

The Art of Online Persuasion through Design: The Role of Issue Involvement as it Influences Users based on Prior Knowledge

Dianne Cyr

Simon Fraser University
cyr@sfu.ca

Eric Lim

University of New South Wales
e.t.lim@unsw.edu.au

Milena Head

McMaster University
headm@mcmaster.ca

Agnis Stibe

MIT Media Lab
agnis@mit.edu

ABSTRACT

With a goal to investigate the dynamics of online persuasion, this research extends the Elaboration Likelihood Model to determine the relative effects of argument quality as a central route to influence attitude change versus design elements (specifically image appeal, navigation design, and connectedness) as peripheral route cues to attitude change. Results emanating from this research are based on a broad sample of 390 participants who viewed a website about the merits of the Keystone XL oil pipeline. The findings indicate that in addition to argument quality, the design of the website can influence attitude change. Further, there are differences in how those with high or low prior knowledge of a persuasion topic are influenced. Of interest, change in issue involvement is less important for the high knowledge group, but for the low prior knowledge group it mediates the peripheral route impacts on attitude change.

Keywords

website design; Elaboration Likelihood Model; online persuasion, issue involvement

INTRODUCTION

Persuasion refers to human communication designed to *influence* the autonomous judgments and actions of another (Simons et al., 2001), who must make optimal compromises among conflicting forces (McGuire, 1973). In the information technology (IT) realm, persuasive systems may be defined as computerized software or information systems designed to reinforce, change or shape attitudes or behaviors, or both, *without* using coercion or deception (Fogg, 2003; Oinas-Kukkonen and Harjumaa, 2009). Unlike earlier information systems research when the IT artifact was assumed to be “neutral” and designed to serve the needs of the user, a persuasive IT has potential to change the user’s attitudes.

Historically, there has been considerable investigation of persuasion in sociology, psychology, and marketing. However, there are few instances when persuasion has been specifically examined in the context of information technology, and more particularly as an IT artifact. However, there is a compelling case for this work when, in an increasingly online environment, the aim is to convince individuals or groups to take a course of action not normally pursued. For example, in e-business this might include creating a web environment when users are prompted to purchase sustainable products. In an e-health setting, there are important social implications if users are persuaded to immunize their children against infectious diseases.

As a theoretical underpinning to this research, we use the Elaboration Likelihood model, or ELM (Petty and Cacioppo, 1984). The basic premise of the ELM is that persuasion may occur through a central route based on strength of arguments presented, or a peripheral route based on cues such as those provided in this case by the design of the website. The extent to which an individual chooses to scrutinize the data provided about the persuasion object depends on the “elaboration likelihood”. In high elaboration likelihood states people are more likely to engage in careful scrutinization or thoughtful processing of an *informational message* and therefore tend to be more persuaded by argument quality than by peripheral cues. In contrast, those in the low elaboration likelihood states (i.e. lacking the motivation or ability to deliberate thoughtfully) also tend to be motivated by peripheral cues. In this research such cues are the design elements that appear on a website such as image appeal, navigation design, or connectedness with others on the site. In sum, peripheral cues will have a stronger influence on attitude change or persuasion when someone is in a low elaboration likelihood state compared to those in high elaboration likelihood states.

An interesting caveat to the ELM, and important to this research, is that the level of personal relevance with a topic influences the likelihood of elaboration, and the content of arguments is important for persuasion (Petty and Cacioppo, 1984). For those with low involvement, the quality of arguments is less important (Ibid.) and the source attractiveness (or in this case website design) has particular impact. Involvement moderates the main effects of argument quality and source credibility on perceived usefulness (Bhattacharjee and Sanford, 2006). Further, when product involvement is low, consumers are less likely to believe content claims, and instead focus on graphic motivators (Vaughn, 1986). Therefore, individuals in the low elaboration state are expected to be most influenced by peripheral cues - with changes in issue involvement as a precursor to attitude change. Following on these findings, in the current research we are interested to further explore conditions of differing levels of prior knowledge. Further, we are interested to explore if change of issue involvement by a user will result in attitude change, and how this may differ to those with low versus high knowledge of the topic of persuasion. This will serve to extend the ELM in the particular context of a design environment.

