Gender and Web Information Seeking: A Self-Concept Orientation Model

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Adapting the consumer behavior selectivity model to the Web environment, this paper's key contribution is the introduction of a self-concept orientation model of Web information seeking. This model, which addresses gender, effort, and information content factors, questions the commonly assumed equivalence of sex and gender by specifying the measurement of gender-related self-concept traits known as *self- and other-orientation*. Regression analyses identified associations between self-orientation, other-orientation, and self-reported search frequencies for content with identical subject domain (e.g., medical information, government information) and differing relevance (i.e., important to the individual personally versus important to someone close to him or her). Self- and other-orientation interacted such that when individuals were highly self-oriented, their frequency of search for both self- and other-relevant information depended on their level of other-orientation. Specifically, high-self/high-other individuals, with a comprehensive processing strategy, searched most often, whereas high-self/low-other respondents, with an effort minimization strategy, reported the lowest search frequencies. This interaction pattern was even more pronounced for other-relevant information seeking. We found no sex differences in search frequency for either self-relevant or other-relevant information.

Introduction

This paper explores gender differences in Web information seeking behavior in a manner that questions the commonly assumed equivalence of sex and gender. An alternative understanding, which distinguishes between the two, defines gender in terms of self-concept traits that vary from person to person. Developing this individual-differences conceptualization of gender, we introduce a new self-concept orientation framework that describes how sex and measurable differences in gender-related traits affect information seeking on the World Wide Web.

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The development of a model that addresses relationships among Web information seeking, sex, and gender is a timely and important research objective for several reasons. First, the Web has had wide-ranging effects on society in general (Lesk, 1997; Lynch, 1997) and on information seeking in particular. Its novel information-seeking environment differs from traditional information retrieval contexts in terms of interfaces, search models, and document collections (Jansen & Pooch, 2001; Sparck Jones & Willet, 1997). This environmental distinctiveness warrants further exploration of Web searching (Jansen & Pooch, 2001).

Second, sex has been identified as a strong predictor of many attitudes and behaviors that have implications for Web information seeking. These include spatial orientation, verbal skills, and learning styles (Carr & Jessup, 1997; Deaux & Kite, 1987; Geary, 1995), as well as attitude towards and interest in computers, online shopping, and Web advertising (Van Slyke, Comunale, & Belanger, 2002; Venkatesh & Morris, 2000; Wolin & Korgaonkar, 2003), to name but a few. Taylor (1991) and Wilson (1999) also identify sex as an important user demographic that can influence seeking behavior. However, surprisingly little research attention has been directed to understanding sex differences in Web information seeking (Ford, Miller, & Moss, 2001). Our conceptual framework and empirical research address this gap by exploring male–female differences in information-seeking effort and the content of information that is sought.

Finally, we believe that any model of sex differences in information-seeking behavior must also address gender as a psychological and social construct. With successive generations, traditional male–female behavioral distinctions are expected to become less pronounced (Nelson, 1994). As gender roles blur and behavior departs from stereotypic role assignments, models that equate gender and sex will be far less useful in explaining information-seeking behavior. In contrast, frameworks that investigate gender in terms of individual psychological differences in self-concept will become increasingly important.

We begin by summarizing pertinent research in psychology, marketing, education, and information studies, paying particular attention to the consumer behavior selectivity model and its gender role explanation of sex differences in information processing. This background informs the development of our proposed self-concept orientation framework and leads to specific research questions concerning the roles of sex and gender in Web information seeking. Next, we report the results of empirical research that explores these questions and demonstrates the value of an individual differences approach to gender research in information-seeking behavior. Even though this research is in its preliminary stages, the self-concept orientation framework yields important insights both for scholars and practitioners who want to personalize Web information system design to better suit the ways that individual users seek information.

