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The perceived credibility of personal Web page information as influenced by the sex of the source

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Abstract

This field experiment examined the effects of the sex of Web site authors and Web site visitors on perceptions of the credibility of personal Web pages. Participants viewed male and female Web pages created for this study, patterned after personal pages on the Web, and assessed sponsor, message, and Web site credibility. Results revealed that men rated both message credibility and site credibility significantly higher than did women and that there was a significant interaction effect whereby opposite-sex credibility evaluations were higher than same-sex credibility evaluations. Overall, this study reveals that sex differences are meaningful in cyberspace but that the reduced cues environment challenges researchers to locate precisely what factors underlie these differences. Potential explanations include the vestiges of a sex-imbalanced Internet culture, sex similarity, sex and message congruence, and social desirability.

Keywords: Internet; Web; Credibility; Sex differences; Gender; Technology

1. Introduction

The Internet and World Wide Web have altered the nature of human association by making communication increasingly feasible among distributed individuals who are unfamiliar with one another, but who nonetheless share common interests. One effect of this increased interconnection is greater access to more diverse information sources than at any time in the past. An attendant result is that the filters and control mechanisms that formerly served to validate and endorse a comparatively limited number of information outlets may not be as effective in the contemporary

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media environment. Absent such controls, the credibility of many sources of Internet-based information is called into question, and attentive information assessment becomes primarily the responsibility of media consumers, rather than media gatekeepers, as it was in the past. Accordingly, scholars have demonstrated a renewed interest in the credibility of messages, their sources, and the media that carry them (e.g., Flanagin & Metzger, 2000; Johnson & Kaye, 1998, 2000; Kim, Weaver, & Willnat, 2001; Metzger, Flanagin, Eyal, Lemus, & McCann, in press; Sundar, 1999).

In spite of these concerns, and recent research addressing them, phenomena such as the online exchange of information between individuals have received little attention. Furthermore, individual differences, such as the sex of information providers and seekers online, have not been explored in terms of the perceived credibility of the information shared between individuals. Nonetheless, many claim that the Internet constitutes an environment which enhances equality among users because communication may be freed from the biases and constraints to community-building that exist in face-to-face contexts, such as status, stereotypes, or other differences between communicators (e.g., Rheingold, 1993). Because empirical tests of this claim are rare, a field experiment was conducted to assess sex differences in perceptions of the credibility of information residing on stimulus Web sites designed to resemble personal home pages. The results shed light on how males and females regard information that is presented online by unknown individuals of the same and opposite sexes. In addition, findings of this study are important for understanding sex differences that exist on the Internet and have implications for interpersonal interaction in the online environment more broadly.

1.1. Sex and source credibility

Research on source credibility has focused on the characteristics of communicators and the factors that make audience members more or less receptive to those communicators' messages. For example, studies have found expertise, trustworthiness and, to a lesser extent, composure, dynamism, and sociability to be important characteristics of persuasive speakers (Gass & Seiter, 1999). In addition, research has also considered audience-specific factors of source credibility such as issue involvement, liking for the source, similarity with the source, and physical attractiveness (O'Keefe, 1990). Consistent with these conceptualizations, sex can be viewed both as a physical trait of the speaker that influences persuasiveness directly and as a marker of similarity or dissimilarity with audience members, both of which may influence perceptions of a source's credibility.

1.1.1. Sex as a physical trait of the source

Research results regarding whether men or women are viewed as more credible sources of information are inconsistent. For example, Sweger (1981; as cited in White & Andsager, 1991) found that identical news stories with a female versus a male byline were evaluated more positively overall and that males assessed stories with a female author to be more believable than the same story attributed to a male author. Similarly, Burkhart (1989) found that women were considered to be better

writers than men, as well as more accurate, trustworthy, credible, and intelligent. However, subjects have also rated editorials written by female authors as lower in quality (Noel & Allen, 1976), and males have been rated as more expert than females in commercial communication, although less trustworthy (Brownlow & Zebrowitz, 1990). Further, whereas college-age women tended to rate both men and women as equally expert, college-age men evaluated men as higher in expertness than women (Carocci, 1988).

To some degree, issue relevance may explain a number of observed credibility differences that vary by sex. That is, there is some evidence that stereotypically male or female *topics* influence the evaluation of information. For example, there is evidence that males are seen to have more expertise than females on male-related issues whereas females are perceived to be more knowledgeable than males on female-related issues (Feldman-Summers, Montano, Kasprzyk, & Wagner, 1980). Similarly, stories attributed to a female author have been found to be more interesting when dealing with what are traditionally considered to be women's interest areas (e.g. fashion), whereas male-authored stories were judged as more interesting when they covered traditionally male subject matter, such as sports (Shaw, Cole, Moore, & Cole, 1981). Overall, such findings suggest that assessments of source credibility may go beyond the physical traits of sources to interact with characteristics of the message as well.

