Online News and the Effects of Heuristic Cues on Audiences' Attitudes

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ONLINE NEWS AND THE EFFECTS OF HEURISTIC CUES ON AUDIENCES' ATTITUDES

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ABSTRACT

This paper is designed to explore how online readers process information when online news articles have majority cues. These majority cues are conceptualized as a specific type of heuristic cue and this study discovered complex interaction effects of this heuristic cue. Heuristic and Systematic Model (HSM) and Elaboration Likelihood Model (ELM) successfully predict how these interaction effects work when these models work together. MANOVA and ANOVA analyses report significant interaction effects among heuristic cues, involvement, and argument quality on readers attitudes (attitude toward information and author’s credibility) that supporting both Hypothesis 1 and 2.

Specifically, in regard a Hypothesis 1, when argument quality is strong the heuristic cue increases the attitude toward information and author’s credibility more positively when the information is about a low-involvement product. On the other hand, the heuristic cue decreases attitude toward information and author’s credibility more negatively when the information is about a high-involvement product. Regarding a Hypothesis 2, when the heuristic cue is low, the strong argument quality increases the attitude toward information and author’s credibility more positively when the information
is about a high-involvement product. On the other hand, the strong argument quality decreases the attitude toward information and author’s credibility more negatively when the information is about a low-involvement product.

In summary, the explanations of both HSM and ELM are supported only when people use their cognitive resources efficiently. On the other hand, theories of Maximization of Cognitive Efficiency (MCE) and affordances explain when people need to use cognitive resources inefficiently. That is because humans are naturally moderate their information processing in the dynamic manner that maximizes their cognitive efficiency to interpret the given information and environment efficiently and in a timely manner. Therefore, at first, people start to adopt heuristic cues to reduce cognitive load even when they are highly involved in subjects. Next, people start to ignore heuristic cues when they are not involved in subjects. Additionally, this study further suggests that people can also ignore heuristic cues when they are highly involved in subjects and when they have to spend cognitive resources far exceeding their threshold.

It is good to know that people have a mechanism that maximizes their limited cognitive resources, because this will help to make better communication strategies for online-communicators. On the other hand, we need to be careful when we express our interests. This is the time that we have to carefully select what we will click.
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CHAPTER I

INTRODUCTION

Most online news pages have features such as “number of recommends,” “positive feedbacks,” “cited,” “likes,” “comments,” and “shares.” These are summarized statistics of readers’ online behaviors that are common across the Internet on nearly all news sites. Figure 1 displays examples of these features. These are features that make online news information different when compared to traditional printed newspapers and magazines, and these features may have influences on online readers’ information processing, among other cognitive and behavioral effects.

![Example of “like,” “tweet,” “google+1,” “buffer,” and “share” on an online news page](image)

As online news readers see high numbers associated with these features (e.g., several hundred comments on an article, or a story that has been shared on Facebook 500 times), these features may then draw readers’ attention and may influence their attitudes
and behaviors. Even though these features have the potential to affect online news readers, they are separate from the content and meaning of the news articles associated with them. The problem is that there are not many known effects of these prevalent online news features, especially when they indicate high numbers. This study will examine the effects of these online news features.

The first step of this study is trying to conceptualize these features (e.g., “number of recommends,” “positive feedbacks,” “cited,” “likes,” “comments,” and “shares”) when these features indicate a high number of readers who are using them. This paper will then apply theories of interactivity (Massey & Levy, 1999; Sundar & Nass, 2001) and heuristic processing (Chaiken, 1980; Faraji-Rad, Samuelsen, & Warlop, 2012; Petty & Cacioppo, 1979). Next, this study will use the Heuristic and Systematic Model (HSM) (Chaiken, 1980; Faraji-Rad et al., 2012; Petty & Cacioppo, 1979) and the Elaboration Likelihood Model (ELM) (Chaiken, 1980; Faraji-Rad et al., 2012; Thurman, 2008) to understand these online features. Finally, I will test my hypotheses and draw conclusions about these online news features.

Even though online news offers immediacy, content richness, user control (Bucy, 2004; Sundar & Nass, 2001), and abundant sources for readers, readers do not always have enough time and attention to read online news stories in their entirety. Instead, many people want to focus only on what they are interested in and can read quickly and easily. That is one of the reasons why online news readers rely on simplified information to form their attitudes (Faraji-Rad et al., 2012). Therefore, while “number of recommends,” “positive feedbacks,” “cited,” “likes,” “comments,” and “shares” are interactive features, when they indicate certain high numbers they may then have much different influences.
than when they have low numbers. In particular, these high numbers (e.g., more than 4000 comments for a Plain Dealer story on the Cleveland Browns) may create heuristic cues that may help readers to process information more efficiently, and it may impact readers’ attitudes.

Beyond interactivity, HSM (Chaiken, 1980; Faraji-Rad et al., 2012; Petty & Cacioppo, 1979) can shed light on this question because studies in this area have tried to explain why people process messages in different ways. Heuristic processing incorporates less cognitive efforts and capacity by using the available subset of information instead of the systematic process (Chaiken & Eagly, 1989). Similarly, these interactive online news features create certain information that reflects complex interactions among online news readers in a simplified version, which could also be conceptualized as a heuristic cue.

Furthermore, when interactive features indicate high numbers they have two dimensions of a heuristic cue. One dimension of a heuristic cue implies that a sheer number of people agree with and favor the information of an online news story, such as a high number of “positive feedbacks,” “cited,” and “likes.” The other dimension of a heuristic cue implies a sheer number of people interested in the online news story because of high numbers of “number of comments” and “shares.” This paper focuses on the effects of the first dimension of heuristic cues which implies that a sheer number of people agree with the content of the news article, its arguments, or the writer’s perspective. This type of heuristic cue is called a majority cue. A majority cue can be defined as a type of heuristic cue that online information has when related interactive features (i.e., “number of recommends,” “positive feedbacks,” “cited,” “likes”) indicate very high numbers.
Regarding the effects of these heuristic cues, the HSM predicts that low involvement would increase the persuasive effects of different heuristic cues and would lower the persuasive effects of a strong argument (Chaiken, 1980; Faraji-Rad et al., 2012; Thurman, 2008). On the other hand, ELM HSM predicts high involvement would lower the persuasive effects of the heuristic cue and would increase the persuasive effects of strong argument (Petty & Cacioppo, 1979). This study will examine these relationships and determine whether they can be applied to online news articles that have majority cues.

This paper is concerned with how online readers process information. The results of this paper will contribute to a better understanding of people who participate in online communication processes; people who design online communication platforms, such as news and contents providers; people who are concerned about the credibility of online information; and people who routinely use online news communication.
CHAPTER II
LITERATURE REVIEW

Chaiken (1980) and Petty and Cacioppo (1979) offered explanations of why people process messages in different ways. HSM (Chaiken, 1980) emphasised the effects of noncontents cues when people process in a peripheral way. On the other hand, ELM (Petty & Cacioppo, 1979) emphasised the effects of content quality when people process in a central way. This chapter will provide different aspects of message processing from HSM and ELM, and explore how they explain the effects of majority cues on attitudes toward online news.

Heuristic and Systematic Model

According to the heuristic versus systematic perspective, audiences incorporate comparatively small amounts of effort and rely on accessible information to minimize the cognitive effort in judging message validity (Chaiken, 1980). Simon (1956) argued that this is because humans have bounded rationality due to their limited cognitive capacity. By using heuristics, humans ignore part of the available information. This leads to a
better decision when the conditions are complex (Gigerenzer, 2010), and it also helps them to reduce uncertainties (Gigerenzer, 2008). However, HSM argues that this is because humans are cognitive misers, and people tend to use cognitive resources only when they are motivated (Chaiken, 1980).

The role of motivation is very similar with the role of involvement in the Elaboration Likability Model (Petty & Cacioppo, 1979). The difference between HSM and ELM is that HSM focuses on what happens when people are in a low motivation, while ELM focuses on what happens when people are in a high involvement. Additionally, HSM has one more element than ELM. HSM argues that cognitive ability also plays an important role like motivation (Chaiken & Ledgerwood, 2011). When people have low motivation or low cognitive ability to process messages, heuristic processing manages to focus on easily understood cues such as an audience reaction. This heuristic processing relies on quick and efficient cognitive short cuts (Tversky & Kahneman, 1974) consciously or unconsciously to reduce the use of cognitive resources (Chaiken & Ledgerwood, 2011). Therefore, HSM describes the roles of motivation that change individuals’ cognitive processes.

