	-0.052	-0.064
Trust						
T1. I believe the sender of this message is honest.	0.029	-0.004	0.966	-0.007	-0.101	-0.235
T2. I believe the sender of this message cares about me.	0.160	0.064	0.824	0.107	0.28	0.449
T3. I believe the sender of this message is trustworthy.	-0.098	-0.022	0.991	-0.037	-0.003	0.076
Social Presence						
SP1. My feeling is that this message is: (Impersonal / Personal)	0.024	-0.087	0.056	0.989	0.01	-0.101
SP2. My feeling is that this message is: (Hot / Cold) (<i>Reverse coded</i>)	0.100	0.209	0.030	0.936	-0.059	0.255
SP3. My feeling is that this message is: (Insensitive / Sensitive)	0.066	-0.002	-0.047	0.986	0.121	0.076
SP4. My feeling is that this message is: (Dehumanizing / Humanizing)	-0.159	-0.054	-0.021	0.968	-0.102	-0.157
Perceived Difficulty						
PD1. Doing what this message requests would be difficult for me.	0.056	0.149	-0.053	0.012	0.985	0.044
PD2. Doing what this message requests would be hard to accomplish.	0.091	0.004	0.002	0.068	0.987	0.116
PD3. It would not be difficult for me to comply with this message. (<i>Reverse coded</i>)	-0.101	-0.126	0.288	-0.151	0.932	-0.010
PD4. It would be very easy for me to do what this message requests. (<i>Reverse coded</i>)	-0.073	-0.036	-0.226	0.049	0.953	-0.179
Intention to Comply						
IC1. How likely is it you would comply with the request made in this message? (Very Unlikely / Very Likely)	-0.016	-0.050	0.037	0.102	-0.089	0.989
IC2. If I actually received this message, I would do what it requests.	-0.081	0.028	0.094	-0.119	-0.043	0.984
IC3. I would pledge to donate at least one book if I actually received this message.	0.065	0.084	-0.065	0.057	0.003	0.991
IC4. I would not pledge to donate any books if I received this message. (<i>Reverse coded</i>)	0.030	-0.060	-0.061	-0.030	0.115	0.989

* All responses used 7-point scales end-marked as 1 = Strongly Disagree and 7 = Strongly Agree except where an alternate response marking is shown in parentheses.

** Results are presented as normalized pattern loadings and cross-loadings obtained using Promax oblique rotation as reported by WarpPLS.

Table 1. Confirmatory Factor Analysis Results**

Results

Prior to evaluating our research model and performing hypothesis tests, we conducted manipulation checks to assess whether our student subjects were reasonably engaged in the study and our treatment produced a satisfactory range of responses. We then conducted confirmatory factor analysis (CFA) to assess our measurement model and partial least squares (PLS) analysis to assess our structural model and test our research hypotheses.

Manipulation Checks

We recognize that university student subjects may not be appropriate for some types of research, especially where they do not have appropriate background experience or are not representative of the general population in key ways (Gordon et al., 1986). We addressed this issue by developing a targeted task to which university students are well-equipped to respond and would find to be sufficiently engaging to motivate their sincere and interested responses across a range of response levels. As a manipulation check for engagement we administered the personal involvement inventory (PII) scale to all subjects (Flynn and Goldsmith, 1993; Zaichkowsky, 1985, 1994). PII scale items were presented in random order (re-randomized for each subject) along with other rating scales used in the analysis. The mean average involvement rating was 4.00, exactly at the middle of the seven-point response scale (s.d. = 1.44). We interpret results of this manipulation check to support our contention that the research design was reasonably engaging to students, given that the message treatment was designed to represent spam email which many of our subjects may have found to be off-putting.

We assessed response range by analyzing frequency of subjects' summated intention to comply ratings, calculated as the sum of responses to intention items divided by the number of those items. Figure 2 shows a histogram of results. Not surprisingly, given the message treatment focus, the largest frequency grouped at 1.0, indicating those subjects had no intention of complying with the message request. Yet approximately two-thirds of our subjects responded with some indication of intention to comply, and summated intention ratings were six or higher on our seven-point scale for over 11% of subjects. We interpret these results to support our assumption that the manipulation achieved a satisfactory range of response levels.