More specifically, this research is focused on the following issues:

1. Argument quality is an important mechanism in activating the central route to influence change in attitude depending on an individual's level of prior knowledge of the target issue. For individuals with low prior knowledge of the target issue, we postulate that argument quality might be less salient in its impact on attitude change, as compared to those of peripheral cues from specific design features such as Image Appeal, Navigation Design, or Connectedness. The reverse is postulated for individuals with high prior knowledge of the target issue.

2. Change in issue involvement moderates the effects of argument quality and characteristics of the source on perceived usefulness as outlined above. In this study, we are interested to examine if change in issue involvement potentially mediates the relationships of argument quality and design elements to attitude change.

3. To what extent do the three design elements chosen for this study impact attitude change? If so, what is the relative impact of design compared to argument quality? Do differences exist based on prior knowledge of a topic?

THE RESEARCH MODEL

Based on the preceding, a theoretical model is developed in Figure 1 to test the relative impact of Argument Quality and Design Elements (Image Appeal, Navigation Design, Connectedness) to Attitude Change and Change in Issue Involvement. We are likewise interested to ascertain

whether or not Change in Issue Involvement will mediate Argument Quality or Design Elements to Attitude Change. Refer to Figure 1.

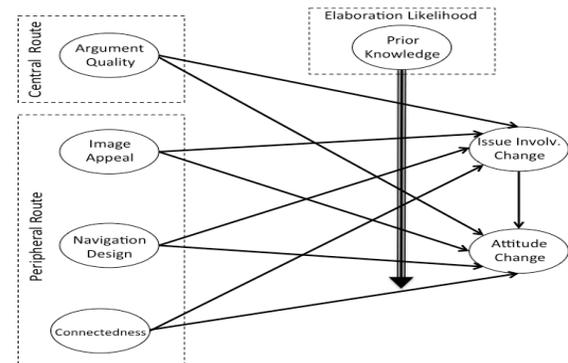


Figure 1. Research Model

HYPOTHESIS DEVELOPMENT

Argument Quality, Attitude Change, Issue Involvement

Bhattacharjee and Sanford (2006) used the ELM to investigate the relative importance of the central information processing route operationalized as argument quality and the peripheral route operationalized as source credibility resulting in attitude change. They found argument quality has a positive effect on a user's perceived usefulness ultimately leading to IT usage intention. Angst and Agarwal (2009) used the ELM to examine individual persuasion in the adoption of electronic health records. These researchers were particularly interested to determine how argument framing and issue involvement interact to influence individual persuasion. Based on the established role of Argument Quality as it relates to Attitude Change, we also explore the role of Change in Issue Involvement on Attitude Change. Further, we are interested to determine if there are any differences in these relationships depending on the role of user expertise (as considered by Bhattacharjee and Sanford, 2006) operationalized in our study as Low Prior Knowledge or High Prior Knowledge users. This leads to our first hypotheses:

Hypothesis 1: Argument Quality positively influences Attitude Change.

Hypothesis 2: Argument Quality positively influences Change in Issue Involvement.

Hypothesis 3: Change in Issue Involvement positively influences Attitude Change.

Image Appeal, Navigation Design, Connectedness

Visual Design of a website is important because it improves website aesthetics and emotional appeal (Djamasbi et al., 2010), which may in turn lead to more positive user attitudes (DeWulf et al., 2006). This

encompasses Web elements such as use of images, photographs, colors, shapes, or font type (Garrett, 2003). Based on the advertisement involvement model by Vaughn (1986) and tested in numerous studies, (p. 58). “source attractiveness/likeability primarily serves as a peripheral cue, having a greater effect on persuasion when elaboration likelihood is low rather than high” (Hanafizadeh and Behboudi, 2012, p. 56). We would therefore expect that Prior Knowledge would influence the relationship of Image Appeal to Change in Issue Involvement and Attitude Change, and that the moderation effect would be stronger when prior knowledge (elaboration likelihood) is low. In this case, image appeal will serve as peripheral cue that serves to change an individual’s perception and involvement with a topic especially when knowledge of a topic is limited, which in turn results in attitudinal change. This expectation is represented in the hypotheses below:

Hypothesis 4: Image Appeal positively influences Change in Attitude.