There are many examples that heuristic cues enhance the persuasiveness of messages. Chaiken (1980) found that systematic processing enhances the persuasive influence of message cues and reduces the persuasive influence of noncontent cues; however, heuristic processing reduces the persuasive influence of message cues and enhances the persuasive influence of noncontents cues. Similary, a study by Faraji-Rad et al. (2012) found that the similarity effects of the persuasiveness of class advisors were
enhanced when people had limited cognitive resources and incorporated “feels right” experience to their judgment (Faraji-Rad et al., 2012).

Chaiken (1980) also tested systematic versus heuristic processes using the effects of likable and unlikable communicators in both high and low involvement. The result of this experiment showed that the low involvement individuals significantly changed their opinions when a likable communicator presented the issue (Chaiken, 1980). In addition, their follow up experiment confirmed the different effects of likable and unlikable communicators in both high and low involvement (Chaiken, 1980).

Edwards and Edwards (2013) similarly tested the idea that positive computer mediated ratings induced participants to perceive their classes’ instructor as more credible, and resulted in more effective learning and motivation to learn than negative or mixed ratings.

These different examples support the effects of heuristic cues in changing attitudes when people are in low involvement and motivation; however, they did not focus on why heuristic cues had no effects when people are in high involvement and motivation.

Therefore, this study will try to answer what is the relationship between involvement and different message processes, how persuasion research needs to explore the conditions to determine how people process persuasive messages, what the processing mechanisms are, and when people incorporate heuristic cues or not.
**Elaboration likelihood model (ELM)**

Unlike HSM, ELM offers an explanation concerning the effects of involvement that shows how involvement influences the persuasiveness of a message; in other words, increased involvement with a message is associated with more information processing and elaboration than reduced involvement (Petty & Cacioppo, 1979). ELM explains when we should be particularly likely to process a message, more or less, about persuasive information (Perloff, 2012).

Using central and peripheral path processing, ELM describes a comprehensive structure to understand persuasion (Perloff, 2012). Increased involvement and ability are likely to lead to the central process, as well as leading to the elaborated process (Perloff, 2012; Petty & Cacioppo, 1979). On the other hand, reduced involvement ability likely leads to peripheral process and heuristic process (Chaiken, 1980; Perloff, 2012). The difference of involvement might be due to personal importance or immediate reward (Petty & Cacioppo, 1979). ELM could be applied to most persuasive messages including posts, news, and messages on the internet. Although, online news and newspapers are similar to other in regard to dealing with similar news content and influencing each other positively and negatively at the same time (Van der Wurff, 2005), online news and newspapers have different aspects such as interactive features. In addition, there are only a few empirical research studies about investigating ELM in this context except for some online news credibility studies (Eysenbach, 2008; Freeman & Spyridakis, 2004; Jo, 2005).
Petty and Cacioppo (1979) tested the effects of argument quality on persuasion. They manipulated involvement between high and low involvement, and argument quality between a strong argument, which provided statistical data and supporting studies, and a weak argument, which provided only quotations and opinions. After that, they observed the change of attitude and cognitive responses (Petty & Cacioppo, 1979). Their experiment supported the Hypothesis that involvement would increase the persuasive effects of a strong argument and would decrease the persuasive effects of a weak argument (Petty & Cacioppo, 1979). Their study suggested that increased involvement enhanced the importance of the message and enhanced the elaborated process.

The effects of heuristic cues and argument quality on online news

There are differences between reading online news and reading a newspaper. First, online news pages have interactive features such as immediacy, content richness, and user control (Bucy, 2004). Online news embeds hyperlinks, user comments, sharing, and a rating system. These features enable readers to participate in the storytelling of news when readers are interested in news that they read. Second, there is complex choice of news content (Massey & Levy, 1999), and therefore readers are likely to pursue their own interests (Tewksbury, 2003). Readers easily jump to abundant alternative news sources and issues when they are not interested in the news that they read. Increased interactivity and abundant information sources enable readers to express their opinions and to take part in a story, which they are interested in, and it changes the relationship between journalists and readers (Thurman, 2008).
Interactivity of internet news offers additional heuristic cues that a newspaper does not have. Majority cue is one kind of these heuristic cues that online news pages offer. Most of the online news pages have a feature that shows the number of recommendations, shares, likes, comments, and citations. These majority cues imply that a certain number of people who read the article agreed with the argument and were motivated to leave their positive response. Figure 2 shows example of the majority cue on a YouTube video. However, there is no way to find out what kinds of people left their feedback and how many did not leave any feedback on the article.

Figure 2.
An example of the majority cue on a YouTube (in a square with dashed line)
Heuristic cues are more persuasive and “feels right” (Faraji-Rad et al., 2012) when people are in low involvement, but less persuasive when people are in high involvement. Specifically, heuristic cues, such as communicator likability (Chaiken, 1980) and salience of a communicator’s attractiveness (Pallak, 1983), change the attitude about persuasive messages more positively under low involvement conditions than high involvement conditions. That is because, when people are less involved in the given information, they are more likely to handle the information with low elaboration and peripheral process.

On the other hand, ELM predicts that low involvement would increase the persuasive effects of heuristic cues, and high involvement would decrease the persuasive effects of heuristic cues. Figure 1 displays the relationship among heuristic cues, involvement and attitude. To test that heuristic cues change the readers’ attitude about a persuasive message, Hypothesis 1.a and 1.b will be tested, and Figure 3 displays the relationship among heuristic cue, involvement, and attitude.

**H1.a:** The heuristic cue effect is stronger for a low-involvement product compared to a high-involvement product.

**H1.b:** When the heuristic cue effect is high, the positive attitude about the message will also be high.
Contrary to the heuristic cue, high quality of content and argument is more persuasive when people are in high involvement conditions, than in low involvement conditions (Perloff, 2012). Specifically, a strong argument changes readers’ attitudes about persuasive messages more positively under high involvement conditions than under low involvement conditions (Petty & Cacioppo, 1979), because when people are highly involved in a given information, they are likely to handle the information with high elaboration and central processing (Perloff, 2012). To test the argument quality that changes the readers’ attitudes about a persuasive message, Hypothesis 2.a and 2.b will be tested. Figure 4 displays the relationship among heuristic cue, involvement, and attitude. Additionally, Figure 5 displays a total conceptual model of this study that includes both Hypothesis 1 and 2.
H2.a: The argument quality effect is stronger for a high-involvement product compared to a low-involvement product.

H2.b: When the argument quality effect is high, the positive attitude about the message will also be high.

Figure 4.
Research model of Hypothesis 2.a and 2.b

Figure 5.
Research model of Hypothesis 1 and 2
CHAPTER III

METHOD

Participants

Participants of this study were 260 college students enrolled at Cleveland State University. All participants were given the opportunity to participate in this study by receiving extra credit in their classes. All participants agreed to an IRB approved consent form in order to participate in the experiment. Among those participants, 27 participants were excluded because they spent less than 5 minutes or more than 50 minutes to complete the experimental session. Therefore, this study included a total of 232 participants, and each spent an average of 11.37 (SD = 5.31) minutes in their participation. There were 106 males (45.7%) and 126 females (54.3%), and their average age was 23.5 (SD = 8.4). Among them, 33 (14.2%) participants were freshmen, 62 (26.7%) participants were sophomores, 72 (31%) participants were juniors, 55 (23.7%) were seniors, and 9 (3.9%) participants were graduate students.
Procedure

To test the effects of heuristic cue and argument quality, this study designed a 2 (high or low heuristic cue) × 2 (strong or weak argument) × 2 (high or low involvement) factorial experiment. All participants were randomly assigned to one of 8 experimental conditions by an online server’s software. Each conditions’ average number of participants was 29 ($SD = 5$). Table 1 shows the number of assigned participants for each condition.

Table 1. Number of assigned participants for each condition

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<th>Heuristic cue</th>
<th>Argument Quality</th>
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<tr>
<td></td>
<td>Strong</td>
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<tr>
<td>Low involvement</td>
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<tr>
<td>Low</td>
<td>28</td>
</tr>
<tr>
<td>High</td>
<td>29</td>
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<tr>
<td>High involvement</td>
<td></td>
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<td>Low</td>
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<tr>
<td>High</td>
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Finally, for a manipulation check, subjects were asked to answer the questions about the involvement of the given stimulus topic at the end of the experiment.
Involvement (high or low involvement) manipulation

Involvement\(^1\) in the experiment was manipulated between high involvement and low involvement. Based on involvement manipulation from Wu, Crocker, and Rogers (1989), this study pretested a high involvement topic about athletic shoes and a low involvement topic about facial tissue. Wu et al. (1989) asked about purchase history, purchase and brand choice criteria, and level of involvement for 12 products to 48 students taking business classes. According to their survey results, they found out that lowest involvement product was facial tissues, and highest involvement product was athletic shoes among 12 products (Wu et al., 1989).