Background

Gender and Internet Usage

Sex differences in Internet usage have attracted considerable interest in the marketing and electronic commerce fields. Until quite recently, the Internet was male-dominated, but female Internet participation and online shopping figures have risen to the extent that women now lead electronic retail in Britain and the United States (Andrews, 2003; Economist, 2004). Nevertheless, certain male–female differences in Internet usage appear to persist. Women are more likely than men to use e-mail to communicate with friends and family and to post supportive messages to online discussion groups (Macklem, 2000; Morahan-Martin, 1998; Weiser, 2000). Often, female usage situations reflect relational concerns such as making friends, fighting for causes, raising children, and role playing. Women use the Web to e-mail, chat, exchange ideas, and search for reference materials, including medical and government information. Men, on the other hand, want detailed and accurate information about investments, purchases, and personal interests, but prefer to minimize their information search effort (Smith & Whitlark, 2001).

Observed sex differences in Internet behaviors often are attributed to gender role distinctions (Morahan-Martin, 1998; Smith & Whitlark, 2001) that are consistent with the agentic–communal gender role conceptualization first proposed by Bakan (1966). The agentic male role, described as independent and autonomous, is associated with greater concern for the self than for others. In contrast, communal females are interdependent and interpersonal, demonstrating concern for others as well as the self. In a similar fashion, more recent self-concept theorizing proposes that the male self-concept is defined through separation from others (i.e., the male *I*) whereas the female self-schema is characterized by attachment and relational connections (Chodorow, 1978; Cross & Markus, 1993; Gilligan, 1982; Markus & Oyersman, 1989).

The consumer behavior ***selectivity model*** addresses more directly the implications of agentic and communal gender orientations for both information processing effort and the type of content that elicits attention and favorable response (Meyers-Levy, 1988; Meyers-Levy & Maheswaran, 1991; Meyers-Levy & Sternthal, 1991). According to the selectivity hypothesis, men are more likely than women to rely on heuristics as surrogates for more detailed processing. By focusing on information that is highly available either because it is salient or because it pertains to the self, men use a selective strategy to minimize processing effort. Furthermore, they are more responsive to marketing communication with agentic messages that emphasize self-interest than they are to those containing communal appeals that articulate concern for others. Women, however, respond to both kinds of messages, and are effortful processors who try to consider all available information. Importantly, the selectivity model's predictions concerning both processing effort and preferred content appear to be consistent with male–female differences in Internet usage. Men look for personally relevant information and want to minimize search effort, while women gravitate towards applications and information that reflect interpersonal concerns.

A Selectivity Model Interpretation of Web Information Seeking

Researchers in information studies and education who have examined sex differences in Web information seeking also have reported results that can be interpreted from a selectivity model viewpoint. Ford and Miller (1996), for example, found significant sex differences in Internet searching. While men seemed to enjoy browsing, women were disappointed and disoriented by the Internet. Ford et al. (2001) also established that information retrieval effectiveness was associated with men, whereas retrieval failure was associated with women. Women felt that they were not in control of their searching; they were unable to avoid irrelevant material and stay on target. Men, however, were confident that they were in control and could bypass extraneous content. Consideration of the selectivity framework suggests that the retrieval failure experienced by women and their inability to avoid extraneous information could be related to their comprehensive processing tendency. Conversely, the confidence and success of men may have reflected their use of a selective strategy that focused on especially salient material.

In their investigation of Web information seeking among same-sex collaborative groups of grade 6 students, Large, Beheshti and Rahman (2002) also found sex differences that can be accommodated within the selectivity model. Compared with groups of girls, groups of boys were more active searchers who formulated more queries, clicked on more hypertext links per minute, and followed up on more hits. Boys spent less time viewing individual pages, jumped pages more frequently, and thought they would retrieve relevant information with just a single-word search term. Large et al. (2002) noted that the boys' shorter viewing times might be explained either by less reading or by less collaborative effort. Both explanations of the boys' behavior are consistent with the model's predictions for processing effort and strategy; their use of single-word queries and swift movement

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through information suggests a selective strategy, whereas a lesser emphasis on collaboration may be attributed to an agentic focus on self.