Hypothesis 5: Image Appeal positively influences Change in Issue Involvement.

Hypothesis 6a: Prior Knowledge will attenuate the relationship of Image Appeal with Change in Issue Involvement.

Hypothesis 6b: Prior Knowledge will attenuate the relationship of Image Appeal with Change in Attitude.

Navigation Design refers to the navigational scheme used to help or hinder users as they access different sections of a website (Garrett, 2003). For example, this could include whether text is horizontal or vertical, and the number of drop down menus or submenus. Similar to the rationale for Image Appeal (above), we expect that Navigation Design is a design element which contributes to Attitudinal Change and Change in Issue Involvement through the ELM peripheral route. Also similar to Image Appeal, we expect the moderation effect for those in the low Prior Knowledge group will be higher than for those with existing and substantial knowledge of the topic of persuasion. This leads to the following hypotheses

Hypothesis 7: Navigation Design will positively influence Change in Attitude.

Hypothesis 8: Navigation Design will positively influence Change in Issue Involvement.

Hypothesis 9a: Prior Knowledge will attenuate relationship of Navigation Design with Change in Issue Involvement.

Hypothesis 9b: Prior Knowledge will attenuate the relationship of Navigation Design with Change in Attitude.

Online users increasingly expect to engage and connect with others on a website or other medium. In a consumer driven context, some researchers have suggested online

interactivity including **Connectedness** helps vendors to build good customer relations (Ghose and Dou, 1998). In the current investigation, Connectedness refers to the extent visitors to the persuasive website share views, feel they benefit from the community of visitors to the website, and share a common bond with others on the website. Following the same logic as for Image Appeal, and Navigation Design (above), we propose the following hypotheses:

Hypothesis 10: Connectedness will positively influence Change in Attitude.

Hypothesis 11: Connectedness will positively influence Change in Issue Involvement.

Hypothesis 12a: Prior Knowledge will attenuate the relationship of Connectedness with Change in Issue Involvement.

Hypothesis 12b: Prior Knowledge will attenuate the relationship of Connectedness with Change in Attitude.

RESEARCH METHODOLOGY

Participants

The sample was recruited via a market research firm with access to a broad pool of participants. This was a balanced stratified sample by the North American age demographic (over the age of 18) consisting of 52.3% males/47.7% females and 77.7% having a college education or higher. The total sample size is 390.

Experimental Task and Design

The Keystone XL oil pipeline (<http://www.keystone-xl.com>) website was chosen due to its aesthetic and human focused design. Participants were asked about their knowledge, attitudes and involvement with the Keystone XL oil pipeline issue. Once participants completed their browsing of the Keystone XL website, they were asked three content-specific questions as a manipulation check to ensure attention was paid to the website. Only those participants who correctly answered all three questions were allowed to proceed to the survey questions. The survey asked participants to respond to items for Argument Quality, Image Appeal, Navigation Design and Connectedness. Participants were again asked about their attitudes and involvement with the Keystone XL pipeline issue in order to determine their potential change in these constructs from viewing the website. The average completion time for the experiment (website browsing and survey questions) was approximately 29 minutes.

ANALYSIS

In this research, survey items were adapted from previously validated work. Therefore, content validity for these constructs was established through past research. A PLS approach to confirmatory factor analysis (CFA) was

used to assess the psychometric properties of the multi-item constructs and determined our instrument demonstrated both discriminant and construct validity. Structural Equation Modeling (SEM) was conducted using PLS, which is a component-based approach.

Although results for the overall model were determined (n=390) due to space constraints we will focus on a comparison of the low versus high prior knowledge groups. The ELM posits that individuals in low elaboration likelihood states (i.e. low Prior Knowledge) tend to be motivated by peripheral cues (design elements) whereas those in high elaboration likelihood states (i.e. high Prior Knowledge) are more persuaded by Argument Quality. Prior Knowledge was a three-item construct measured on a 7-point Likert scale, and the sample was divided into Low Prior Knowledge (0 and 4.2) and High Prior Knowledge (4.3 and 7) based on average participant scores. Figure 2a and 2b show the results of our PLS analysis for the Low Prior Knowledge group (n=216) and High Prior Knowledge group (n=125), respectively. Only significant moderation paths are shown on these figures.