1.1.2. Sex as a marker of similarity

Besides serving as a speaker attribute that can influence perceptions of credibility, sex may also influence source credibility assessments by increasing the perceived similarity between source and receiver. For example, although they discovered no differences in credibility directly, White and Andsager (1991) found that readers evaluated same-sex authors as more interesting and, under conditions of ambiguous authorship, assessed the author as same-sex if they rated the article itself as interesting. Similarly, among teenagers, boys and girls both evaluated messages as more credible when delivered by a speaker of the same sex (Bochner, 1994). Overall, such findings support the observation that opposite-sex evaluations tend to be less favorable than same-sex evaluations.

As a consequence, persuasiveness can be enhanced by similarity between source and receiver (Brock, 1965). For example, the "matching hypothesis" claims that people form relationships with those whom they perceive as similar to themselves and that increased similarity leads to increased attraction (Berschied & Walster, 1978; Byrne & Nelson, 1965; Silverman, 1974). In this regard, similarity between source and receiver, such as shared sex, may positively influence credibility assessments due to increased liking (O'Keefe, 1990).

1.2. Online source credibility

With the migration of source credibility research to the online environment, scholars have begun to examine the perceived credibility of sources such as individuals who construct personal Web pages. For example, Schweiger (2000) lists *pre-*

senters, or the author of the information being evaluated, among the potential targets of credibility attributions. In the case of personal Web sites, presenters are the individuals whose Web page is posted online. Similarly, Tseng and Fogg (1999) note that *presumed credibility* rests on general assumptions and stereotypes that are used to assess sources, and may thus be linked to a presenter's sex. Source credibility with regard to individual Web sites is a matter of site visitors' perceptions of the presenters and, absent a known reputation or firsthand experience with those authors, rests primarily on presumed credibility—their general assumptions and stereotypes about those presenters.

Existing source credibility research outlined earlier suggests that a salient factor in assessing the presumed credibility of Web site presenters may be the sex of the Web page author. In this domain, the impact of sex in perceptions of source credibility online may be important in at least two ways: first, in terms of the culture of computing technologies and the relative sex composition of Internet users in general; second, as a function of the capabilities afforded by the particular features of the technology, some of which suggest that sex differences may have different effects online than in more traditional face-to-face contexts.

1.2.1. Computing culture and the sex composition of cyberspace

Sex differences in technology may be attributable to a number of factors, such as cultures that encourage males' technology use disproportionately over that by females (Kiesler, Sproull, & Eccles, 1985), the degree of environmental structure supporting technology use (Arch & Cummins, 1989), social encouragement (Rogers, 1986), and the content, design, and labeling of technical products (Mundorf, Westin, Dholakia, & Brownell, 1992). Past research has suggested that males have more positive attitudes toward computers than do females (Chen, 1986; Gattiker & Nelligan, 1988; Jackson, Ervin, Gardner, & Schmitt, 2001; Temple & Lips, 1989) and Gutek and Bikson (1985) found that although on-the-job use did not differ for males and females, females felt less proficient and experienced higher anxiety with computers. Similarly, females have reported less computer self-efficacy, less favorable computer attitudes, and greater levels of computer anxiety than men (Jackson et al., 2001). Mundorf et al. (1992) found sex differences in familiarity with technologies—whereas men showed greater familiarity with state-of-the-art and enhanced technologies, women showed greater familiarity with interpersonal communication technologies. Attitude differences such as these have been attributed to education (Crowley, 1988; Tittle, 1986), math and science orientation (Fennema & Sherman, 1976), experience (Chen, 1986), aptitude differences (Quick, Schkade, & Eakin, 1986), and gender bias in software design (Huff & Cooper, 1987; Kiesler et al., 1985). Overall, these findings suggest that men have more favorable attitudes toward computers, as well as greater programming competence than women, and that women have less experience with and higher anxiety about computer technologies than men.

Although such differences might explain males' early domination of the Internet, they may not be indicative of contemporary Internet users' attitudes or behavior. The proportion of male Internet users in 1995 was estimated to be 71%, in 1997 it

was approximately 58%, and in 1999 53% (GVU, 2001; Neilsen Media Research, 2001). Today, however, Internet users are slightly more likely to be female than male, with an estimated 50.6% of Internet users said to be female (Rainie & Packel, 2001). This shift to a more sex-balanced Internet environment likely reflects wider cultural changes and therefore suggests that previous findings regarding the male-oriented culture of computing may no longer be as pronounced as they once were (see Charlton, 1999; Rainie & Packel, 2001). Consequently, research regarding the behavior of online users that might be influenced by cultural expectations, stereotypes, and demographics needs to reflect recent changes in precisely these domains, since they might directly affect user attitudes and behaviors.

1.2.2. The reduced cues environment of cyberspace

A great deal of research has considered the nature of computer-mediated communication (CMC) and its potential effects on interpersonal interaction. Studies in this domain typically consider direct communication between individuals, such as that which may occur via email or in online chat rooms. Consequently, CMC is often characterized by relatively anonymous communication between partners, which is a proposed foundation for many of the observed effects. Nonetheless, certain findings may also translate to other online venues for self-presentation, such as personal Web pages.