In another study, Roy, Taylor, and Chi (2003) examined how grade 8 students used the library and the Web to search, browse, and find information in response to a specific prompt. They discovered that boys in the Web condition learned significantly more target-specific and target-related information than girls. Additional investigation conducted among the Web searchers suggested that the boys were successful because of their *horizontal search moves* (Roy & Chi, 2003). After submitting a query, boys quickly inspected the returned results list before submitting another search. In this approach, excerpts were browsed but only a few documents actually were explored. In contrast, *vertical search moves* were more typical of girls, who perused a majority of the documents in each hit list. Whereas boys filtered information at an early stage in the search cycle, girls were more linear and thorough navigators. Put in selectivity model terms, boys appeared to use a selective strategy that focused on highly available information with particular relevance to the search task. Girls, however, tried to process more comprehensively.

To summarize, the literature documents differences between men and women in the strategies they use to search for information on the Web and the subject domains they explore. Admittedly, the educational findings were obtained with very small samples of children. Nevertheless, it appears that documented sex differences are consistent with selectivity model predictions. Whereas men's Web searching tends to be more selective in nature, women employ—and perhaps become frustrated with—a more effortful and conscientious approach. The communal role orientation of women, compared with the agentic psychological makeup of men, also is associated with greater interest in information and usage situations that reflect concern for others.

Conceptual Framework: The Self-Concept Orientation Model

Like the selectivity model, gender research in information systems and computer-mediated communication (e.g., Ford, Ledbetter, & Roberts, 1996; Gefen & Straub, 1997; Hoxmeier, Nie, & Purvis, 2000; Jaffe, Lee, Hunag, & Osahagan, 1999; Simon, 2001; Soukoup, 1999; Walsh, Kucker, Maloney, & Gabbay, 2000) employs sex as an operationalization of gender. However, relationships between sex and gendered aspects of self-concept are culturally determined and vary over time (Markus & Kitayama, 1991). By assuming rather than testing the relationship between sex and gender, the equation of sex and gender confounds biology with a social and psychological construction. To address this methodological shortcoming, we propose a ***self-concept orientation model*** to study relationships among sex, gender, and information-seeking behavior. As illustrated in Figure 1, we incorporate three factors that impact our understanding of sex differences in Web information seeking: gender, effort, and information content.

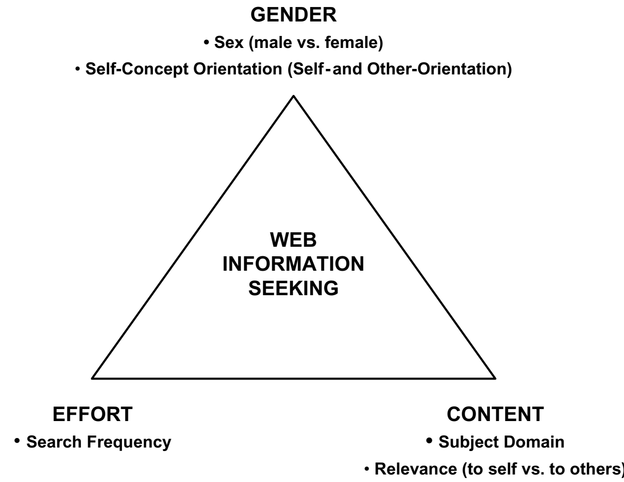

FIG. 1. The self-concept orientation model of Web information seeking.

A key aspect of the framework concerns the definition of ***gender***. Although sex commonly is used as an operationalization of gender, our approach distinguishes between the two. Rather than assume that sex determines gender, our framework specifies the measurement of gender-related aspects of self-concept known as self- and other-orientation (Hupfer, 2001). *Self-orientation*, a five-item composite of *self-sufficient, make my own choices, am my own person, self-reliant,* and *independent,* assesses agentic traits. Communal characteristics *(nurturing, understanding, compassionate, sympathetic,* and *sensitive to the needs of others)* are tapped with *other-orientation*. Respondents use a 9-point scale anchored by *never true of me* (1) and *always true of me* (9) to respond to all 10 items. The two scale scores, which are reliable and valid indicators of self-concept orientation, are calculated as the averages of their respective items.