Confirmatory Factor Analysis

We selected WarpPLS version 4.0 Kock (2014) to use for CFA and structural model analysis in order to account for the presence of significant skewness in cost goals, benefit goals, perceived difficulty, and intention to comply measures. Unlike covariance-based structural equation modeling methods, PLS analysis does not require variables to be normally distributed (Chin, 1998). In addition, WarpPLS is effective at modeling and estimating important non-linear relationships which often are encountered in cognitive and behavioral research (Kock, 2013).

We used WarpPLS to calculate combined loadings and cross-loadings of the CFA using Promax oblique rotation. Results show a prominent factor structure in which all measurement items loaded on the anticipated factor at a value of .824 or above with substantially lower cross-loading on other factors (see Table 1).

Convergent validity of measures was assessed by calculating Chronbach's alpha and composite reliability (see Table 2). Chronbach's alpha was .76 or greater and composite reliability was .85 or greater for items comprising each factor, exceeding the .70 criterion proposed by Hair et al. (2009). Discriminant validity was assessed through analysis of average variance extracted (AVE) calculated using WarpPLS. The AVE for each measure is greater than .50, and the square root of AVE is higher than any correlation of that factor with another measure, thereby meeting criteria proposed by Fornell and Larcker (1981). The measurement model demonstrates satisfactory construct validity based on these results.

