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The color of gender stereotyping: The congruity effect of topic, color, and gender on health messages' persuasiveness in cyberspace



Fan Yang*, Cong Li

University of Miami, United States

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ABSTRACT

The internet is becoming a common platform for individuals to seek and assess information. How heuristic cues in an online environment such as website background color influence information persuasiveness, however, is somewhat underexplored. This study examines the effect of such cues based on the MAIN model and color/gender-related stereotypes. A 2 (health message topic: breast cancer vs. prostate cancer) \times 2 (website background color: pink vs. blue) \times 2 (audience gender: female vs. male) between-subjects experiment ($N = 224$) was conducted, and the results revealed significant three-way interaction effects that men and women's perceptions of message credibility, informativeness, as well as their attitudes toward cancer screening were affected by message topic and background color.

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Colors are often gender-stereotyped in American society (Karniol, 2011). From birth, many infants and children find themselves surrounded by colors that reflect gender stereotypes in US culture. For example, girls' clothes, toys, and rooms are typically colored with variations of pink, while boys' clothes, toys, and rooms tend to be colored with variations of blue (e.g., Shakin, Shakin, & Sternglanz, 1985). These color-gender associations not only exist during a person's childhood, but also remain in the adulthood. Studies conducted with adults demonstrate that pink and blue color cues are sufficient to trigger heuristics of gender-related knowledge (e.g., Cunningham & Macrae, 2011). Would such color/gender-related stereotypes affect how people evaluate messages in an online environment? This is the primary research question that the current study intends to address.

As suggested by the MAIN model (Sundar, 2008), people tend to process online information based on cues due to information overload. Such cues refer to anything in the context of digital media that serves as a trigger for the operation of heuristics (Sundar, 2008). Since the internet has been recognized as a popular platform for people to seek health information (e.g., Kommalage & Thabrew, 2008), researchers are paying more attention to the

effect of heuristic cues in an online environment by testing how they influence people's attitudes and beliefs toward health messages. For example, Lee and Sundar (2013) examined the effect of three cues presented on Twitter including authority cue (whether the source appears to be an expert), bandwagon cue (the number of followers the source has), and source proximity cue (distance of a message from its original source), and revealed a significant three-way interaction effect on perceived health message credibility.

Along this line of research, the current study is designed to test the effect of a unique cue: congruity cue influenced by color/gender-related stereotypes in American society. Previous studies that adopted the MAIN model as the theoretical framework (e.g., Hu & Sundar, 2010; Lee & Sundar, 2013) identified a number of heuristic cues that could influence perceived information credibility such as novelty cue, authority cue, and social presence cue. Yet, the potential influence of heuristic cues triggered by color/gender-related stereotypes is underexplored. As the internet presents colorful information to web users all the time, would color/gender perceptions affect how people evaluate health messages in an online environment? To answer this research question, a full factorial $2 \times 2 \times 2$ experiment is designed within the context of promoting cancer screening. According to a recent report of the American Cancer Society (2015), cancer has become the second leading reason of death in the U.S., following heart disease. Oncology studies (e.g., Bartsch et al., 2001; Shapiro, Strax, & Venet,

* Corresponding author. School of Communication, PO Box 248127, Coral Gables, FL 33146, United States.

E-mail address: f.yang3@umiami.edu (F. Yang).

1971) suggest that cancer screening can help reduce the death rate of breast/prostate cancer, highlighting the importance of designing and delivering effective messages to promote cancer screening. Built upon the theoretical framework of MAIN model (Sundar, 2008), this study aims to test how people evaluate such messages. Specifically, the experiment examines how three factors affect the persuasiveness of a message that promotes cancer screening: message topic (breast cancer vs. prostate cancer), background color of the information channel (pink vs. blue), and audience gender (female vs. male).

1. Literature review

Health information is fundamental for health-related decision making (Owen, Fotheringham, & Marcus, 2002). However, traditional channels of gaining such information (e.g., appointments with doctors) are often complained for not meeting people's needs (Boberg et al., 2003), which leads them to proactively go after other venues (Hu & Sundar, 2010). A popular channel for obtaining health information nowadays is the internet (Kommallage & Thabrew, 2008). Previous studies have shown that the internet is effective in disseminating health-related messages: online health information seekers are more active to ask their doctors questions, more confident to make proper health care decisions, and more enthusiastic to share new health knowledge with others (Bass et al., 2006; Fox, 2006).