Many researchers attribute specific behavioral acts that occur via computer-mediated interaction, at least in part, to the "reduced social cues" environment characteristic of CMC. For example, Dubrovsky, Kiesler, and Sethna (1991) found that because sex can be reduced or suppressed in CMC environments, females who were typically uncomfortable with or discouraged from participating in face-to-face groups were more at ease when participating in CMC environments. Similarly, Gopal, Miranda, Robinchaux, and Bostrom (1997) found that females preferred communicating in CMC environments because of the anonymity afforded by the technology and Hardy, Hodgson, and McConnell (1994) found that females participated more often than males in CMC situations. Finally, Flanagin, Tiyaamornwong, O'Connor, and Seibold (2002) found that women tended to enjoy the reduced cues environment of anonymous CMC more than males. Overall, although to some degree a function of the dramatically reduced cues provided by *anonymous* communication, these findings suggest the ways in which individuals can and do manage facets of interpersonal communication in reduced cues environments. Indeed, communication partners in CMC may engage in selective self-presentation by taking advantage of characteristics of the medium to hide undesirable cues while intentionally presenting those they choose to accentuate (Walther, 1996).

The social identity model of deindividuation (or the SIDE model; Spears & Lea, 1992, 1994) proposes that group identification becomes more salient as social cues are reduced. The SIDE model thus draws from social identity and self-categorization theories that present individuals as accessing facets of their identity depending on which identity is most salient in a given social context (Postmes, Spears, & Lea, 1998). In this manner, sex may serve as a significant cue to Internet users that signals a common group identity and promotes behavior consistent with that identification.

Indeed, personal Web pages are perhaps less rich than more typical forms of CMC (e.g., chat or email), due to their relatively limited potential for direct and immediate interaction with Web site visitors, and thus may invoke this reaction even more dramatically.

In view of the foregoing, it is timely to assess perceptions of source credibility, across sexes, through personal Web page self-presentation via the Internet. In light of mixed findings concerning sex differences in source credibility via traditional media, attributions that can be due to both sex stereotypes and perceived similarity between sources and receivers, the intriguing possibilities that emerge considering shifting perceptions and demographics of technology use, and the reduced cues environment of the Internet, the following research questions are proposed:

RQ1: Do male and female Web users assess the credibility of information on personal Web sites differently?

RQ2: Do Web users assess the credibility of information on the personal Web sites of men and women differently?

RQ3: Does the sex of the information source interact with the sex of the receiver to affect the perceived credibility of information on personal Web sites?

Finally, because past research has shown that several variables (such as issue salience, information verification behaviors, and demographic variables; see Feldman-Summers et al., 1980; Flanagin & Metzger, 2000; Shaw et al., 1981) have important influences on perceptions of the credibility of information, these factors were statistically controlled in this study.

2. Method

To evaluate the research questions posed, this study was designed to assess sex differences across sources and receivers of information residing on personal Web pages. First, as a basis for the main study, a pretest of photographs that would constitute a portion of the Web site stimuli was performed. Second, data from visitors to the stimuli Web sites were collected in order to assess the research questions outlined earlier.

2.1. Pretest of photographs for the individual web sites

2.1.1. Sample

A sample of 118 subjects (mean age of 19.75 years, S.D. = 1.35; 79% female, 21% male) who volunteered for the study in return for credit in undergraduate communication classes, and who were distinct from the respondents in the main study, participated in a pretest of eight pilot photographs (four male and four female). The aim of the pretest was to locate photographs of individuals who were perceived *not* to differ along a number of dimensions that might reasonably be

thought to affect perceptions of source credibility. From these pilot photographs, two were ultimately selected for use on the individual Web sites in the main study (one each for a female and male Web page).

2.1.2. Procedure and measures

Participants in the pretest were presented with individual photographs and were instructed to rate the person in each photograph along several dimensions. Specifically, because *trustworthiness* and *expertise* are the two most common elements of source credibility (Gass & Seiter, 1999; McCroskey, Holdridge, & Toomb, 1974), these dimensions were assessed by respondents on 7-point scales (where higher values indicated greater levels of trustworthiness and expertise). In addition, *physical attractiveness* items addressed the extent to which respondents found the people in the photographs to be physically attractive. Items comprising the physical attractiveness scale were taken from McCroskey and McCain (1974) and include respondents' ratings of how good looking, physically attractive, sexy, ugly (reverse coded), handsome/pretty, and well-dressed, as well as the degree that they liked the way the person in the photograph looked (Cronbach's alpha = 0.90). In order to guard against possible order and contrast effects in the pretest, each participant viewed only four of the eight pilot photographs, selected randomly and presented in random order.