This is an example of the experimental stimulus for a high involvement, strong argument, and high heuristic cue: *If you want to run well and run safely, consider fit first and price last. “You want a shoe that helps you maintain a balanced position, and a more expensive shoe is not always the solution.” Money often buys higher-quality goods, but not when it comes to running shoes, athletic equipment experts say. Some researchers found that some low-and mid-cost shoes cushioned runners' feet just as well as high-cost ones, sometimes even better.*

*Sales of running shoes reached a record $2.36 billion in 2013, 60 percent more than a decade earlier. But some of those dollars may not have been well spent. In 2012, Scottish researchers tested running shoes at three price levels, ranging from $80 to $150,*

\(^1\) The text of the articles used in this experiment were originally used by a researcher (Wu, Crocker, and Rogers, 1989), based on actual online news articles.
and found that low- and mid-cost shoes within the same brand cushioned runners’ feet just as well as high-cost ones, sometimes even better.

This is an example of the experimental stimulus for a low involvement, strong argument, and high heuristic cue: Now Kleenex has something it claims is a first: Along with lotion, Kleenex Cool Touch contains ingredients that promise cooling relief to sore noses.

In 2012, research indicates that softness is the most important quality for 84 percent of facial tissue purchasers, but facial tissue companies still pursue other innovations to stand out. Kleenex Cool Touch, in contrast, is unscented; because, among households that use facial tissue, 89 percent buy unscented varieties, while only 19 percent buy scented varieties, according to Mintel, a market research firm.

“This really is a game-changing innovation,” said Craig Smith, the brand director for Kleenex. According to a recent research, for 91% of subjects were reported that this is the tissue that releases a cool sensation, and it takes soothing to a whole different level.

Facial tissues are used in 70 percent of households, according to Mintel, and Mr. Smith, of Kleenex, believes that Cool Touch is an innovation that will draw consumers from other brands and also win over some who thought toilet tissue or paper napkins suited their noses fine.

This study tested participants’ involvement about each topic between athletic shoes (Chronbach’s alpha of .54) and facial tissues (Chronbach’s alpha of .45) to pre-test a manipulation (Guimond, 1997; Hunt, Keaveney, & Lee, 1995) with the below items,
and confirmed \[ F (1, 57) = 11.72, \ p \leq .01 \] that participants are more involved in athletic shoes \( M = 6.57, \ SD = 1.60 \) than facial tissues \( M = 5.50, \ SD = 1.61 \).

1) Athletic shoes / facial tissues is very important to me

2) About athletic shoes / facial tissues, it’s not a big deal if you make a mistake : Reverse coded

3) About athletic shoes / facial tissues, it’s hard to make a bad choice : Reverse coded

4) You can really tell about the quality of athletic shoes / facial tissues.

5) When purchasing athletic shoes / facial tissues, how important is the brand or company?

Additionally, this study tested subjects’ involvement about each topic between athletic shoes and facial tissues to test a manipulation check (Guimond, 1997; Hunt et al., 1995) with the below items; however, these were not found to be a credible measure to test participants involvement (Chronbach’s alpha of .09).

6) The article’s information is very important to me

7) About the information of the article, it’s not a big deal if you make a mistake (reverse coded)

8) About the information of the article, it’s hard to make a bad choice (reverse coded)

9) You can really tell about the quality of the product, which is discussed in the article.

10) When purchasing the product that discussed in this article, how important is the brand or company?
Heuristic cue (high or low cue) manipulation

The heuristic cue was manipulated between the conditions high or low cue. Heuristic cues were printed at the margins of articles. The high heuristic cue was visually shown: 6.2K people “recommended” an article\(^2\) and user rating of an article is 7,043,994 points, including 7,980,870 positive points and 936,876 negative points\(^3\). Regarding a low cue condition, the cue was visually shown: 1 person “recommended” an article and user rating of an article is -69 points, including 7 positive points and 76 negative points. Figure 6 displays examples of high and low heuristic cues.

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\(^2\) This is similar to the “like” found on Facebook.

\(^3\) These “points” are similar with a rating system that is very common in the Korean news site Ohmynews.co.kr.
Argument quality (strong or weak argument) manipulation

Argument quality was manipulated between strong or weak argument (Petty & Cacioppo, 1979). The strong argument version of the message was presented with more affirmative voices, such as “must,” “should,” and “have to,” and with more statistical supporting evidences, such as research results and survey data. The weak argument version of the message presented with less affirmative voices, such as “might,” “could,” and “consider,” and quotes from other people without statistical supporting evidence, such as “my friends said…” and “people said…”

Attitude toward information and author’s credibility scale

During the experiment, participants read their assigned stimulus article depending on which condition they were randomly assigned. After reading, participants rated the degree of their agreement about the given information. The scale of responses was a 10-point Likert. Participants answered four questions asking their attitude about the given article’s information adapted from Petty and Cacioppo (1979) as a reliable scale (Chronbach’s alpha of .88):

1) I agree with this information
2) This information makes sense to me
3) I accept the story of this information
4) I think this information is a good solution
In addition participants answered four questions asking about the author’s credibility for the given article’s information adapted from Petty and Cacioppo (1979) as a reliable scale (Chronbach’s alpha of .92).

1) I think the author is trustworthy
2) I think the author is credible
3) I think the author won’t lie to me
4) I think the author won’t deceive someone
CHAPTER IV

RESULTS

MANOVA analysis

The purpose of Multivariate Analysis of Variance (MANOVA) was completed in order to assess the main and interaction effects of the heuristic cue, involvement, and argument quality on attitude toward information and author’s credibility. Table 2 describes descriptive data for these control variables. Total number of case was 232; however, 2 cases were not included because of missing values. Online news ($M = 7.21, SD = 1.87$, Cronbach’s alpha of .88) and Facebook preference ($M = 4.93, SD = 2.41$, Cronbach’s alpha of .90), broadcasting TV watching hours ($M = 2.03, SD = 1.90$), social networking use per day ($M = 4.25, SD = 2.78$), level of college education ($M = 2.80, SD = 1.18$), and experiment duration was controlled. The level of college education is an ordinal variable, but this variable is treated as a numerical variable by this study. This analysis excludes answers for the “other” category as the level of college education.
Table 2.
Descriptive statistics for control variables

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>Number of items</th>
<th>Chronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Online news preference</strong></td>
<td>7.21</td>
<td>1.87</td>
<td>4</td>
<td>.88</td>
</tr>
<tr>
<td>I like Online news postings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I’m comfortable with reading Online</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>news postings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think Online news postings are</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>useful</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think Online news postings are</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>credible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.93</td>
<td>2.41</td>
<td>4</td>
<td>.90</td>
</tr>
<tr>
<td><strong>Facebook news preference</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I like Facebook postings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I’m comfortable with reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facebook postings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think Facebook postings are</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>useful</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I think Facebook postings are</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>credible</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Broadcasting TV watching hours</strong></td>
<td>2.03</td>
<td>1.90</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>On an average day, how many hours do</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>you watch TV shows?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>: including network cable, public</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broadcasting, but not streaming and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>download.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Social networking use per day</strong></td>
<td>4.25</td>
<td>2.78</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>On an average day, how many news</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>stories do you read from SNS such</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>as Facebook, Twitter, Google +, and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinterest?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>: include all screens—desktop,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>laptop, iPad, smartphone, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Level of college education</strong></td>
<td>2.80</td>
<td>1.18</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>What year are you at CSU?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Freshman, 2 Sophomore, 3 Junior,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Senior 5. Graduate student 6. Other*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Experiment duration (minute)</strong></td>
<td>11:37</td>
<td>5.31</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
MANOVA was required for this study because attitude toward information and author’s credibility were significantly correlated ($r = .65, p \leq .001$). Therefore, this study was able to analyze both main effects and interaction effects on attitude toward information and author’s credibility.

