

The Effects of Evidence Type on Online Health Headline Selection – a Moderation of Thinking Style

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Abstract. The acquisition of health information is conducive to promoting the public's health literacy and improving citizens' health. The display of online health information features an entering page that lists headlines hyperlinked to health article pages. Among the various techniques that help increase headline effectiveness, this study was particularly interested in evidence type (anecdotal type/numerical) and investigated how it influenced headline selection in the form of fixation and clicking and considered thinking styles as a possible moderator. Based on an eyetracking experiment, this study found that participants were more likely to click on numerical headline than anecdotal headline. In addition, message credibility had moderating effects on the relationship between evidence type and fixation and that between evidence type and clicking count. The findings provide useful implications for creating effective online headlines in the health domain and enrich our understanding of how information characteristics affect information selection.

Keywords: Evidence Type, Health Information, Headline Selection, Thinking Style, Eye-tracking Experiment.

1 Introduction

An increasing number of people are acquiring health information on the Internet, which is a global trend. The majority of the Internet users in the U.S., Europe, and China have sought for information on health-related topics, including specific diseases and treatments as well as lifestyle choices on diet, nutrition, exercises, smoking, alcohol, and so on. Online health articles are written with an attempt to persuade people to adopt a healthy behavior or abandon an unhealthy behavior [1].

Various techniques have been used to increase the persuasiveness of health messages, with providing evidence in favor of a health-related position among them. Such evidence mainly divides into two types: anecdotal and numerical. Anecdotal evidence, also called narrative evidence, story, testimonial, case, or exemplar, refers to

a detailed presentation of the experience of a particular subject in a particular setting [2]. Numerical evidence, also called statistical or scientific evidence, refers to a quantified description of a number of events, persons, or other phenomena [3].

It is interesting to notice that more and more headlines of online health articles are created in the form of very brief anecdotal or numerical evidence. For examples, “Mum sheds half her body weight by following this flexible plan” is an anecdotal headline, and “14 simple steps make you lose 10 pounds in a month” is a numerical one. The display of online information often features an entering page that lists headlines hyperlinked to article or content pages, which also applies to the health domain. The effectiveness of headlines determines what will be read and what will be ignored [4].

Despite the abundance of existing research on the anecdotal/numerical evidence embedded in the content of health articles, this study instead focused on anecdotal/numerical headlines and investigated how they attracted users’ attention and clicks, with an aim to provide useful implications for creating effective online health headlines. In particular, the thinking style was taken into consideration for being an important individual difference that has an impact on the persuasiveness of anecdotal/numerical evidence [5]. An eye-tracking experiment was conducted to capture users’ eye movements and selection behavior in response to online health headlines whose evidence types were manipulated.

2 Literature Review

2.1 Evidence Type and Persuasiveness

The existing researches on the evidence types of the body of health information mainly focus on comparing the persuasiveness of two types of health information: the anecdotal type and the numerical type. The former is more vivid, interesting, and readable, thus easier to encode into and retrieve from memory [6]. While the latter is more objective, credible, and verifiable, which makes it harder to be refuted [7]. They are apt to arouse affective and cognitive reactions, respectively. Three outcome variables, Beliefs, Attitude and Intention, are often used to measure persuasiveness in these researches [1]. Most studies obtained significant evidence showing a difference between the effect of the evidence type (i.e. anecdotal, numerical) on persuasiveness. For cancer-related health information, the anecdotal type has a better persuasive effect than the numerical type [8]; for daily life health information, the numerical type has a better persuasive effect than the anecdotal type [9].

2.2 Information Headlines and Selection

Despite the lack of focused research on the headlines of health information, researchers have devoted great efforts to exploring news headline techniques. It was suggested that the major role of an online news headline is to attract users’ attention to the news story, and sometimes it need to entice them to click and open the news articles [10].