2.1.3. Pretest results

An 8 (photograph) × 2 (participant's sex) MANOVA was conducted with expertise, trustworthiness, and physical attractiveness as the dependent measures. The analysis revealed a significant main effect for photographs (Wilks' lambda = 0.77, $F[21, 1289.84] = 5.98$, $P < 0.001$), and for participants' sex (Wilks' lambda = 0.98, $F[3, 449] = 3.71$, $P < 0.05$). Follow-up univariate analyses revealed that the photographs significantly differed in trustworthiness ($F[7, 467] = 3.50$, $P < 0.01$, $\eta^2 = 0.05$) and physical attractiveness ($F[7, 467] = 16.27$, $P < 0.001$, $\eta^2 = 0.20$), and that the male and female respondents differed in their perceptions of expertise of the individuals in the photographs ($F[1, 467] = 4.74$, $P < 0.05$, $\eta^2 = 0.01$). Follow up analyses also revealed that the interaction between photographs and participant's sex was significant for physical attractiveness ($F[7, 467] = 3.22$, $P < 0.01$, $\eta^2 = 0.05$). Thus, differences existed among the eight photographs in respondents' assessments of trustworthiness and physical attractiveness. Differences also existed between males' and females' ratings of expertise over the eight photos. Moreover, the sex of the rater influenced perceptions of attractiveness.

In order to locate photographs to be used in the main study that did *not* differ along the dependent measures, planned comparisons were performed. Two photographs (one male and one female) were selected that *did not differ* in trustworthiness ($P = 0.32$), expertise ($P = 0.64$), or physical attractiveness ($P = 0.32$). However, a difference did emerge when the sex of the rater was considered: women rated both the male and the female photographs selected as more physically attractive than men did ($F[1,115] = 8.24$, $P < 0.01$; $\eta^2 = 0.07$; $M_{\text{males}} = 3.92$; $M_{\text{females}} = 4.65$). Despite this difference, the ratings of the attractiveness of the two images were reasonably similar

(i.e. less than one point on the 7-point scale). Findings of the main study, however, must be considered with this difference in mind.

2.2. Main study

2.2.1. Sample

A total of 156 individuals participated in the field experiment, of whom 37.2% ($n=58$) were male and 62.8% ($n=98$) were female.[1] Data were collected from a sample of registered voters ($n=71$) in the county where the study was conducted and from a sample of undergraduate college students ($n=85$). A random sample of nonstudent participants was mailed a written solicitation to participate in the experiment and was offered an incentive in the form of a free 1-year magazine subscription of their choice to do so. Student respondents were solicited from undergraduate courses and were given course credit for their participation in the study. As expected, the student and nonstudent samples differed in terms of age and level of education. Nonstudents were significantly older ($M_{\text{students}}=19.85$, $M_{\text{nonstudents}}=43$, $t[70.76]=-12.15$, $P<0.001$), as well as better educated ($M_{\text{students}}=13.73$ years of education, $M_{\text{nonstudents}}=16.13$ years of education, $t[89.92]=-7.52$, $P<0.001$). Because there were no differences between the subsamples on credibility measures, issue salience, verification measures, Internet/Web experience, or income, the samples were combined for data analyses.

The range of respondent ages was 18–75 years, with a mean age of 30.38 years (S.D. = 15.83). In addition, participants had a mean of 14.82 years of education (S.D. = 2.21), a mean annual income of between $50,000 and $60,000 (if claimed as dependents, this reflected their parents' income), and a mean reported experience with the Internet/Web of 5.30 (S.D. = 1.33) on a 7-point scale, where higher scores indicate greater experience (see below for scale details). Overall, the sample obtained for this study is comparable to demographic characteristics of Internet users nationally.[2]

2.2.2. Procedure

Participants viewed one of two personal Web sites that were constructed by researchers and used as stimuli in this study. The sites varied only by the names ("Jeff Newmar" and "Julie Newmar") and photographic images of the individuals on the sites (photographs were included in order to increase realism of the sites; see Papacharissi, 2002). These sites were constructed with close adherence to the criteria described by Papacharissi (2002) that characterize personal Web pages and thus

[1] Although participant sex was unbalanced in this sample, it was balanced across experimental conditions by sequential assignment, as described in Section 2.2.2.

[2] The sample obtained for this study is comparable to demographic characteristics of Internet users nationally, according to 2000 Census statistics ("Falling through the Net", 2000): sample males, 37.2%, census data, 44.6%; sample average age, 30.38, census data, 18–49 listed as most avid usage age group; sample education listed as some college or more, census data, some college or more; sample income range, $50,000–60,000 annually, census data, most avid Internet users $35,000 and up. An exception is that the sample used in this research was more heavily female (62.8%) compared to census data (44.2%). However, this factor was statistically controlled in the research design and analysis.

closely reflected individual Web pages commonly found on Geocities, Yahoo, AOL, MSN, and other popular Web page hosting locations on the Internet. Each site contained an identical story on the topic of the potentially harmful effects of radiation on pregnant women who regularly fly in airplanes, which was embedded in each site as a prominent, live "link." The plausibility of this story on each of these Web pages was enhanced by the information on the page itself: The individuals were portrayed as amateur journalists or writers and the stimulus story was embedded along with others on a diverse set of issues, under the general heading "Articles I Have Written."