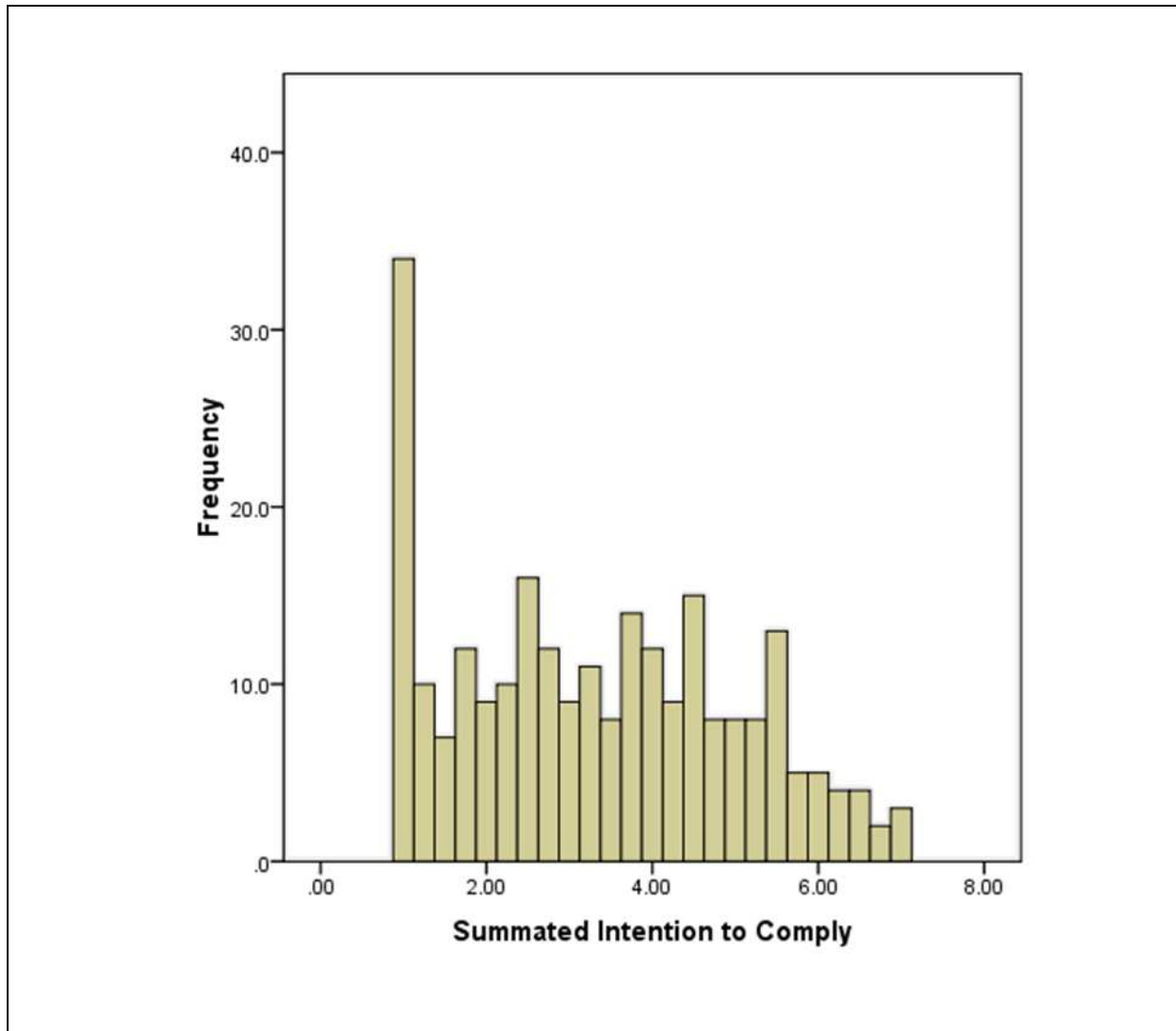


Figure 2. Histogram of Intention to Comply Response Frequencies (1 – 7 Range).

	Mean	SD	VIF	Alpha	CR	B	C	T	SP	D	IC
Benefit Goals (B)	4.63	1.67	1.29	0.83	0.90	0.87					
Cost Goals (C)	3.83	1.70	1.10	0.76	0.86	-0.19	0.82				
Trust (T)	3.57	1.16	2.18	0.86	0.86	0.36	-0.24	0.82			
Social Presence (SP)	4.26	1.28	1.82	0.77	0.85	0.37	-0.08	0.62	0.77		
Perceived Difficulty (PD)	4.00	1.48	1.81	0.77	0.85	-0.29	0.19	-0.43	-0.37	0.77	
Intention to Comply (IC)	3.32	1.68	2.90	0.89	0.93	0.44	-0.21	0.67	0.57	-0.67	0.87

* Means and standard deviations (SD) are calculated as averaged summations of the raw data; Full collinearity variance inflation factor (VIF), Chronbach’s alpha (Alpha), and composite reliability (CR) are shown as reported by WarpPLS; and the square root of average variance extracted (AVE) for each latent factor as reported by WarpPLS is shown as a bolded entry in the diagonal.

Table 2. Measurement Scale Characteristics*.

Structural Model

Results of PLS analysis of the structural model are shown in Figure 3. Overall, the cognitive factors we selected for evaluation explain 66% of the observed variance in our subjects' intention to comply with spam email. WarpPLS 4.0 provides the following measures of model fit (Koch, 2014); the structural model meets established criteria for each measure.

- Average path coefficient (APC) = 0.21, $P < 0.001$
- Average R-squared (ARS) = 0.66, $P < 0.001$
- Average adjusted R-squared (AARS) = 0.65, $P < 0.001$; acceptable if $P < 0.05$ overall for APC, ARS, and AARS
- Average block VIF=1.48; acceptable if ≤ 3.3
- Average full collinearity VIF=1.85; acceptable if ≤ 3.3
- Tenenhaus GoF=0.66; ≥ 0.36 indicates large explanatory power
- Simpson's paradox ratio=0.80; acceptable if ≥ 0.7
- R-squared contribution ratio (RSCR)=1.00; acceptable if ≥ 0.9
- Statistical suppression ratio (SSR)=1.00; acceptable if ≥ 0.7
- Nonlinear bivariate causality direction ratio (NLBCDR)=1.00; acceptable if ≥ 0.7

In addition, full collinearity variance inflation factors (VIFs) for each scale are lower than 3.30 (see Table 2), indicating that analysis of the structural model is acceptably free from both vertical and lateral collinearity effects (Kock and Lynn, 2012).