As shown in Table 3, the analysis results show significant main effects of involvement [Pillai’s Trace: $F (2, 215) = 4.17, p \leq .05, \eta^2 = .037$] and significant interaction effects among heuristic cue, involvement, and argument quality [Pillai’s Trace: $F (2, 215) = 4.55, p \leq .05, \eta^2 = .041$] on both attitude toward information and author’s credibility. Box’s $M$ test of equality of covariance matrices was significant ($p \leq .01$), therefore this result confirms the homogeneity of the variance across all individual experimental groups. In addition, the robustness of this analysis is solid because assigning participants to each condition is not related with any other manipulation procedures or experiment orders. That is because the online survey software equalized the number of the sample to each condition automatically.
Table 3. Multivariate test for MANOVA: Pillai’s Trace

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>F-value</th>
<th>P-value</th>
<th>Partial eta squared</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heuristic cue</td>
<td>0.00</td>
<td>0.51</td>
<td>0.60</td>
<td>.005</td>
<td>0.13</td>
</tr>
<tr>
<td>Involvement</td>
<td>0.04</td>
<td>4.17</td>
<td>0.02*</td>
<td>.037</td>
<td>0.73</td>
</tr>
<tr>
<td>Argument Quality</td>
<td>0.01</td>
<td>0.82</td>
<td>0.44</td>
<td>.018</td>
<td>0.19</td>
</tr>
<tr>
<td>Heuristic cue × Involvement × Argument Quality</td>
<td>0.04</td>
<td>4.55</td>
<td>0.01*</td>
<td>.041</td>
<td>0.77</td>
</tr>
</tbody>
</table>

* Correlation between attitude toward information and author’s credibility was .65 (p ≤ .001)

ANOVA analysis

In an inspection of ANOVAs for the attitude toward information and author’s credibility separately, individual post hoc test from the MANOVA was analyzed.

Regarding the attitude toward information, there is one main effect and one interaction effect. First, involvement has a significant main effect on attitude toward information \([F (1, 216) = 7.18, p ≤ .01]\), and explains 3.2% of total variance of attitude toward information. The attitude toward information of a high-involvement product \((M = 7.19, SD = 1.74)\) was significantly more positive than of a low-involvement product \((M = 6.56, SD = 2.03)\).
Second, there was a significant interaction effect among heuristic cue, involvement, and argument quality \( F(1, 216) = 9.12, p \leq .01 \) and this explains 4.0\% of total variance of attitude toward information.

Regarding author’s credibility, there is only an interaction effect and the main effects were not significant. There was a significant interaction effect among heuristic cue, involvement, and argument quality \( F(1, 216) = 3.94, p \leq .05 \), and it explains 1.8\% of total variance of the author’s credibility.

An ANOVA analysis reports significant interaction effects among heuristic cue, involvement, and argument quality on both the attitude toward information and the author’s credibility. These results support Hypothesis 1 and 2. The interaction effects on both attitude toward information and the author’s credibility supports Hypothesis 1a and 1b when the argument quality is strong, and Hypothesis 2a and 2b when the heuristic cue is low. Table 4 summarizes the analysis data that support these hypotheses.
Table 4.
Hypothesis and their results

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Attitudes</th>
<th>ANOVA results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects of the heuristic cue predicted by HSM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1a The heuristic cue effect is stronger for a low-involvement product compared to a high-involvement product.</td>
<td>Attitude toward information</td>
<td>Table 5 and Figure 7</td>
</tr>
<tr>
<td></td>
<td>Author’s credibility</td>
<td>Table 6 and Figure 8</td>
</tr>
<tr>
<td>1b When the heuristic cue effect is high, the positive attitude about the message will also be high.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attitude toward information</td>
<td>Table 5 and Figure 7</td>
</tr>
<tr>
<td></td>
<td>Author’s credibility</td>
<td>Table 6 and Figure 8</td>
</tr>
<tr>
<td>Effects of the argument quality predicted by ELM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2a The argument quality effect is stronger for a high-involvement product compared to a low-involvement product.</td>
<td>Attitude toward information</td>
<td>Table 7 and Figure 9</td>
</tr>
<tr>
<td></td>
<td>Author’s credibility</td>
<td>Table 8 and Figure 10</td>
</tr>
<tr>
<td>2b When the argument quality effect is high, the positive attitude about the message will also be high.</td>
<td>Attitude toward information</td>
<td>Table 7 and Figure 9</td>
</tr>
<tr>
<td></td>
<td>Author’s credibility</td>
<td>Table 8 and Figure 10</td>
</tr>
</tbody>
</table>
Hypothesis 1

Both MANOVA and ANOVA analysis report significant interaction effects among heuristic cue, involvement, and argument quality on both the attitude toward information and the author’s credibility. These significant interaction effects support Hypothesis 1 when the argument quality is strong.

First, Hypothesis 1 is supported by both MANOVA and ANOVA analysis, showing significant interaction effects among heuristic cue, involvement, and argument quality on the attitude toward information.

Table 5. Attitude toward information of each condition when the argument quality is strong

<table>
<thead>
<tr>
<th>Heuristic cue</th>
<th>High involvement</th>
<th>Low involvement</th>
<th>High involvement</th>
<th>Low involvement</th>
<th>High involvement</th>
<th>Low involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>7.01</td>
<td>7.13</td>
<td>2.04</td>
<td>1.69</td>
<td>37</td>
<td>28</td>
</tr>
<tr>
<td>Low</td>
<td>7.54</td>
<td>6.19</td>
<td>1.42</td>
<td>2.30</td>
<td>24</td>
<td>28</td>
</tr>
</tbody>
</table>

Hypothesis 1a predicted that the heuristic cue effect is stronger for a low-involvement product compared to a high-involvement product. As shown in Table 5,
ANOVA analysis shows that when argument quality is strong the heuristic cue increases the attitude toward information more positively (+ 0.94) when the information is about a low-involvement product. On the other hand, the heuristic cue decreased attitude toward information more negatively (- 0.53) when the information was about a high-involvement product. Figure 7 demonstrates these relationships that when the argument quality is strong, the heuristic cue effect is stronger for a low-involvement product compared to a high-involvement product (Hypothesis 1a), and when the heuristic cue effect is high, the positive attitude about the message will also be high (Hypothesis 1b).

Figure 7.
The interaction effect on the attitude toward information under the strong argument quality
In addition, Hypothesis 1b predicted that when the heuristic cue effect is high, the positive attitude about the message will also be high. ANOVA analysis shows that the information presented with the high heuristic cue ($M = 7.13, SD = 1.69$) induces more positive attitudes toward information than the information presented with the low heuristic cue ($M = 6.19, SD = 2.30$) when the information was about a low-involvement product.

Second, Hypothesis 1 is also supported by both MANOVA and ANOVA analysis, reporting significant interaction effects among heuristic cue, involvement, and argument quality on the author’s credibility.

**Table 6.** Author’s credibility of each condition when the argument quality is strong

<table>
<thead>
<tr>
<th></th>
<th>$M$</th>
<th>$SD$</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Heuristic cue</td>
<td>High</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Involvement</td>
<td>involvement</td>
<td>involvement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>5.81</td>
<td>6.24</td>
<td>1.93</td>
</tr>
<tr>
<td>Low</td>
<td>6.38</td>
<td>5.41</td>
<td>2.05</td>
</tr>
</tbody>
</table>

Hypothesis 1a predicted that the heuristic cue effect is stronger for a low-involvement product compared to a high-involvement product. As shown in Table 6, ANOVA analysis shows that when argument quality is strong the heuristic cue increases,
the heuristic cue increases (+ 0.83) the author’s credibility of the information when the information is about a low-involvement product. On the other hand, the heuristic cue decreased (- 0.57) the author’s credibility of the information when the information was about a high-involvement product with strong argument quality. Figure 8 demonstrates these relationships; when the argument quality is strong, the heuristic cue effect is stronger for a low-involvement product compared to a high-involvement product (Hypothesis 1a), and when the heuristic cue effect is high, the author’s credibility of the message will also be high (Hypothesis 1b).

Figure 8.
The interaction effect on the author’s credibility under the strong argument quality
In addition, Hypothesis 1b predicted that when the heuristic cue effect is high, the positive attitude about the message will also be high. As shown in Table 5, ANOVA analysis shows that the information presented with the high heuristic cue ($M = 6.24$, $SD = 1.96$) induce more positive author’s credibility than the information presented with the low heuristic cue ($M = 5.41$, $SD = 2.40$) when the information was about a low-involvement product.
Both MANOVA and ANOVA analysis report significant interaction effects among heuristic cue, involvement, and argument quality on both the attitude toward information and the author’s credibility. These significant interaction effects support Hypothesis 2 when the heuristic cue is low.