Participants were directed to the study's "launch" Web site via a written URL included in the solicitation letter sent to potential subjects (in the student sample, the URL was distributed in class) and were told that they could access the site from anywhere they chose, at any time within the following two weeks. This study thus had the feature of enabling participants to work in a naturalistic environment, according to their own schedule, at their convenience. After going online and agreeing to informed consent, participants were instructed that they would be viewing "a Web site belonging to a private individual—that is, a person who has chosen to post his or her Web page on the Internet." Participants were then automatically directed to one of the study's two experimental Web sites by sequential rotation, in order to preclude any systematic biases within conditions (in this manner, relatively equal numbers of participants were ultimately directed to each site). Once at the site to which they had been directed, participants could not confirm identifying information that would indicate that the site they were viewing was created by the researchers.

Participants were instructed to browse the Web site as much as they would like in order to explore the information on its pages. In addition, they were instructed to read the story on the potentially harmful effects of radiation on pregnant women who fly, and were given its title and approximately where it would appear on the main page of the site to which they were directed. Finally, participants were instructed that after they had browsed the Web page in general, and had a chance to read the story indicated in particular, they should click on a link (contained in a bar at the bottom of all pages) that indicated that they were finished browsing. After this, they were prompted to make sure that they had read the story as instructed and, if not, were given the opportunity to return to the Web page to browse further and read the story. When they were done browsing, they were directed to a questionnaire which they completed online. Upon completing the questionnaire, respondents from the nonstudent sample were able to select the magazine of their choice and all participants were debriefed online.

2.2.3. *Measures*

In order to address the complexity of the notion of credibility in the contemporary media environment (e.g., it is plausible that source, message, site, and medium credibility are all relevant to judgments of online information), three separate dimensions of *credibility* were measured. First, respondents were asked to indicate their perceptions of the credibility of the Web site *sponsor*, defined as the individual

who created the site. Items to measure sponsor credibility were selected after a factor analysis assessing participants' perceptions of a range of features of the Web site sponsor. Five items loaded together (explaining 47% of the variance) and were used to measure sponsor credibility: these items assessed the extent to which the sponsor was perceived to be credible, to have high integrity, to have a positive reputation, to be successful, and to be trustworthy. These items were measured on a 7-point scale and averaged to derive the measure of sponsor credibility ($M = 3.97$, S.D. $= 0.92$). Cronbach's alpha for this measure was 0.81.

Second, following past research, *message* credibility was assessed with five items measuring participants' perceptions of the believability, accuracy, trustworthiness, bias, and completeness of the information provided in the radiation story (see Austin & Dong, 1994; Carter & Greenberg, 1965; Flanagin & Metzger, 2000; Gaziano, 1988; Rimmer & Weaver, 1987; West, 1994). Bias scores were reverse-coded so that higher scores on all dimensions indicated greater perceptions of credibility and all items were measured on a 7-point scale. The mean value of the five items constituted the final message credibility measure ($M = 3.65$, S.D. $= 1.16$; Cronbach's alpha $= 0.84$).

Third, a battery of items adapted from standard source credibility scales (Berlo, Lemert, & Mertz, 1970; Leathers, 1992; McCroskey, 1966; McCroskey & Jenson, 1975) was factor analyzed and 6 items were found to load together (explaining 36% of the variance) and assess the credibility of the Web *site* as a whole. Subjects assessed the extent to which they found the Web site as a whole to be trustworthy, believable, reliable, authoritative, honest, and biased (bias was reverse-coded). The mean of these six items constituted the site credibility measure, on a 7-point scale ($M = 4.15$, S.D. $= 1.03$). Cronbach's alpha for the Web site credibility scale was 0.82. Finally, a factor analysis was conducted on all of the items constituting the three credibility measures in order to determine the extent to which these items were perceived by participants to constitute the three proposed dimensions of credibility. The three dimensions were distinct, with no cross-loaded items, confirming that subjects did indeed distinguish between sponsor, message, and site credibility.

As noted earlier, several control variables were assessed as well. Given the nature of the experiment, and due to likely inflation of the self-report of verification behavior due to social desirability, two measures of verification of Internet information were used: *self-reported verification* and *actual verification*. Survey items from Flanagin and Metzger (2000) were used to measure self-report verification. Respondents were asked to consider their behavior with Web sites in general, aside from their behavior with the Web site they were asked to browse, and to indicate the degree that they check to see (a) who the author of the Web site is and (b) whether contact information for that person or organization is provided on the Web site; (c) verify the author's qualifications or credentials; (d) consider the author's goals/objectives for posting information online; (e) check to see if information is current; (f) seek out other sources to validate information they find online; (g) look for an official "stamp of approval" or a recommendation from someone they know; (h) consider whether the information represented is opinion or fact; and (i) check to see that the information is complete and comprehensive. These items were measured on

a 7-point scales (where 1 = "never," 2 = "very rarely," 3 = "rarely," 4 = "occasionally," 5 = "often," 6 = "very often," and 7 = "all the time") and averaged to obtain self-reported information verification (Cronbach's alpha = 0.88; $M = 3.92$, S.D. = 1.08). Actual verification was attained by providing links to actual, external Web sites that were related in content to the story participants were asked to read (e.g., links indicated sites on "Traveling During Pregnancy" and "Flight Radiation Levels"). These links were listed under the heading "For More Information" which was located at the bottom of the same Web page as the story they read. Individuals had the opportunity to select from among seven relevant links and the total number of links that they selected constituted the measure of actual verification behavior ($M = 0.51$, S.D. = 1.33).