The second factor addresses the ***effort*** that is devoted to Web information seeking, which in our study is indicated by *search frequency* or how often a person seeks information on the Web during a specified time period. Other effort measures could be used, but we selected search frequency because it is used in large-scale tracking projects such as GVU's WWW User Surveys (http://www.gvu.gatech.edu/user_surveys) and the Pew Internet & American Life Project (http://www.pewinternet.org) as well as individual research studies (Choo, Detlor, & Turnbull, 1999, 2000a, 2000b; Rieh, 2004; Warner & Procaccino, 2004) to characterize and understand ongoing patterns of Web information seeking behavior. According to the selectivity hypothesis, women are more comprehensive information processors than men. If search effort can in fact be explained by agency and communion, then self- and other-orientation should explain the kinds of differences that until now have been accounted for by sex as a proxy for gender. Consequently, the search frequency measure has an additional advantage in that it facilitates comparison with other research that documents sex differences.

Content, the third factor, can be classified by its *subject domain* as well as its *relevance* for the user. As noted, men

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and women differ in their online interests, and these differences appear to be compatible with selectivity-hypothesis predictions concerning the content that generates favorable response. That is, preferred applications and usage situations suggest that women are attracted to the Web's social networking, whereas men may be more motivated by individual interests. By classifying information according to its relevance, the self-concept orientation framework examines these motivations more directly. Users may seek content that has personal relevance or may peruse information that is important to those with whom they are close.

As an adaptation of the selectivity model to an individual differences context, the self-concept orientation framework separates the effects of sex and self-concept in its examination of the interplay among gender, effort, and content. Therefore, we can determine how self-orientation, other-orientation, and their interaction compare with sex as predictors of information-seeking behaviors. Importantly, the measurement of gender-related traits also allows self-concept orientation theorizing to accommodate those whose psychological makeup departs from what stereotypes prescribe and the selectivity hypothesis assumes (Bem, 1974; Hupfer, 2001; Spence, Helmreich, & Stapp, 1975). That is, some women have self-concepts that are more agentic than communal, and the opposite is true for certain men.

Research Questions

With this background in mind, we propose three broad research questions to determine whether the self-concept orientation framework, as an adaptation of the selectivity model, provides insight into the basis of Web information-seeking behaviors. Whereas the selectivity model predicts male–-female differences in processing effort and response to self-relevant versus other-relevant information, the self-concept orientation model examines Web information-seeking as a function of self- and other-orientation.

1. Do self- and other-orientation predict how often an individual searches for self-relevant and other-relevant information on the Web?
2. Are self- and other-orientation better predictors of search frequency than biological sex? Once we have accounted for self-concept orientation, does sex add anything to prediction?
3. Do self- and other-orientation predict search frequency in a manner that is consistent with the selectivity model?

    Is self-orientation related to effort minimization and lower search frequency, for both self- and other-relevant information?

    Is other-orientation related to a more effortful search strategy and higher search frequency, for both self- and other-relevant information?

    Finally, are these differences amplified when we examine other-relevant information? Highly self-oriented individuals should be even more apt to minimize effort when it concerns information to which they are generally less responsive.

Research Design

Data Collection

Online questionnaires have been employed in both cross-sectional (e.g., Smith & Whitlark, 2001; Weiser, 2000) and longitudinal studies (e.g., http://www.gvu.gatech.edu/user_surveys) of Web usage behaviors. Accordingly, we believed that a survey method was appropriate for initiating our examination of the self-concept orientation framework. All current students, recent graduates, faculty, and staff in the business school of a medium-sized university received an e-mail message to invite their participation in an online survey of Web information search habits. Participants were entered in a draw for a number of $100 gift certificates to a local shopping mall. Of the 422 surveys that were received, complete data were obtained from 379 respondents.

Dependent measures. Two sets of items were created to assess how frequently participants searched for information with personal relevance versus content important to close others. Our key subject domains drew on Smith and Whitlark (2001), Weiser (2000), GVU's WWW User Surveys (http://www.gvu.gatech.edu/user_surveys), and general media reports. Qualitative pretests indicated that the questions were clear and addressed an adequate range of topics that were of interest to both men and women (see Table 1 for survey items). All responses were collected using a 9-point scale that ranged from *not at all* (1) to *more than once a day* (9).