First, Hypothesis 2 is supported by both MANOVA and ANOVA analysis, reporting significant interaction effects among heuristic cue, involvement, and argument quality on the attitude toward information.

### Table 7.
**Attitude toward information of each condition when the heuristic cue is low**

<table>
<thead>
<tr>
<th>Argument quality</th>
<th>M</th>
<th>SD</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High involvement</td>
<td>Low involvement</td>
<td>High involvement</td>
</tr>
<tr>
<td>Strong</td>
<td>7.54</td>
<td>6.19</td>
<td>1.42</td>
</tr>
<tr>
<td>Weak</td>
<td>6.90</td>
<td>6.70</td>
<td>1.75</td>
</tr>
</tbody>
</table>

Hypothesis 2a predicted that the argument quality effect is stronger for a high-involvement product compared to a low-involvement product. As shown in Table 7, ANOVA analysis shows that when the heuristic cue is low, the strong argument quality
increases the attitude toward information more positively (+ 0.64) when the information is about a high-involvement product. On the other hand, the strong argument decreases the attitude toward information more negatively (- 0.51) when the information was about a low-involvement product. Figure 9 demonstrates these relationships that when the heuristic cue is low, the argument quality effect is stronger for a high-involvement product compared to a low-involvement product (Hypothesis 2a), and when the argument quality effect is high, the positive attitude about the message will also be high (Hypothesis 2b).

Figure 9.
The interaction effect on the attitude toward information under the low heuristic cue condition
In addition, Hypothesis 2b predicted that when the argument quality effect is high, the positive attitude about the message will also be high. ANOVA analysis shows that the information presented with the strong argument quality \( (M = 7.54, SD = 1.42) \) induces more positive attitudes toward information than the information presented with the weak argument quality \( (M = 6.90, SD = 1.75) \) when the information was about a high-involvement product.

Second, Hypothesis 2 is supported by both MANOVA and ANOVA analysis, reporting significant interaction effects among heuristic cue, involvement, and argument quality on the author’s credibility.

**Table 8.**
**Author’s credibility of each condition when the heuristic cue is low**

<table>
<thead>
<tr>
<th>Argument quality</th>
<th>( M )</th>
<th>( SD )</th>
<th>( Sample size )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong</td>
<td>6.38</td>
<td>5.41</td>
<td>2.05 2.40 24 28</td>
</tr>
<tr>
<td>Weak</td>
<td>5.52</td>
<td>5.60</td>
<td>1.97 2.12 28 24</td>
</tr>
</tbody>
</table>

35
Hypothesis 2a predicted that the argument quality effect is stronger for a high-involvement product compared to a low-involvement product. As shown in Table 8, ANOVA analysis shows that when the heuristic cue is low, the strong argument quality increases (+ 0.86) the author’s credibility of information when the information is about a high-involvement product. On the other hand, the strong argument decreases (- 0.19) the author’s credibility of information when the information was about a low-involvement product. Figure 10 demonstrates these relationships that when the heuristic cue is low, the argument quality effect is stronger for a high-involvement product compared to a low-involvement product (Hypothesis 2a), and when the argument quality effect is high, the author’s credibility of message will also be high (Hypothesis 2b).

Figure 10.
The interaction effect on the author’s credibility under the low heuristic cue condition
In addition, Hypothesis 2b predicted that when the argument quality effect is high, the author’s credibility of the message will also be high. ANOVA analysis shows that the information presented with the strong argument quality ($M = 6.38$, $SD = 2.05$) induces author’s credibility of information more positively than the information presented with the weak argument quality ($M = 5.52$, $SD = 1.97$) when the information was about a high-involvement product.
Summary of analysis results

According to the results of both MANOVA and ANOVA analysis, this study found significant interaction effects among heuristic cue, involvement, and argument quality on both the attitude toward information and the author’s credibility. These significant interaction effects support Hypothesis 1 when the argument quality is strong; and Hypothesis 2 when the heuristic cue is low. Table 9 summarizes both Hypotheses and their findings.

Table 9. Hypothesis and their results

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>MANOVA results</th>
<th>ANOVA results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects of the heuristic cue predicted by HSM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1a The heuristic cue effect is stronger for a low-involvement product compared to a high-involvement product.</td>
<td>Supported</td>
<td>Supported for both the attitude toward information and the author’s credibility</td>
</tr>
<tr>
<td>1b When the heuristic cue effect is high, the positive attitude about the message will also be high.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Effects of the argument quality predicted by ELM

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>MANOVA results</th>
<th>ANOVA results</th>
</tr>
</thead>
<tbody>
<tr>
<td>2a The argument quality effect is stronger for a high-involvement product compared to a low-involvement product.</td>
<td>Supported when heuristic cue is low</td>
<td>Supported for both the attitude toward information and the author’s credibility</td>
</tr>
<tr>
<td>2b When the argument quality effect is high, the positive attitude about the message will also be high.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This paper is designed to explore how online readers process information when online news articles present *majority cues*. These majority cues are considered a specific type of heuristic cue and this study discovered complex interaction effects of these heuristic cues. HSM and ELM successfully predict how these interaction effects work when these models work together. This is because the emphasized points of both predictions are slightly different. HSM (Chaiken, 1980) emphasizes the effects of non-content cues when people process information along a peripheral path because humans are cognitive misers. Meanwhile, ELM (Petty & Cacioppo, 1979) emphasizes the effects of content quality when people process information along a central path because people can elaborate more on the given information. Motivation and involvement are the common keys to determine whether people process information along peripheral or central paths.

The assumptions and predictions of both HSM and ELM are supported by this study in a different and more integrated way. Additionally, this study’s results conclude
that people are cognitive misers when they face heavy cognitive loads; until that point they elaborate information easily. In other words, people try to spend their cognitive resources more efficiently.

First, Hypothesis 1 states that the heuristic cue effect is stronger for a low-involvement product compared to a high-involvement product, which was supported by both MANOVA and ANOVA analysis. Analysis results also confirm the HSM’s predictions when the argument quality of given information is strong. Specifically, heuristic cues increase the attitudes of participants, both attitude toward information and author’s credibility, more positively when the information is about a low-involvement product, but the heuristic cues decrease the attitudes of participants more negatively when the information was about a high-involvement product. HSM explains that this is because people are cognitive misers. According to HSM, people just adopt heuristic cues when they do not have motivation to use their cognitive resources to minimize their cognitive load, whereas people ignore heuristic cues when they do have motivations to use their cognitive resources to understand given information. This is supported only under the condition when the argument quality is strong.

Second, Hypothesis 2 states that the argument quality effects are stronger for a high-involvement product compared to a low-involvement product, which was supported by both MANOVA and ANOVA analysis. Analysis results also confirm ELM’s predictions, when the heuristic cue is low. Specifically, the strong argument quality increases the attitude toward information more positively when the information is about a high-involvement product. On the other hand, the strong argument decreases the attitude toward information more negatively when the information was about a low-involvement
product. ELM explains that this is because people elaborate information differently based on their involvement. According to ELM, people elaborate given information more when they are highly involved in subjects; therefore, they process the information through central paths. People do not elaborate given information when they are not involved in subjects; therefore, they process the information through peripheral paths. These explanations are supported only under the condition when the heuristic cue is low.

Third, this study suggests additional explanations as to why HSM’s and ELM’s predictions are supported only in certain conditions. HSM is supported only under the condition when the argument quality is strong, and ELM is supported only under the condition when the heuristic cue is low. The results of this study suggest that people also can rely on heuristic cues when they are highly involved in the subjects; and people also do not need to elaborate argument quality when they are highly involved in the subjects. These results are counterparts of both HSM’s and ELM’s predictions. This study suggests both models to have additional parts, which are cognitive efficiency (Lo Storto, 2013; Rypma et al., 2006) and cognitive threshold to explain the results that both HSM and ELM does not account for.

Cognitive efficiency is generally defined as a degree of qualitative increases in acquired knowledge compared to the invested cognitive efforts (Hoffman, 2012). This concept is similar to the degree of the amount of reduced uncertainty or complexity of information per required cognitive resources. For example, if we could understand qualities of information without serious consideration and thinking, then it is considered cognitively efficient. The Cognitive threshold is the point of divide between efficiency and inefficiency. For example, when given information requires only a little amount of
cognitive resources that is below the cognitive threshold, people can understand information efficiently; however, when the given information requires a larger amount of cognitive resources that exceed the cognitive threshold, people cannot understand information efficiently. This study suggests that the HSM and ELM are supported only when the required amount of cognitive resources is below the cognitive threshold and when people can process information efficiently. On the other hand, when the given information requires a larger amount of cognitive resources that exceeds the cognitive threshold and when people cannot understand information efficiently, then HSM and ELM fail to explain why people process messages differently. Figure 11 displays how cognitive thresholds divide cognitive efficiency between the efficient area and inefficient area.