Issue salience was measured by asking respondents to rate how relevant the story was to their own life, how interesting they found the story to be, how much they enjoyed the story, and how important they felt the story was ($M = 3.28$, S.D. = 1.11 on a 7-point scale; Cronbach's alpha = 0.76). As mentioned earlier, participants' level of *Internet/Web experience* was measured on a 7-point scale. The scale consisted of 3 items, averaged to obtain the measure: "How often do you use the Internet/Web?," "How would you characterize your own level of expertise in using the Internet/Web?," and "How much experience do you have using the Internet/Web?" Cronbach's alpha reliability for this scale was 0.89. Demographic information, including respondent *sex*, *age*, level of *education*, and *income* were self-reported in the post-stimulus questionnaire.

3. Results

In order to assess the research questions, a 2 (sex of the Web site source) × 2 (sex of the respondent) MANCOVA analysis was performed, with demographics (age, education, income), Internet experience, issue salience, and both self-report and actual verification as the covariates, and the perceived credibility of the target message (radiation story), the Web site as a whole, and the Web site sponsor as the dependent measures. Internet experience and the demographic variables were controlled because analyses revealed significant differences between male and female participants on those dimensions.[3] Issue salience and information verification behavior were controlled to rule out the possibility of these variables as alternative explanations for credibility perceptions, as discussed earlier.

For both site and message credibility, there was a significant main effect for the sex of the respondent. Males ($M = 4.39$) found both of the Web sites (Jeff's and Julie's) to be more credible than did females ($M = 4.00$; $F[1, 145] = 8.98$, $P < 0.01$,

[3] Male and female participants differed significantly in age, education, income, and experience with the Internet. Specifically, males were older ($M_{male} = 34.66$, $M_{female} = 27.86$, $t[102.77] = 2.52$, $P = 0.013$), more highly educated ($M_{male} = 15.28$, $M_{female} = 14.55$, $t[154] = 2.00$, $P = 0.047$), and had more Internet experience ($M_{male} = 5.62$, $M_{female} = 5.12$, $t[154] = 2.28$, $P = 0.024$) than females in the sample. Females, however, earned higher incomes than the males who took part in the study ($M_{male} = 5.10$, $M_{female} = 6.30$, $t[154] = -1.99$, $P = 0.049$).

$\eta^2 = 0.06$). Similarly, males ($M = 3.82$) rated the credibility of the radiation story (message credibility) on either of the Web sites to be significantly higher than did females ($M = 3.56$; $F[1, 145] = 4.54$, $P < 0.05$, $\eta^2 = 0.03$). However, these effects can be explained largely as a function of the significant interaction between sex of the Web site source and the sex of the respondent, for both Web site credibility ($F[1, 145] = 5.32$, $P < 0.05$, $\eta^2 = 0.04$) and message credibility ($F[1, 145] = 9.68$, $P < 0.01$, $\eta^2 = 0.06$). More specifically, follow-up tests revealed that women visiting Julie's site found the site overall to be significantly less credible ($M = 3.87$) than did men visiting the same site ($M = 4.66$; $P < 0.05$). In addition, women visiting the female Web site found the target story (message) to be significantly less credible ($M = 3.25$) than did men visiting that site ($M = 4.14$; $P < 0.05$). No significant differences were found with regard to the perceived credibility of the Web site sponsor.

4. Discussion

This study examined the effects of the sex of Web site authors and Web site visitors on perceptions of the credibility of personal Web pages. Because the Web environment poses some complex issues with regard to the assessment of credibility, this variable was conceptualized in three ways: *message* credibility (the perceived credibility of the information residing on a Web site), *sponsor* credibility (the perceived credibility of the individual whose site is represented), and *site* credibility (the perceived credibility of the Web site as a whole). These three dimensions of credibility were assessed across male and female personal Web sites, by members of both sexes.

The first research question focused on whether males and females evaluate personal Web pages differently in terms of perceived credibility. Results revealed that males rated both message credibility and site credibility significantly higher than did women. These findings provide some evidence that males and females assess the credibility of personal Web sites differently, with men being more generous in their credibility assessments than women.[4]

The second research question posed whether men's and women's personal Web sites are evaluated differently in terms of their credibility, without regard to the sex of site visitors. No evidence for this was found for the Web sites used in this study, on any of the credibility measures used.