By using pairs of questions with identical subject domains but different relevance for the user, we intended to create two matched constructs that referred to search for self-relevant versus other-relevant information (Morrison, 1990, pp. 313–319; Tabachnik & Fidell, 2001, pp. 582–583). An examination of self- and other-relevant information at the construct level would allow more general inference about relationships among self-concept orientation, content relevance, and information-seeking effort than the consideration of individual search frequencies for specific subject domains would permit. This parsimonious approach also reduces Type 1 error by limiting the number of hypothesis tests, and often produces scale scores that are more reliable and conform more closely to the normal distribution than do the individual items (Hays, 1994, pp. 449–451; Mood, Graybill, & Boes, 1974, p. 195; Tabachnik & Fidell, 2001, pp. 582–583).

Predictor variables. As specified in the self-concept orientation model, our focal predictor variables were self- and other-orientation (Hupfer, 2001). Participants also were asked to complete sex and university status items (current student, graduate, faculty, or staff). In addition, we asked respondents to indicate how often in the last 6 months they had searched the Internet for information about products and services, and how frequently they had made online purchases. As with our dependent measures, these two items were assessed using a 9-point scale that ranged from *not at all* (1) to *more than once a day* (9).

TABLE 1. Survey items: Self-relevant and other-relevant information search frequency.

Thinking about your behavior **over the last six months**, about *how often* have you looked for the following types of information on the Internet?	
1. Relationship information that is important to you personally (e.g., childcare, eldercare, friendship, dating, marriage)	2. Relationship information that you think would be important to someone with whom you have a close personal relationship
3. Fashion and/or personal appearance information that is important to you personally	4. Fashion and/or personal appearance information that you think would be important to someone with whom you have a close personal relationship
5. Your own hobbies and interests (e.g., computers, crafts, cars, gardening, home improvement, cooking, collecting)	6. Hobbies and interests of someone with whom you have a close personal relationship
7. Government information that is important to you personally (e.g., policies, documents, online forms)	8. Government information that you think would be important to someone with whom you have a close personal relationship
9. Health or medical information that is important to your own personal health or medical condition	10. Health or medical information that you think would be important to the health or medical condition of someone with whom you have a close personal relationship
11. Articles, papers and reports that concern topics, other than those described above, which are important to you personally	12. Articles, papers and reports that concern topics, other than those described above, which are important to someone with whom you have a close personal relationship
Items 1, 3, 5, 7, 9, and 11 measured frequency of search for self-relevant information	*Items 2, 4, 6, 8, 10, and 12 measured frequency of search for other-relevant information*

Data Analysis

First, we used principal components methods to determine whether our 12 search frequency dependent measures were amenable to analysis as two latent constructs (Morrison, 1990, pp. 313–319; Tabachnik & Fidell, 2001, pp. 582–583). After verifying that the two item sets formed single dimensions, we calculated average scores for self-relevant and other-relevant information search frequencies. Cronbach's alpha for the self-relevant information items was .74 and reliability for the other-relevant aggregate was .83. We then applied log transformations to reduce the positive skewness of the two distributions (Tabachnik & Fidell, 2001, p. 81).

To investigate relationships among search frequency and the self-concept orientation scale scores, we preferred multiple regression models. Regression techniques are especially suitable for analysis with continuous independent measures because they often are correlated, rather than orthogonal by virtue of experimental design (Tabachnik & Fidell, 2001, p. 111). Regression also preserves the information and statistical power that is lost when continuous scores are converted to the discrete categories that ANOVA methods require (Aiken & West, 1991, p. 4).

Even though regression is a linear equation, nonlinear relationships can be assessed by including redefinitions of the independent variables. Curvilinear relationships can be examined by squaring independent measures, and interactions can be analyzed by creating cross products; all redefined variables are included in the regression equation along with the original independent measures (Tabachnik & Fidell, 2001, p. 114). Because we wanted to investigate the possibility of nonlinear relationships between the self-concept scales and the dependent measures, as well as the interaction between self- and other-orientation, we specified regression models with all terms for the full quadratic polynomial mean function (Cook & Weisberg, 1999). These included the linear main effect parameters for self-orientation and other-orientation, the cross-product interaction, and the squared self- and other-orientation terms. The 2 scale scores were standardized before the higher-order parameters were computed (Aiken & West, 1991).