1.1. The MAIN model

Web users often evaluate online information based on heuristics due to information overload (Sundar, 2008). Heuristics refer to mental generalizations of knowledge that provide shortcuts in information processing (Sundar, Xu, & Oeldorf-Hirsch, 2009). Heuristics in a persuasive context can be effective. For instance, an attractive source is often used by advertisers to increase a positive, even if somewhat superficial, connection between the source and the product (Sundar, 2008). Another example is that a long message that carries the "length cue," potentially triggering the "length indicates strength" heuristic, may lead to the conclusion that the message is strong, a conclusion without taking into consideration of the message's core content (O'Keefe, 2002).

According to the MAIN model (Sundar, 2008), there are various cues in an online environment that may trigger heuristics. These cues are conveyed through four types of affordances: modality (M), agency (A), interactivity (I), and navigability (N). Affordances, referring to the capabilities possessed by a medium to facilitate a certain action, can shape the nature of content in a given medium and determine the way of the content being presented via the medium. Previous studies have identified several interface cues conveyed through agency affordance such as authority cue, bandwagon cue, and source proximity cue (e.g., Lee & Sundar, 2013). Yet, congruity cue, specifically the congruity heuristic triggered by color elements conveyed via agency affordance, is somehow underexplored.

1.2. The effect of congruity cues

The current study is focused on a unique cue in an online environment: congruity. According to Lee and Schumann (2004, p. 59), congruity refers to a "match between a stimulus element (e.g., product, brand, endorser, music, or any execution element) and the existing schema that one holds about the stimulus." The term "schema" means a knowledge structure that serves as the frame of reference for an individual to judge incoming information (Bobrow & Norman, 1975; Mandler, 1982). Incongruity is likely to occur

when there is a mismatch between the representation of an object and an individual's formation of its associated schema (Fiske, 1982; Mandler, 1982; Sujan, 1985).

The effect of congruity has been widely examined in the literature, and the results of previous research suggest that congruent information can be recognized better (Hastie & Kumar, 1979), recalled more frequently and rapidly (Barsalou, 1982; Nedungadi & Hutchinson, 1985), retained for a longer time (Sengupta, Goodstein, & Boninger, 1997), and generate more preferences or favorable attitudes than incongruent information (Kahle & Homer, 1985; Kamins, 1990; Kamins & Gupta, 1994; Misra & Beatty, 1990; Sengupta et al., 1997). Noticeably, previous research investigated the effect of congruity across a wide variety of persuasive contexts, and several congruity cues were identified with the ability to effectively influence the persuasiveness of health messages (e.g., Mann, Sherman, & Updegraff, 2004; Updegraff, Sherman, Luyster, & Mann, 2007). Different from those prior studies, the current research examines the effect of congruity caused by color/gender-related stereotypes.

1.3. Color/gender-related stereotypes

As found in the literature, colors contain a remarkable linkage with gender-related stereotypes (e.g., Picariello, Greenberg, & Pillemer, 1990). For example, pink and blue are commonly associated with women and men, respectively (Picariello et al., 1990). Cunningham and Macrae (2011) argue that young children's surroundings are "saturated with" gender-typed information, with blue items "essential" for boys and pink items "obligatory" for girls (p. 600). Indeed, "young children may identify clothing color as one of several defining attributes of sex even before they are knowledgeable about the biological differences between the sexes" (Picariello et al., 1990, p. 1459). In one of Cunningham and Macrae's (2011) experiments, participants were asked to respond to different-gendered faces that appeared on either a pink or blue background. The results were that participants responded faster when faces were presented on a gender-matched background (e.g., a female face on a pink background) than when the background was gender-mismatched (e.g., a female face on a blue background). These results indicate that pink and blue color cues are sufficient to trigger heuristics of gender-related knowledge.

Such color/gender associations not only exist offline, but also are expected to function in an online situation because people are likely to use their present knowledge structures to evaluate information, according to social judgment theory (Hovland & Sherif, 1980). When incoming information looks consistent with existing knowledge, the effect of congruity shall occur. Thus, it is predicted in this study that when people view a specific gender-oriented health message (i.e., breast/prostate cancer) from an online source such as a blog post, the congruity heuristic will be triggered by the background color of the blog (i.e., pink/blue): a blogger whose gender is unknown writing about breast cancer on a pink background will likely be guessed as a female, while a blogger talking about prostate cancer on a blue background will likely be guessed as a male. The first hypothesis is proposed accordingly:

H1. *There will be an association between the congruity of gender-oriented health topic and background color and the online source's perceived (guessed) gender. Participants will be more likely to guess the blogger being a female when the blog post is presented on a pink background and is about breast cancer, whereas they will be more likely to guess the blogger being a male when the blog post is presented on a blue background and is about prostate cancer.*

The audience gender is also expected to influence a health message's effectiveness in this color-gender cue context because

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