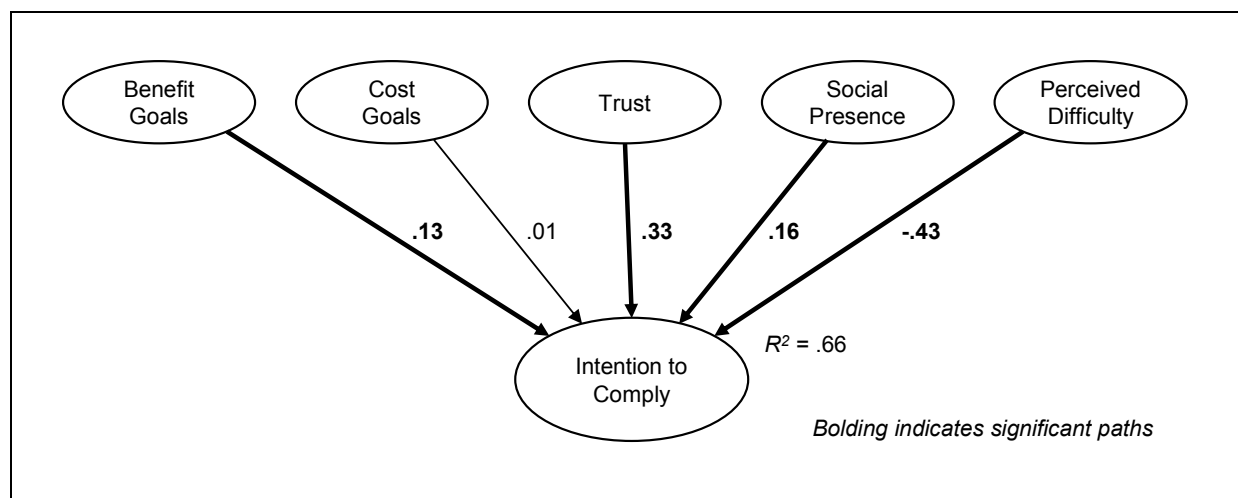


Figure 3. Results of WarpPLS Analysis.

Hypothesis Tests

Of the five hypotheses we tested, those addressing benefit goals, trust, social presence, and perceived difficulty were supported by significant relationships with intention to comply. Hypothesis 2 addressing cost goals was not supported.

DISCUSSION AND CONCLUSION

Spam email has been approached principally through research toward development of automated spam filtering technologies. Yet some spam messages continue to reach the intended targets, thereby placing some level of cognitive burden on them. Our research is focused on one aspect of this issue—the specific

situation where spam email messages are opened and read by receivers—and this study is necessarily exploratory due to lack of prior research using the factors we evaluated.

We find that the cognitive factors we studied provide very good overall prediction of intention to comply with a message request, explaining approximately two-thirds of variance in this measure. Four of the five cognitive factors we assessed—benefit goals, trust, social presence, and perceived difficulty—are significant and unique predictors of intention (see Figure 3).

It is noteworthy that these antecedents encompass a variety of cognitions, including a factor that is characteristic of the receiver (communication benefit goals) and factors that emerge in response to the message (trust, social presence, and perceived difficulty). This finding suggests, first, that receivers' responses are not based entirely on one-dimensional criteria and, second, that it be beneficial for future research to address the role that situational stereotypes may play in cognitive processing of spam email (West and Wilson, 1995).

In addition, the findings call into question why the communication cost goal factor is not predictive. We anticipated that individuals with strong goals toward avoiding costs would tend to respond negatively to a message request, however, no corresponding effect was found. To test the idea that effects of cost goals are subsumed by perceived difficulty, we reran the WarpPLS analysis without the latter factor, yet cost goals remained an insignificant predictor of intention in this follow-up analysis. Wilson and Lu (2008) previously questioned whether cost goals should be reclassified as a secondary communication goal. The findings of our study support the need for future research to address this issue.

Finally, the strong predictions of antecedent factors in this study suggest it may be productive to test this structural model beyond the context of spam email. In particular, we call on future researchers to test generalizability between spam email and permission-based email advertising, as recommended by Chang et al. (2013).

Conclusion

There is no doubt that spam email will continue to place cognitive burdens on receivers for years to come, regardless of advances in automated spam filtering technologies. Because the decision to comply with spam email requests typically is made under conditions of uncertainty and ignorance, we proposed that the receiver's own perceptions are key determinants of compliance. Our exploratory study shows that trust and three other cognitive factors are significant antecedents to compliance intention and suggests several directions for further research in this area.

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