The final research question considered whether the interaction between sex of the Web site sponsor and sex of the person viewing the site affected credibility perceptions. For site and message credibility, there was a significant interaction whereby females judged both the female site, and the message on the female site, least favor-

[4] The pretest finding that women raters found both the male and female photographs to be more attractive than did men could contribute in part to this difference (i.e., if females find more attractive men and women to be less credible). However, research consistently finds that attractiveness increases, not decreases, perceptions of credibility, through increased liking (e.g., O'Keefe, 1990; Patzer, 1983).

ably, and males judged the female's Web site and its message most favorably. Although a significant interaction was not found for sponsor credibility, the means for all three of the credibility measures indicated a consistent pattern: males rated Julie's site the highest, and females rated Julie's site the lowest. Put another way, the opposite-sex credibility evaluations were higher than the same-sex credibility evaluations.

Due to the inconsistent findings from past research noted earlier, and the novel consideration of the issues of sex and perceived credibility in the online environment, there are several intriguing interpretations of the results that together construct a view of how sex and credibility might interact in personal Web pages. Furthermore, findings from this study suggest directions for future research and theoretical extensions and modifications based on these findings. Among the most important factors in assessing the results of this research are: vestiges of a sex-imbalanced Internet culture, sex similarity between site sponsors and visitors, sex and message congruence, and social desirability.

4.1. Vestiges of a sex-imbalanced Internet culture

As mentioned earlier, scholars examining computing culture have found that men have more favorable attitudes toward computers than do women. Further research has found that these attitudes exist also in cyberspace, such that men's attitudes toward the Internet are more positive than women's attitudes (Jackson et al., 2001). If this male-oriented culture of computing and the Internet persists today (despite recent changes in the demographics of Internet use), this may explain why men had more favorable evaluations of both male and female Web sites than did the women in the study. Thus, just as general computer attitudes are seen to positively influence Internet attitudes, attitudes about cyberspace may similarly impact users' views about content on the World Wide Web, including personal Web sites. To assess this possibility directly, future research will have to go beyond looking at individuals' Internet/Web experience (which was controlled for in this study) and examine individuals' attitudes toward Internet and Web technologies specifically. Even these explanations, however, fail to account for the interaction between credibility perceptions and viewer sex that was discovered in this study. Potential explanations for this interaction are addressed next.

4.2. Sex similarity

Research examining sex as a marker of similarity predicts that credibility ratings will be higher when the sex of the message source matches the sex of the message receiver (Bochner, 1994; White & Andsager, 1991). The SIDE model (Postmes, Spears, & Lea, 1998; Spears & Lea, 1992) similarly predicts that same-sex evaluations will be higher than opposite-sex evaluations because group identity (in this case, due to sex) will be more salient in deindividuated or reduced cues environments (such as with CMC), and people will thus act in accordance with their in-group affiliation in this context. Data from this study, however, indicate the opposite:

same-sex credibility evaluations were lower than opposite-sex credibility evaluations. There are several possible explanations for this discrepancy.

Similarity effects only work when receivers perceive the source of the communication as substantially similar to them, and it is possible that female participants in this study saw Julie to be quite dissimilar to them. Although speculative, it is possible that to the female participants, Julie violated sex-role stereotypes with, for example, her high technical expertise, as demonstrated by both her computer skill (creating a personal Web page) and knowledge about a technical topic (radiation). In support of this explanation, research in business and professional settings has found that women who violate sex role expectations are judged more harshly by other women than they are by men (Engstrom, 1996; Mathison, 1986). It is possible that a similar dynamic was operating for the women who participated in this study: They may have viewed Julie's technical expertise as evidence that she is unlike them, and this personal incongruence may have resulted in disapproval, such as thinking of Julie as an "overachiever" who violates existing norms (Mathison, 1986). Similarly, Kaiser (1990) notes that same-sex evaluations can actually be *more* critical than opposite-sex evaluations because they are made on the basis of greater knowledge, sensitivity, or attention to detail (see also Engstrom, 1996; Mathison, 1986).

In addition, it is possible that sex-based group identifications, as predicted by the SIDE model, were not actually cued in this context. Unlike other forms of text-based CMC (e.g., email, chat), personal Web sites such as those used in this study have a great deal of individuating information, despite the relatively "lean" communication environment available. Thus, personal Web pages may offer plentiful rather than reduced cues about their creators. As a consequence, categories other than sex identification may have been made salient to site visitors, and the SIDE model is perhaps not appropriately applied to contexts beyond text-based forms of CMC, where sufficient individuating cues may exist.

Each of these explanations, however, fails to account for why the male participants rated Julie's Web site so highly. One potential explanation lies in the cognitive dissonance perhaps created when female participants discovered that Julie was in fact quite dissimilar to them by virtue of her technical expertise, although they may have expected her to be similar to them through sex identification. According to cognitive dissonance theory (Festinger, 1957), one strategy to reduce dissonance is to devalue the person or object creating it. Thus, female participants in the study may have engaged in this strategy, whereas male participants may have experienced less dissonance, and therefore no devaluation, because they might have had lower expectations for similarity with Julie in the first place (see Mathison, 1986 for a similar argument).