When increasing the effectiveness of a headline, news providers may consider a variety of verbal techniques, including sensationalism, selectivity, negativity, using

questions, quotes, numbers, and presentation (e.g. position, format, etc.) influences users' attention and behavior [11, 12].

Attention and behavior are two basic levels of information selection. Attention is selective in nature, and it determines to which stimuli in the environment our perceptual system is addressed [13]. The observable behavior, such as clicking, recommending, and commenting, might be inconsistent with attention [14]. It has been found that external links [15], pictures [16], larger font size [17] would increase users' fixation duration. The use of numbers or questions, simplification, negativity, forward-reference could encourage people to click on the headline to increase readership [18, 19].

2.3 Thinking Styles

According to Cognitive-Experiential Self-Theory (CEST), thinking style refers to people's dependency on the two information processing systems (i.e. experience information processing systems and rational information processing systems) [20]. The experience system relies on emotions and mainly used to process information presented in the form of images, generalizations, metaphors, and stories. The rational system relies on rules and mainly used to process information presented in abstract symbols, words, and numbers [21]. As anecdotal information can stimulate people's emotions, people rely more on experience system tend to think that anecdotal information is more convincing [1,3]; In the contrast, as numerical information is more objective, credible, and verifiable, people rely more on rational system tend to think that numerical information is more convincing [5].

3 Methods

3.1 Participants

This study recruited 24 participants (5 male and 19 female) who were undergraduate or postgraduate students aging between 19 and 26. They all reported that they have used the Internet to acquire health information. Before the experiment, the participants were invited to complete the Rational-Experiential Inventory (REI) scale (30) for the purpose of determining their thinking styles. The REI further consists of two unipolar scales, i.e. the Need for Cognition (NFC, Cronbach's Alpha=.874) and the Faith in Intuition (FI, Cronbach's Alpha=.808), which measures rational thinking and intuitive thinking respectively (30).

3.2 Apparatus and Stimuli

The experiment was conducted on a simple mockup health website built with the prototyping tool Axure to simulate two types of pages. A navigation page displays a list of health headlines, and each headline is hyperlinked to a consumption page where the corresponding health article is displayed. A total of 40 real headlines/articles related to 10 popular health topics, i.e. diet, exercises, sleep, weight loss, smoking, eye protection, harm of electronic devices, skin care, and mental stress, were collected

widely from online health sources. Four headlines were assigned to each topic, two anecdotal and two numerical. The original headlines were modified to different degrees to control other possible factors, such as length and use of special characters. To minimize the influence of position, this study created two different designs of headline displaying sequence based on a 2*2 Latin square. That is, anecdotal and numerical headlines appear alternately on the navigation page; and the first design starts with an anecdotal headline while the second numerical.

3.3 Task and Procedures

In the experiment, the 24 participants were given three minutes, a duration determined through pilot studies, to surf the mockup site in a way they visited online health websites for their own sake. Their attention and clicking were captured with a Tobii Pro X3-120 eye tracker and the built-in screen recorder respectively. At the beginning of the experiment, the researchers briefly described the surfing task and calibrated the eye tracker using 5 calibration points. Then the participants started to perform the task and were reminded to stop when time was up. They might click into the consumption pages to read the health articles, but this study was only interested in their interaction with the navigation page. An Area of Interest (AOI) was created for each headline so that fixation data could be exported in terms of AOI rather than the entire page.

Half of the participants, i.e. three from each of the four thinker groups, were presented with a navigation page based on the first sequence design and the other half the second.