Figure 11.
Cognitive thresholds and efficiency
One reason why people may process differently when using cognitive efficiency is that individuals moderate their information processing in more efficient ways for them to achieve a Maximization of Cognitive Efficiency (MCE). This theory is similar with ecological approaches, which are represented by the concept of affordances (Gibson, 1977; Good, 2007; Withagen & Chemero, 2011). Gibson and Walker (1984) defined affordances as relative properties of the environment taken to observers; therefore, when people perceive the utility of given information for appropriate actions, then they detect the affordance.

Similar to Gibson’s and Walker’s (1984) affordances, MCE explains that when people are involved in topics of given information they spend their cognitive resources to elaborate the information until the point when they can process efficiently. Meanwhile, when people need to spend more cognitive resources than their cognitive thresholds, then they choose to rely on more efficient processes such as heuristic cues. Furthermore, if they have to spend cognitive resources far exceeding their thresholds, they might choose to abandon processing the information. There are differences between Gibson and Walker (1984) affordances and MCE. First, people moderate their message processing based on their motivations and involvements, which are applied from HSM and ELM. Second, the roles of action that affordances have do not apply to MCE. Therefore, when comparing affordances that explain the interaction between individuals and the environment, MCE explains more specifically about knowledge acquisition processes.

Once we apply cognitive thresholds and MCE, the current study can explain the counterparts of HSM and ELM as well as their original predictions. Before explaining counterparts, HSM and ELM’s predictions are applied when people have supporting
materials that can be efficiently processed. First, HSM predicts that people save their
cognitive resources and rely more on heuristic cues when they are not involved in the
messages. This is because people tend to choose more efficient cognitive processes when
they have less involvement, compared to when they are highly involved in subjects.
Heuristic cues are more efficient than elaboration when they are not involved in the
information, although heuristic cues may be less accurate than elaboration. Therefore,
people rely on heuristic cues to process information when they are less involved in the
messages.

Second, ELM predicts that people elaborate information more when they are
highly involved. When individuals have supporting materials that they can easily
elaborate and are highly involved in the given information, they are willing to elaborate
supporting materials within their cognitive thresholds. This is a circumstance when
people can process information efficiently; and therefore, they determine their attitudes
based on available supporting materials, such as argument quality, and minimize the
effects of heuristic cues. This is because elaboration is more efficient to reduce
inaccuracy that heuristic cues have. Determining argument quality can reduce uncertainty
efficiently and without exceeding the cognitive threshold.

The uniqueness of this study is the additional results that HSM and ELM could
not account for, especially when there are no supporting materials that people can
efficiently process. When people cannot find easily accessible supporting materials, they
start to adopt heuristic cues as their supporting materials, and HSM and ELM fail to
explain this. First, when people face a huge uncertainty that requires excessive cognitive
resources, they rely on heuristic cues even if they are highly involved in the information,
which is not explained by ELM. Increased uncertainty makes people use more cognitive resources beyond their cognitive thresholds to process the message properly; this is inefficient. When the information requires an excessive cognitive load that exceeds their cognitive thresholds, people rely on heuristic cues to avoid cognitive inefficiency that comes from numerous uncertainties and complexities, even if they are highly involved in the given subjects.

Second, people consider the heuristic cues as irrelevant information for the low-involvement products, which is not explained by HSM, when people could not find easily accessible supporting materials. This is because people do not want to spend their cognitive resources inefficiently even if it is a very small amount, such as heuristic cues, when they face a huge uncertainty for the low-involvement subjects. Likewise, when people are highly involved in subjects, they spend more cognitive effort to adopt heuristic cues because that is more efficient than elaborating huge uncertainties and complexities.

In summary, the explanations of both HSM and ELM are supported only when people use their cognitive resources below the limit of cognitive thresholds, and MCE explains when people need to use cognitive resources above their cognitive thresholds. At first, people start to adopt heuristic cues to reduce cognitive load even when they are highly involved in the subjects. Next, people start to ignore heuristic cues when they are not involved in subjects. Additionally, this study further finds that people also can ignore heuristic cues when they are highly involved in subjects and when they have to spend cognitive resources far much exceeding their threshold. That is because humans are naturally moderating their information processing in a dynamic manner that maximizes
their cognitive efficiency to interpret the given information and environment efficiently and in a timely manner.

Limitations and future research

There are some limitations to this thesis that encourage future research projects. Although this study replicated well known assumptions of HSM and ELM, the results of this study support their predictions under only certain conditions. This study tried to provide explanations of why their predictions cannot account for certain circumstances in regard to MCE; however, the assumptions and explanations of MCE need more empirical support with future research. Additional research employing various methods, contexts, and fields are required to support this theory.

First, the effects of heuristic cues are highly dependent upon an individual’s cognitive ability and environment. In other words, participants’ demographics and experimental environments may play important roles. For example, the effects of heuristic cues may be different between age groups and education, between lab experiments and take home surveys, between paper print and computer screen, and between smaller and larger screens. This is because people perceive heuristic cues and affordances as relative properties of the environment taken to observers (Gibson & Walker, 1984). Therefore, future studies should examine how heuristic cues have different effects depending on demographics and the experimental environment.
Second, the effects of heuristic cues are also highly variable depending upon participants’ involvement. The participants of this study are only selected from college students and it uses limited subjects; however, in reality, there are various issues in which people have different involvement levels. Studies that explore various topics, issues, and public opinions will have benefits when they incorporate the results of this study. For example, this study can guide the effects of heuristic cues in regard to online health communication, political communication, organizational communication, advertising, public relations, and social media. This study’s results can guide future studies to discover the unique effects of online communication that have interactive features.

Third, future studies could explore the different types of heuristic cues on online media. This study examines only one specific type of heuristic cue, which is the majority cue; however, there are undiscovered heuristic cues in regard to individual’s emotions, and social norms. For example, certain stories and pictures can create certain types of emotional heuristic cues (Horowitz & Wanstrom, 2008), and certain other replies or content can create certain types of heuristic cues that are based on social norms and political socialization (Horowitz & Wanstrom, 2006).

Fourth, more specific in-depth studies that examine cognitive efficiency and thresholds of individuals, and studies that examine different efficiencies among different media, would be welcome. For example, cognitive efficiencies and thresholds of individuals can be different when they process information from different media types, such as different channel richness (Bracken, Jeffres, & Neuendorf, 2004) and presence (Bracken & Skalski, 2009), or different media forms and presence (Bracken, 2006). In these examples, it is predicted that when people process messages with different media
types, the difference of individuals’ level of presence can change their cognitive efficiencies and thresholds that influence the effects of heuristic cues and information processing.

Finally, future research inquiries will be encouraged to integrate the effects of heuristic cues both with an individual’s cognitive ability and with the participants’ involvements for various subjects in various environments, and with the different media types and presence. These studies will help us to understand the complex nature of information processing, and unveil the interactive effects of online media.

Implications and conclusions

This paper presents that HSM and ELM are supported when people use their cognitive resources efficiently. On the other hand, these predictions are not supported when people need to use cognitive resources inefficiently. MCE explains that this is because humans naturally moderate their information processing in a dynamic manner that maximizes their cognitive efficiency to interpret the given information and environment efficiently and in a timely manner. Therefore, when people can process given information efficiently they tend to ignore heuristic cues as predicted by HSM and ELM. Meanwhile, when people cannot process given information efficiently due to the increased amount of uncertainty that exceed cognitive thresholds, people start to adopt heuristic cues to reduce cognitive load although they are highly involved in the subjects of given information. Additionally, this study further suggests that people can also ignore
heuristic cues and argument quality, and just give up to process the given information when they have to spend cognitive resources far exceeding their threshold although they are highly involved in the subjects of given information.

For example, in public healthcare issues, there are tons of arguments, advertisements, and information about healthcare and MCE can explain individuals’ different information processing. First, for people who think those healthcare issues are important for themselves and their family, strong argument quality is likely more important than heuristic cues when the argument quality is efficiently processed and elaborated by individuals. On the other hand, when individuals cannot process the argument quality easily, such as when the given information is too long or complex to read and understand, they will likely try to elaborate this information until the point of their cognitive thresholds. Once the required cognitive resources exceed their cognitive threshold, people will likely start to rely on heuristic cues even if they are highly involved in the healthcare issues.