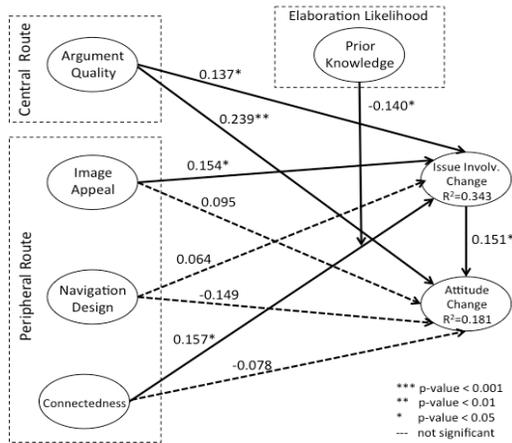


Figure 2a: Low Prior Knowledge Groups (n=216)

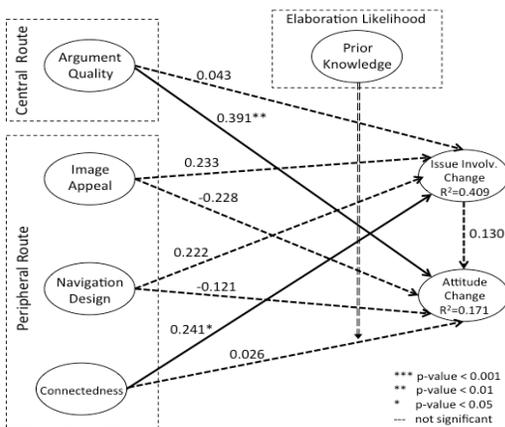


Figure 2b: High Prior Knowledge Groups (n=125)

In sum, for the Low Prior Knowledge Group significant paths indicate: Argument Quality results Issue Involvement Change and Attitude Change; Image Appeal results in Issue Involvement Change; Connectedness results in Issue Involvement Change; and Issue Involvement Change results in Attitude Change. For the High Prior Knowledge Group significant paths indicate: Argument Quality results in Attitude Change; and Connectedness results in Change Issue Involvement Change. The only significant moderating effect of Prior Knowledge for either group was between Connectedness and Change in Issue Involvement for the Low Prior Knowledge Group.

DISCUSSION AND CONTRIBUTIONS

Based on the preceding framework and results, there are several theoretical contributions that emanate from this investigation. First, as already confirmed, argument quality is important as a central route to influencing change in attitude. However, new to this research is that for those with low prior knowledge, argument quality directly impacts attitude change but it is also mediated through change in issue involvement. For those with high prior knowledge, argument quality directly impacts attitude change but does not impact change in issue involvement. Therefore, the role of issue involvement plays a role in affecting attitudinal change. One explanation is that for those with the least prior knowledge, they also have the least commitment to the topic; then as they become more involved, their attitudes are most likely to be mediated by change in issue involvement leading to attitude change.

Second, it appears that change in issue involvement is of less importance to the high knowledge group (it does not have a significant effect on change in attitude). But change in issue involvement is important for the low prior knowledge group and mediates the peripheral route design impacts on attitude change. While involvement is known to influence commitment (Vaughn, 1986), we believe this is the first study in which issue involvement is studied in tandem with both argument quality and design features.

Third, this is one of the first investigations to study the relative impact of argument quality versus design elements on attitude change. While not all design elements had a direct impact on attitudinal change (e.g. navigation design for either the low or high knowledge groups), it should be noted that the peripheral (design) route is more important for the low prior knowledge group. Further, connectedness and image appeal have a direct significant effect on change in issue involvement (which in turn has a direct significant effect on change in attitude). The feeling of connectedness is important to influence issue involvement, regardless of prior knowledge level. However for those with less prior knowledge, connectedness plays an even stronger

influential role on changing issue involvement. Not only does connectedness have a significant direct effect on change in issue involvement, but it also moderates this relationship such that those with the lowest prior knowledge would see the connectedness of the site as having an even stronger influence on change in issue involvement. In sum, this signals the important role that design elements may have in the attitudinal change process.