4 Results

4.1 Effect of Evidence Type on Health Headline Selection

The participants' selection of anecdotal/numerical health headlines was observed at two levels, i.e. attention (i.e. fixation count and fixation duration) and behavior (click count). According to the descriptive statistics, the 24 participants paid attention to 252 headlines in total, including 120 anecdotal and 132 numerical, and clicked on 66 of them, including 28 anecdotal and 38 numerical. The anecdotal headlines had a smaller average fixation count ($5.175 < 5.682$) and a shorter average fixation duration (second; $.373 < .409$) than the numerical headlines. There existed a positive correlation between fixation count and fixation duration ($r = .888, p < .001$), whereas neither fixation count (Kendall's tau-b = $.082, p = .128$) nor fixation duration (Kendall's tau-b = $-.009, p = .895$) was significantly correlated with click count. As indicated by the linear regression analysis, headline evidence type had no significant effect on fixation count ($F = .995, p = .320$) or fixation duration ($F = .669, p = .414$). However, the results of a binary logistic regression analysis show that headline evidence type had significant effect on click count: anecdotal headlines received significantly fewer clicks than numerical ones ($\chi^2 = 13.070, p = .000, OR = .340$).

4.2 Moderating Effect of Thinking Style

This study also explored whether thinking style would moderate the effect of evidence type on the selection of online health headlines. As mentioned above, the NFC and FI scales were used to determine the participants' thinking styles. For both NFC and FI, the median score was used to distinguish two levels – high and low. The 24 participants were assigned evenly to four groups: rational thinkers (high NFC & low FI), intuitive thinkers (low NFC & high FI), complementary thinkers (high NFC & high FI), and poor thinkers (low NFC & low FI). One-way ANOVA was used to examine the moderating effect of thinking style between evidence type and fixation count/duration. Significant results were obtained for both fixation count ($F=3.931$, $p=.009$) and fixation duration ($F=5.138$, $p=.002$). As can be found in Figure 1-2, both of rational thinkers and complementary thinkers had larger fixation count and longer fixation duration on numerical headlines than those on anecdotal headlines. Intuitive thinkers had larger fixation count and longer fixation duration on anecdotal headlines than those on numerical headlines. As for the poor thinkers, there was no difference in fixation count and fixation duration between the two types of evidence. Whether thinking style would moderate the association between evidence type and clicking count was determined with the binary logistic regression analysis as clicking count is a categorical variable, either clicking or not clicking. It was found that there was no moderating effect of thinking style between evidence type and clicking count ($p=.068$).

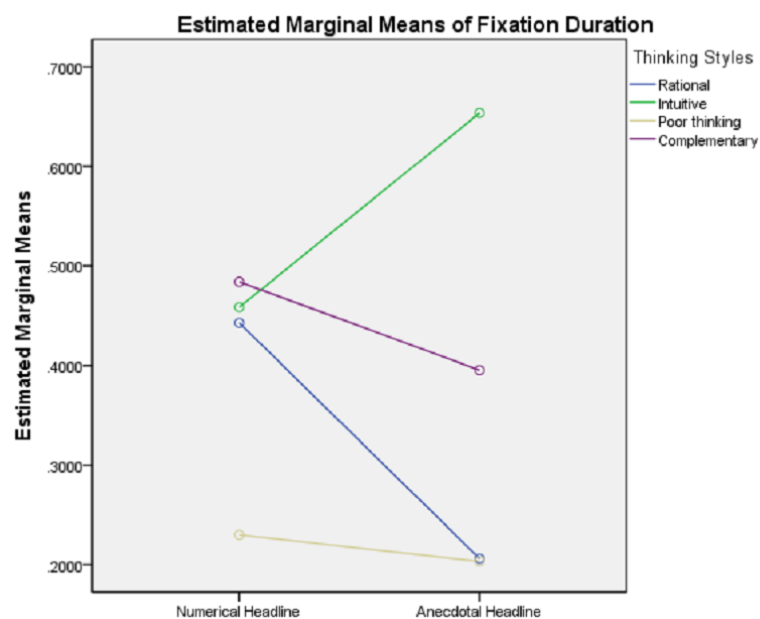


Figure 1 Moderation of thinking style between evidence type and fixation duration