4.3. Sex and message congruence

Beyond focusing on similarities between senders and receivers, research also considers the similarity between the source of the message and the message itself. In order to establish any potential congruence between sponsor sex and the sex-orien-

tation of the message, a sample of subjects distinct from those of the pretest and main study was surveyed.[5] Analyses revealed that participants felt the story was more appealing to women than to men, and female respondents ($M = 4.13$) felt that the story was significantly more appealing to women than did male respondents ($M = 3.86$; $t = -4.81$, d.f. $= 409$, $P < 0.001$).

In spite of the assessment that the story appealed more to women than to men, the story was perceived by women to be more credible by virtue of its appearance on Jeff's site. This finding contradicts past research that has shown that credibility ratings are highest when the sex of the source matches the sex-relatedness of the issue (e.g., Feldman-Summers et al., 1980). The robustness of the effect in spite of past findings may point to crucial differences with personal Web page information, suggesting distressing cross-sex perceptions of credibility online.

Alternative explanations include the interpretation that because this particular story might also require esoteric knowledge (e.g. about the effects of radiation), females may have identified with Julie, and with the story's content, but concluded that since they lacked the special knowledge to make full sense of the story, Julie must lack this credibility as well. By contrast, perhaps men would not *expect* to identify with Julie at all, and thus not have experienced the same expectation violation. It could also be true that women may know more about pregnancy and may have judged the story to be less credible (it should be noted that all information in the story was indeed accurate). In other words, if information in the story was perceived to be incorrect, women may have penalized Julie but not Jeff. Notably, these sex-message congruence interpretations only serve as potential explanations for findings on message credibility, and cannot explain differences in perceived site credibility.

4.4. *Social desirability*

Finally, the finding that men rated Julie's Web site to be significantly more credible than women did could also be a result of a social desirability response bias operating primarily for the male participants. Given social proscriptions against sexism, it is possible that the male participants in this study may have felt compelled not to appear to be biased by being particularly generous in their ratings of Julie's site. Because females are more often the target of sexism than they are perpetrators of it, the women in the study may not have had the same level of concern about appearing sexist as did the male participants. This interpretation of the results suggests that further research on this topic should measure and control for social desirability response biases of this specific type.

[5] A total of 411 students enrolled in introductory communication courses took part in the survey for course credit. All participants read a hard copy of the radiation story (not online) and then answered a short questionnaire assessing the degree to which they felt the story was more *appealing* to male or female readers (as indicated by its importance, how interesting it was, its appeal, and whether they believed the story was written more for male or female readers). Responses were made on 5-point Likert-type scales, with 3 as the neutral point.

4.5. Limitations and directions for future research

In spite of its strengths, results of this study should be interpreted with an awareness of its limitations. Specifically, it is important to note that this study focused on one type of information available on the Web, personal Web pages, and tested differences by a comparison of only two artificial Web sites. Although these stimulus sites were constructed with close adherence to the criteria described by Papacharissi (2002) that characterize personal Web pages, differences may have existed between these and "typical" sites that might affect the generalizability of findings. Also, although sequential assignment to conditions was used to minimize the possibility of systemic biases within any condition, true random assignment to conditions was not achieved in this quasi-experiment. Moreover, because the measures of the dependent variables were specific to the sponsors, sites, and the message residing on those sites, the inclusion of a control group in this study was not feasible.

Future research should strive to build on the current study by examining a greater variety of individual Web sites (i.e., site sponsors), a broader range of site designs, an assortment of stories (i.e., messages) that have been pre-tested to be predominantly female-oriented, male-oriented, or neutral, and measures of similarity between the message and the receiver. Doing so would help to further resolve the effects of viewer sex, sponsor sex, and message and sex congruence. In addition, subsequent research should consider differences in credibility attributions, as was done in this study, based on an intriguing finding from the current research: Although females rated site and message credibility as lower for the female site, this was not true of the site sponsor. Thus, lower credibility attributions applied not to the person (i.e., the site sponsor), but rather to the person's products (i.e., the message and the site). This suggests a subtle or indirect ascription that, although reflecting on the person, seems to be manifested only indirectly.

5. Conclusion

This research has some important implications for the effects of sex on perceptions of the credibility of Web-based information. Results suggest that sex is a significant factor when looking at perceived Web site credibility measures, at least across personal information found on the Web. Although males were favorable overall in their assessments of the credibility of personal Web pages, it is the interaction between authors' and viewers' sex that seems to be at the base of this relation. In addition, findings from this study were fairly robust: results were relatively, although not entirely, consistent across three different measures of credibility and differences reported were not due to demographics (age, education, and income), Internet/Web experience, issue salience, and both self-report and actual information verification, all of which were statistically controlled. Overall, this study reveals that sex differences are meaningful in cyberspace, just as they are in other venues, although the reduced cues environment challenges researchers to locate precisely what factors underlie these differences.

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