Therefore, public campaigns or arguments about healthcare issues should be presented with an appropriate amount and complexity of supporting materials; however, if it is hard to adjust the argument to have the right amount and complexity of information, then try to make the issue very complex and hard to understand and rely on heuristic cues. Usually, healthcare issues are very complicated and they require too much time to understand and to consider every single aspect of the issues. Additionally, there are too many controversial arguments on the Internet. As a result, many people have no other choices other than to rely on heuristic cues such as friends’ recommendations, majority cues, and their political party’s stances. Furthermore, if the issues are always
complex and hard to understand, then it is possible that people will abandon understanding given information at all. It is common to see people who do not stand for any side of arguments and avoid discussing healthcare issues. This is a problem that HSM and ELM cannot account for.

Second, for most people who think that healthcare issues are not important for them, heuristic cues attached to given information such as majority cues may increase the persuasiveness of the given information. Additionally, in order for these heuristic cues to work properly, the given information about healthcare issues should include any kind of supporting materials that people can easily understand, such as good argument quality. If the given information does not include any of these supporting materials that people can efficiently process, individuals will consider these heuristic cues as irrelevant information.

Therefore, MCE predicts that heuristic cues are a very efficient way to change individuals’ attitudes; however, in order to make these cues work properly, communicators should consider conditions when they will take effect, such as the individuals’ involvement, cognitive thresholds, and complexity of information and problems. It is good to know that people have a mechanism that maximizes their limited cognitive resources, because this will help to make better communication strategies for online-communicators.

In addition, this paper carefully casts a warning that the effects of heuristic cues on socially unacceptable contents can also influence people’s attitude, such as content and posts that including highly sensational texts and images. In order to get an individual’s interest and attention, this content is often weaponized with sexuality,
racialism, and violence. This content tends to get people’s attentions relatively easily.

Furthermore, the advertisement market values our attention to this content. People may consider that this content is just for fun and has nothing to do with the real world; however, inconsiderate attention for this content may influence both the individuals who create this content and those who see this content later. This is because the creators of this sensational content may try more extreme sensational material and exposure of such content may lead viewers to want more extreme content. In these circumstances, the effects of heuristic cues on those contents may make people more accepting and insensitive to those socially unacceptable contents. Therefore, we need to be careful when we express our interests. This is the time that we have to carefully select what we will click.
REFERENCES


Faraji-Rad, A., Samuelsen, B. M., & Warlop, L. (2012). Similar advisers are more persuasive when advice-takers rely on their feelings. *FEB Research report MO_1202*.


APPENDICES
A. Manipulation items

1. High involvement

1.1 High involvement, strong argument, high heuristic cue
1.2 High involvement, strong argument, low heuristic cue

For Running Shoes, It’s Fit First and Price Last

By Alicia W. Stewart, CNN
updated 8:44 AM EST, Wed November 27, 2013

If you want to run well and run safely, consider fit first and price last. “You want a shoe that helps you maintain a balanced position, and a more expensive shoe is not always the solution,” Money often buys higher-quality goods, but not when it comes to running shoes. Athletic equipment experts say. Some researchers found that some low-and mid-cost shoes cushioned runners’ feet just as well as high-cost ones, sometimes even better.

Sales of running shoes reached a record $2.36 billion in 2013, 60 percent more than a decade earlier. But some of those dollars may not have been well spent. In 2012, Scottish researchers tested running shoes at three price levels, ranging from $80 to $150, and found that low- and mid-cost shoes within the same brand cushioned runners’ feet just as well as high-cost ones, sometimes even better.
1.3 High involvement, weak argument, high heuristic cue
1.4 High involvement, weak argument, low heuristic cue
2. low involvement

2.1 low involvement, strong argument, High heuristic cue
2.2 low involvement, strong argument, Low heuristic cue
2.3 low involvement, weak argument, High heuristic cue
2.4 low involvement, weak argument, Low heuristic cue
B. Consent form

Informed Consent Form

Communication and Understanding

A project conducted under the auspices of Cleveland State University
School of Communication
Principal Investigators: Dr. Edward Horowitz and Hocheol Yang

This study will look at how individuals think about the information that they see and read. We are interested in how some people think about what they see posted on a website. This research will hopefully result in better understanding of the thinking and reactions people have.

In this study, you will be asked to read an online post and then answer some questions about your reaction to this post and your attitudes to events in the news. In total, your participation will take about 30 minutes. While this should be an interesting task to complete, there will be no immediate benefits or risks from your participation.

Your participation in this study is completely voluntary and your answers will remain confidential. Although answering every question is preferable, you have the right to skip any question that you do not want to answer. You also have the right to stop participating at any time prior to the completion of the project without any consequence whatsoever.

Your name will never be identified with any of the study materials. We may use the results of this investigation in later research; however, no identifying information will be available. Published results of this study will contain no information linking you to this study.

If you have any questions about this research or the questionnaire, you may contact Dr. Edward Horowitz at (216) 687-4511 or Hocheol Yang (570) 500-0015.

You must be at least 18 years old to participate in this research.

Thank you for your participation and help.

☐ I hereby agree to participate in the above-described research. I understand my participation is voluntary and that I may withdraw at any time without penalty.
Informed Consent Form (for extra credits)

Communication and Understanding

A project conducted under the auspices of Cleveland State University
School of Communication
Principal Investigators: Dr. Edward Horowitz & Hocheol Yang
Supervisor: Dr. Edward Horowitz
Instructor: MA. Hocheol Yang

This study will look at how individuals think about the information that they see and read. We are interested in how some people think about what they see posted on a website. This research will hopefully result in better understanding of the thinking and reactions people have.

In this study, you will be asked to read an online post and then answer some questions about your reaction to this post and your attitudes to events in the news. In total, your participation will take about 30 minutes. While this should be an interesting task to complete, there will be no immediate benefits.

You are eligible to earn extra credits when you are taking a class that offer extra credits for participating research studies. The amount of credit and eligibility will be determined by an instructor of participating class.

Your participation in this study is completely voluntary and your answers will remain confidential. Although answering every question is preferable, you have the right to skip any question that you do not want to answer. You also have the right to stop participating at any time prior to the completion of the project without any consequence whatsoever.

Your name will never be identified with any of the study materials. We may use the results of this investigation in later research; however, no identifying information will be available. Published results of this study will contain no information linking you to this study.

If you have any questions about this research or the questionnaire, you may contact Dr. Edward Horowitz at (216) 687-4511 or Hocheol Yang (570) 500-0015. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board (IRB) at (216) 687-3630 or access their website at “http://www.csuohio.edu/offices/irb/”

You must be at least 18 years old to participate in this research.

Thank you for your participation and help.

I hereby agree to participate in the above-described research. I understand my participation is voluntary and that I may withdraw at any time without penalty.

☐ I agree to participate in this research  ☐ I disagree to participate in this research
C. Survey questions

A1~5. Attitude toward argument, Likert (1~10).
A1. I agree with this information.
A2. This information makes sense to me.
A3. I accept the story of this information.
A4. I think this information is a good solution.

B1~4. Author’s credility, Likert (1~10).
B1. I think the author is trustworthy
B2. I think the author is credible
B3. I think the author won’t be lie to me
B4. I think the author won’t deceive someone

C1~4. Intention, Likert (1~10).
C1. I will share this article using my SNS (Examples: Facebook, Twitter, and Google +)
C2. During talking with friends and family in person, I will share this article's idea to them.
C3. I will join online community sites to express my support of this article (Example: Slicksdeal)
C4. I will post an article on my blog to support this article's idea.

D1~4. Involvement: manipulation check, Likert (1~10).
D1. The article’s information is very important to me
D2. About the information of the article, it’s not a big deal if you make a mistake
D3. About the information of the article, it’s hard to make a bad choice
D4. You can really tell about the quality of the product, which is discussed in the article.

D5. When purchasing the product that discussed in this article, how important is the brand or company?

E1. In your opinion, how believable is this information to you?
E2. In your opinion, how convincing is this information to you?
E3. In your opinion, how sound is this information to you?
E4. In your opinion, how strong is this information to you?