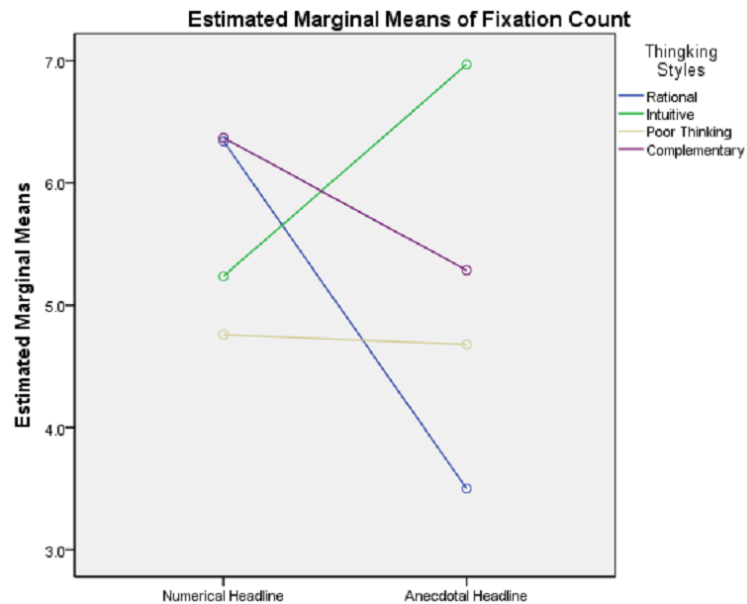


Figure 2 Moderation of thinking style between evidence type and fixation count

5 Discussion and Conclusions

5.1 Implications for Online Headline Creation

The study found that the participants were more likely to click on numerical headline than anecdotal headline. According to previous research on the evidence type of health article, anecdotal information had a more significant impact on the emotional response from information receivers, and had a significant impact on the users' behavioral intention [1, 22]. The reason may be that anecdotal information enhances the appeal and recreational value of information. It can also cover up the intention of persuasion and the negative impact of health information, so as to attract people's attention and select the health information [23]. In addition, it can lead the audience into the story and arouse the emotional response of the audience, so that the participants can receive the information mentally [22]. One of the most persuasive features of anecdotal information is that it shows the sequence of events and the consequences of making a particular medical decision [24]. The conclusion of this study was different because the body of health information can provide a complete story, so as to attract the users' attention and trigger emotional reactions. The headline of the health information is too condensed so it's just a condensed version of the details. Because it cannot show a complete story to the users, it cannot convey the emotions expressed by information properly. Numerical headline, because of its refined expression and two kinds of

characters, namely text and prominent number, hence can attract the attention of the users and trigger their behavioral reactions.

5.2 Effect of Thinking Style on Headline Selection

The type of headline had no significant effect on the duration and frequency of fixation on the headline. However, when thinking style was included into the model as a moderating variable, the study verified that: compared with anecdotal headlines, the rational participants spent more time on numerical headlines and had more fixation count. The intuitive participants did the opposite. This shows that the rational participants prefer numerical headlines, while the intuitive participants prefer anecdotal headlines. And it proves the existing research conclusion: the intuitive participants tend to process information presented in the form of concrete images, generalizations, metaphors and stories [20], while the rational participants tend to process information presented in the form of abstract symbols, words and numbers [20]. The findings suggest that people with different thinking style process information differently. The conclusion is also confirmed in the body of health information. Anecdotal information enabled the rational users to have a lower risk perception and less negative emotions for skin cancer (fear of getting skin cancer), while the intuitive users had a higher risk perception and negative emotions (fear of getting skin cancer). Numerical information has the same impact on rational and intuitive users [25].

5.3 Future Research

This study had several limitations that could be addressed in future work. This study only explored the impact of the evidence type on the headline selection. It will be interesting to explore more techniques for applying headlines. In addition, there is evidence showing the impacts of affective factors on people's intention and behavior. This study plans to examine how affective factors affect the relationship between evidence type and headline selection.

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