From a practical standpoint, this research is relevant in a variety of online settings (e.g., e-government, e-health, e-commerce), when the goal is to change user behavior or attitudes. It provides insights for designers to design elements that can potentially persuade users. While three design elements were investigated in this study, there is much scope for designers to determine which design elements are most appropriate for the goal of persuasion. Based on the results of this study, increasing user knowledge through design will in turn increase issue involvement leading to potential attitudinal change.

A limitation to this research is that a single website was used. It may be that users would respond differently depending on the site, and that a website on the topic of an oil pipeline may not be of interest to many of the users. So while this particular website was carefully selected, other websites could possibly yield differing results depending on the level of user knowledge and involvement with the topic. Likewise, there are numerous website features such as interactivity, perceived social presence, or “Inspiration” (Fogg, 2003) that could have been tested. While a sample of design elements was tested in this investigation, this also becomes an avenue for future research. These design elements should also be investigated across cultures. Although there is previous research into cross-cultural elements of website design (e.g. Cyr et al., 2009) and how users in different cultures have different preferences for design features, to our knowledge there is little if any research that investigates specific persuasive design features in different cultural contexts.

In sum, and as the world increasingly moves to online media as a form of communication, then how to appeal to the sensibilities of users - including how to persuade - is a topic of immense interest. A focus on how attitude change through both words and through design is expected to be a topic of continuing investigation.

ACKNOWLEDGMENT

This research was funded by the Social Sciences and Humanities Research Council of Canada.

REFERENCES

1. Angst, C. and Agarwal, R. (2009). Adoption of Electronic Health Records in the Presence of Privacy Concerns: The Elaboration Likelihood Model and Individual Persuasion, *MIS Quarterly*, 36(2), 339-373.
2. Bhattacharjee, A. and Sanford, C. (2006). Influence Processes for Information Technology Acceptance: An Elaboration Likelihood Model. *MIS Quarterly*, 30(4), 805-825.
3. Cyr, D., Head, M., Larios, H. and Pan, B. (2009a). Exploring human images in website design: A multi-method approach. *MIS Quarterly*, 33(3), 539-566.
4. DeWulf, K., Schillewaert, N., Muylle, S. & Rangarajan, D. (2006). The Role of Pleasure in Web Site Success. *Information and Management*, 43, 434-446.
5. Djamasi, S., Siegel, M., Tullis, T. and Dai, R. (2010). Efficiency, Trust, and Visual Appeal: Usability Testing through Eye Tracking, *Proceedings of the 43rd Hawaii International Conference on System Sciences*. pp. 1-10.
6. Fogg, B.J. (2003). *Persuasive Technology: Using Computers to Change What We Think and Do*. San Francisco: Morgan Kaufmann Publishers.
7. Garrett, J. (2003). *The Elements of User Experience: User-Centered Design for the Web*. Thousand Oaks, CA: New Riders.
8. Ghose, S. and Dou, W. (1998). Interactive functions and their impacts on the appeal of Internet presence sites, *Journal of Advertising Research*, 38(2), 29-43.
9. Hanafizadeh, P. and Behboudi, M. (2012). *Online Advertising and Promotion*. IGI Global.
10. McGuire, W.J. (1973). “Persuasion” in G.A. Miller (ed.) *Communication, Language, and Meaning Psychological Perspectives*. New York: Basic Books, 242-255.
11. Oinas-Kukkonen, H. and Harjuma, M. (2009). Persuasive Systems Design: Key Issues, Process Model, And System Features. *Communications of the Association for Information Systems*, 24(28), 485-500.
12. Petty, R.E. and Cacioppo, J.T. (1984). Source Factors and the Elaboration Likelihood Model of Persuasion. *Advances in Consumer Research*, 11, 668-672.
13. Simons, H.W., Morreale, J. and Bronbeck, B. (2001). *Persuasion in Society*. Thousand Oaks: Sage Publications, Inc.
14. Vaughn, R. (1986). Cited in Hanafizadeh, P. and Behboudi, M. (2012). *Online Advertising and Promotion*. IGI Global.