F1~4. Heuristic cue manipulation check, Likert (1~10).
F1. I think many people agree with this information
F2. I think many people liked this information
F3. I think many people showed their support for this information
F4. I think many people supported about the information of this article

G. demographics
Please tell us a little about yourself.
a. Gender? □ 1 Male □ 2 Female
b. Your age on your last birthday: _______
c. What year are you at CSU?
   1 Freshman, 2 Sophomore, 3 Junior, 4 Senior
d. Race: 1. white, 2. Black or African American, 3. American Indian and Alaska Native, 4. Asian,
   5. Native Hawaiian and other Islander, 6. None of the listed choices.
Researching the Sneeze and How to Handle It

by Alicia W. Stewart, CNN
updated 8:41 AM EST, 3rd November 27, 2013

Now Kleenex has something it claims is a first: Along with lotion, Kleenex Cool Touch contains ingredients that promise cooling relief to sore noses.

In 2012, research indicates that softness is the most important quality for 84 percent of facial tissue purchasers, but facial tissue companies still pursue other innovations to stand out. Kleenex Cool Touch, in contrast, is unscented; because, among households that use facial tissue, 89 percent buy unscented varieties, while only 10 percent buy scented varieties, according to Mintel, a market research firm.

"This really is a game-changing innovation," said Craig Smith, the brand director for Kleenex. According to a recent research, for 91% of subjects were reported that this is the tissue that releases a cool sensation, and it takes soothing to a whole different level.

Facial tissues are used in 70 percent of households, according to Mintel, and Mr. Smith, of Kleenex, believes that Cool Touch is an innovation that will draw consumers from other brands and also win over some who thought toilet tissue or paper napkins suited their noses fine.

Please write your comment here shortly (minimum of 10 words and maximum of 20 words)

1. On a scale from one to ten, where ONE means STRONGLY DISAGREE, and TEN means STRONGLY AGREE, indicate whether or not you agree with these statements.

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<td>A1. I agree with this information.</td>
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<td>A2. This information makes sense to me.</td>
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<td>A3. I accept the story of this information.</td>
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A4. I think this information is a good solution.
B1. I think the author is trustworthy.
B2. I think the author is credible.
B3. I think the author won't be lie to me.
B4. I think the author won't deceive someone.
C1. I will share this article using my SNS (Examples: Facebook, Twitter, and Google +).
C2. During talking with friends and family in person, I will share this article's idea to them.
C3. I will join online community sites to express my support of this article (Example: Slickdeals).
C4. I will post an article on my blog to support this article's idea.
D1. The article's information is very important to me.
D2. About the information of the article, it's not a big deal if you make a mistake.
D3. About the information of the article, it's hard to make a bad choice.
D4. You can really tell about the quality of the product, which is discussed in the article.
D5. When purchasing the product that discussed in this article, how important is the brand or company?
E1. In your opinion, how believable is this information to you?
E2. In your opinion, how convincing is this information to you?
E3. In your opinion, how sound is this information to you?
E4. In your opinion, how strong is this information to you?
F1. I think many people agree with this information.
F2. I think many people like this information.
F3. I think many people showed their support for this information.
F4. I think many people supported about the information of this article.
2. On a scale from one to ten, where ONE means STRONGLY DISAGREE, and TEN means STRONGLY AGREE, indicate whether or not you agree with these statements.

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<th>STRONGLY AGREE</th>
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2A1. I like Online news postings
2A2. I'm comfortable with reading Online news postings
2A3. I think Online news postings are useful
2A4. I think Online news postings are credible
2B1. I like Facebook postings
2B2. I'm comfortable with reading Facebook postings
2B3. I think Facebook postings are useful
2B4. I think Facebook postings are credible
3. a On an **average day**, how many hours do you read ONLINE NEWS (include all screens—desktop, laptop, iPad, smartphone, etc.)?

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<th>10 or more than 10 hours</th>
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3. b On an **average day**, how many hours do you watch TV shows using internet streaming?

: including streaming services, such as Hulu, Amazon and Netflix

___ hours ___ minutes

3. b hours 

3. b minutes

3. c On an average day, how many hours do you watch TV shows?

: including network cable, public broadcasting, **but not** streaming and download?

___ hours ___ minutes

3. c hours 

3. c minutes

4. a On an **average day**, how many **news stories** do you access from ONLINE NEWS websites such as AP news, NY times, WSJ, and Plain Dealer (include all screens—desktop, laptop, iPad, smartphone, etc.)?

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4. b On an **average day**, how many **news stories** do you read from SNS such as Facebook, Twitter, Google +, and Pinterest? (include all screens—desktop, laptop, iPad, smartphone, etc.)?

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4. b On an **average day**, how many **news stories** do you read from MESSAGING SERVICES such as Snapchat, Facetime, KakaoTalk, and Google Hangouts? (include all screens—desktop, laptop, iPad, smartphone, etc.)?

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<th>10 or more than 10 stories</th>
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16.a. What is your gender?
   1. Male
   2. Female

16.b. Your age on your last birthday

16.c. Which political party, if any, do you feel closest to?
   1 Republican
   2 Democrat
   3 Independent
   4 Tea Party
   5 No Party
   6 Other
   Please specify

16.d. The terms "liberal" and "conservative" may mean different things to people, depending on
the kind of issue one is considering. In terms of political issues, would you say you are:
   1 very liberal
   2 liberal
   3 somewhat liberal
   4 moderate
   5 somewhat conservative
   6 conservative
   7 very conservative
   99 I Don't Know

16.e. Please think for a moment about your parents' home. About how many books are there in
your parents' home? Do not count newspapers or magazines.
   1. None
   2. 1-10 books
3. 11-50 books
4. 51-100 books
5. 101-200 books
6. More than 200 books

16. f. On a scale from ONE to TEN where ONE means NOT AT ALL RELIGIOUS and TEN means VERY RELIGIOUS.

How religious would you say you are?

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<th>VERY RELIGIOUS</th>
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16.g. Are you a US citizen?
1. Yes
2. No

What country are you a citizen of?

16.h. What year are you at CSU?
1. Freshman
2. Sophomore
3. Junior
4. Senior
5. Graduate student
6. Other
please specify

16.i. Race?
1. White
2. Black or African American
3. American Indian and Alaska Native
4. Asian
5. Native Hawaiian and Other Pacific Islander
6. None of the listed choices
If none of the above, what race do you consider yourself?

75
What is your class number, that you want to report about your participation

<table>
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<td>Professor Horovitz</td>
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</table>

Other (please specify)

*What is the last name of the professor of this class?

The only first and complete participation that provided by current participants’ CSU ID number will be reported for extra credit opportunity.

What is your CSU ID number?

What is your last name and Email address?

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That concludes our survey. Thank you very much for participating.
## D. Tables for ANOVA Analysis

### Table 10.
ANOVA results predicting attitude toward information

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Table 11. ANOVA results predicting author’s credibility

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E. IRB approval

Memorandum
Institutional Review Board

To: Edward Horowitz
   COMMUNICATION

From: Bernie Strong (b.r.strong@csuohio.edu, X3624)
   BRS
   IRB Coordinator
   Sponsored Programs & Research Services

Date: April 15, 2014

Re: Results of IRB Review of your project number: #29914-HOR-HS
Co-Investigators: Hocheol Yang
Title: The Effect of Majority Cue

The IRB has reviewed and approved your application for the above named project, under the category noted below. It has been determined that the research being performed under this protocol is Exempt. This determination does not expire and does not require an annual review.

However, by accepting this decision, you agree to notify the IRB of: (1) any additions to or changes in procedures for your study that modify the subjects' risk in any way; and (2) any events that affect that safety or well-being of subjects. Notify the IRB of any revisions to the protocol, including the addition of researchers, prior to implementation.

Thank you for your efforts to maintain compliance with the federal regulations for the protection of human subjects.

________________________________________________________________________

Approval Category: Approval Date: October 21, 2013

X Exempt (b2)

cc: Project file
COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)
HUMAN RESEARCH CURRICULUM COMPLETION REPORT
Printed on 04/15/2014

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Hocheol Yang (ID: 31209752)
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Cleveland
OH 44115

DEPARTMENT
Communications

PHONE
513-003-0016

EMAIL
H.YANG 15@case.edu

INSTITUTION
Cleveland State University

EXPIRATION DATE
10/17/2014

SOCIAL & BEHAVIORAL RESEARCH INVESTIGATORS

COURSE/TAOE
Basic Control

PASSED ON:
10/17/2012

REFERENCE ID:
0501097

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For this Completion Report to be valid, the learner listed above must be affiliated with a CITI Program participating institution or be a paid independent learner. Misused information and unauthorized use of the CITI Program course site is unethical and may be considered research misconduct by your institution.

Patti Balsamo-Ringe, Ph.D.
Professor, University of Miami
Director, Office of Research Education
CITI Program Course Coordinator