We also included z-scores for the general search and purchase variables to account for variance arising from overall Internet use. By doing so, we could capture variance associated with Internet usage that might otherwise attenuate relationships between our focal predictor variables and search frequencies (Tabachnik & Fidell, 2001, p. 116). To allow for the possibility of differential response from our sample's mix of students, alumni, faculty, and staff, we created a university status variable (1 = current students, 2 = graduate, and 3 = all others).

Data inspection revealed no obvious outliers in either of the two dependent measures. Because we were concerned about the effects of extreme Self- and Other-Orientation scores on our multiplicative terms, we also examined our predictor variables for problematic data points. A bivariate scatterplot traced a very low Self-Orientation score (2.60) and two extreme Other-Orientation scores (1.40 and 2.60) to two respondents. These were flagged as potential outliers in our regression models (Hays, 1994, p. 721; Tabachnik & Fidell, 2001, pp. 118–119).

After running preliminary regressions with the two search frequency dependent measures, we examined scatterplots of Cook's D, centered leverage values, and standardized residuals for evidence of influential points (Hays, 1994, p. 722; Tabachnik & Fidell, 2001, p. 122). Observing very large Cook's D and centered leverage values associated with the two flagged respondents, we removed these cases from the dataset. We recomputed the polynomial terms with new

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Self- and Other-Orientation z-scores before running the models once more. An additional set of scatterplots and standardized residuals histograms suggested no further problems. Furthermore, correlations among the predictors were within acceptable guidelines, with the largest between self-orientation and its squared term (.531). Tolerance value multicollinearity diagnostics, calculated as the proportion of variance for a given predictor variable that is not accounted for by others in the equation, also were within the acceptable range (Hays, 1994, pp. 722–723).

An additional two sets of analyses allowed us to examine the relationships among sex, self-concept, and frequency of search for self- and other-relevant information. First, we added a sex parameter to the university status, Internet use, and self-concept orientation terms; this was done on a forward conditional basis with liberal probabilities of .10 for entry and .15 for removal. By using a sequential approach, we were able to determine whether sex added anything to prediction if self- and other-orientation were known (Tabachnik & Fidell, 2001, pp. 138–139). Next, to establish if sex emerged as a significant predictor when the self-concept variables were omitted, we ran regressions with only the sex, status, and Internet use parameters.

Results

All results that we report below were obtained after the two outlying respondents were removed from the data set. Our remaining sample of 377 respondents consisted primarily of young (78.2% between 18 and 24 years), single (84.9%) students (75.3%). More men (222) than women (155) participated. Self-Orientation scores ranged from 4.2 to 9.0 with a mean of 7.64; Other-Orientation ranged from 3.4 to 9.0 with a mean of 7.24. Cronbach's alphas were .84 and .87, respectively. As expected (Hupfer, 2001), no sex difference was found in self-orientation ($\bar{x}_{\text{female}} = 7.65$, $\bar{x}_{\text{male}} = 7.60$; $t_{375} = -.511$, $p < .061$) but women were significantly higher on other-orientation ($\bar{x}_{\text{female}} = 7.51$, $\bar{x}_{\text{male}} = 6.86$; $t_{375} = -5.99$, $p < .0005$). Cross-tabulation of individual-level differences between the two scales indicated that men conformed more closely to stereotypic prescriptions. Most (73.5%) had Self-Orientation scores that were greater than or equal to their Other-Orientation scores. Women, on the other hand, were more likely than men to have scores in the opposite direction of the gender stereotype. Half of the women we surveyed had Self-Orientation scores that were greater than or equal to their Other-Orientation scores.

Self-Relevant Information Search Frequency

The polynomial regression conducted with the self-concept terms revealed a significant other-orientation squared term and a self-orientation by other-orientation interaction (see Table 2). The university status parameter also was significant ($\bar{x}_{(ln)\ \text{current students}} = 1.24$, $\bar{x}_{(ln)\ past\ students} = 1.31$, $\bar{x}_{(ln)\ other} = 1.06$), as were positive terms for the general search and purchase variables. When a sex parameter was added to these terms on a forward conditional basis, it failed to meet our entry criterion ($p < .166$). Likewise, our third analysis excluding the self-concept variables found no sex effect on search frequency for information with personal relevance ($p < .461$).

TABLE 2. Self-relevant information search frequency.

ANOVA	Sum of squares	df	Mean square	F	Significance
Regression	16.392	8	2.049	17.139	.000
Residual	43.995	368	.120		
Total	60.386	376			
	R^2 .271		Adjusted R^2 .256		

Coefficients	Unstandardized coefficients		Standardized coefficients	t	Significance
	B	Std. error	Beta		
(Constant)	1.355	.045		30.234	.000
Status	−.076	.030	−.116	−2.561	.011
General search	.148	.019	.369	7.745	.000
General purchase	.092	.019	.229	4.831	.000
Self	−.029	.022	−.072	−1.333	.183
Other	.028	.021	.069	1.325	.186
S × O	.047	.016	.132	2.850	.005
S^2	.004	.013	.015	.273	.785
O^2	−.025	.012	−.114	−2.173	.030

To interpret the results obtained with the polynomial self-concept parameters, we computed point estimates of predicted search frequency by solving the regression equation at all nine possible combinations of low, moderate, and high levels of both self- and other-orientation. Following Cohen and Cohen (1983), these levels were assigned values of −1 (low = 1 standard deviation below the mean for z-scores), 0 (moderate = mean), and 1 (high = 1 standard deviation above the mean). Because the graphical evidence pertaining to self- and other-orientation was our primary interest, we chose to substitute values of 1 for the university status and general Internet use variables; both of these parameters were main effects whose values would only shift the Y-axis up or down, rather than alter the pattern of relationships among our focal self-concept parameters. To further aid interpretation, we employed the inverse log transformation to return the predicted search frequencies to the original 9-point scale (Table 3). Finally, we generated a two-way plot of predicted search frequency at low, moderate, and high values of both self- and other-orientation (Figure 2).

Our examination of the two-way graph indicated that other-orientation made little or no difference to self-relevant information search frequency at low and moderate levels of individual self-orientation. However, when self-orientation was high, the level of other-orientation had an impact. High levels of self-orientation were associated with the desire to minimize search effort by searching less frequently. When this tendency was not offset by the effortful processing

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TABLE 3. Predicted self-relevant and other-relevant information search frequencies by levels of self- and other-orientation.

Self-Orientation	Other-Orientation	Self-Relevant information	Other-Relevant information	Self-Relevant — Other-Relevant information
L	L	4.69	3.44	1.25
	M	4.72	3.58	1.15
	H	4.52	3.49	1.02
M	L	4.33	2.99	1.34
	M	4.57	3.35	1.22
	H	4.58	3.52	1.06
H	L	4.03	2.61	1.42
	M	4.45	3.14	1.32
	H	4.68	3.55	1.13

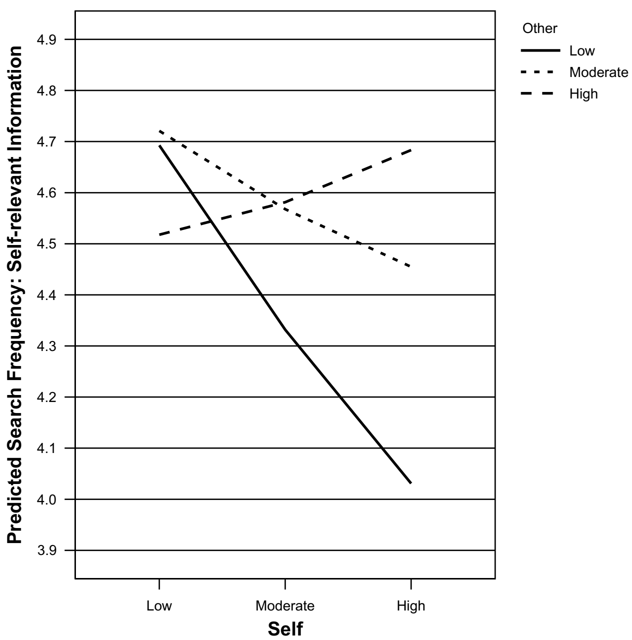

FIG. 2. Self-Relevant information search frequency.

attributed to other-orientation, information search was conducted less often. Among high-self respondents, those who were low-other reported the lowest information search frequency, whereas high-other individuals searched most often.

Other-Relevant Information Search Frequency

We also found a significant interaction between self- and other-orientation in our analysis of search frequency for information that respondents believed to be important to those with whom they had close relationships (Table 4). This was accompanied by main effects for self-orientation and other-orientation, and a significant coefficient for the other-orientation squared term. With respective *p*-levels of .888 and .393 for the sex parameters, neither our forward conditional analysis nor the model omitting the self-concept terms found evidence of male–female differences in search for information of relevance to close others.

TABLE 4. Other-relevant information search frequency.

ANOVA	Sum of squares	df	Mean square	F	Significance
Regression	31.287	8	3.911	17.628	.000
Residual	81.640	368	.222		
Total	112.927	376			
	R^2 .277		Adjusted R^2.261		

Coefficients	Unstandardized coefficients B	Unstandardized coefficients Std. error	Standardized coefficients Beta	t	Significance
(Constant)	1.002	.061		16.409	.000
Status	−.109	.040	−.122	−2.698	.007
General search	.144	.026	.262	5.520	.000
General purchase	.171	.026	.312	6.606	.000
Self	−.065	.029	−.119	−2.210	.028
Other	.081	.029	.148	2.845	.005
S × O	.073	.022	.151	3.271	.001
S^2	.001	.018	.003	.048	.962
O^2	−.031	.016	−.103	−1.975	.049

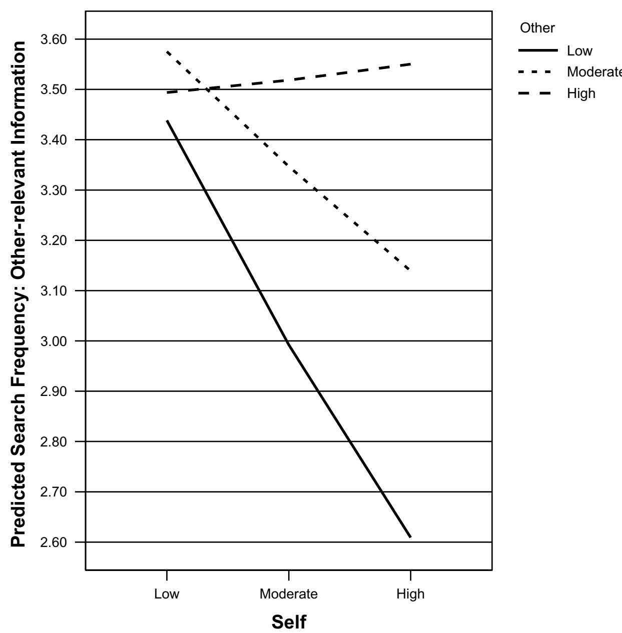

FIG. 3. Other-Relevant information search frequency.

Continuing to employ a point-estimate graphical method, we produced a two-way plot of other-relevant information search frequency at low, moderate, and high levels of both self- and other-orientation (Figure 3). To facilitate comparison between the two self-concept regressions, we calculated differences between the point estimates pertaining to self- and other-relevant information search frequency (Table 4). We also used the same Y-axis range for the two graphs, albeit with different minimum and maximum values.

Similar to the interaction pattern obtained in our analysis of self-relevant information search, other-orientation had no impact on search frequency when self-orientation was low

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and little effect when self-orientation was moderate. Among highly self-oriented individuals, however, the level of other-orientation was strongly associated with search for other-relevant information. High-other individuals conducted search most frequently, followed by individuals with moderate and low levels of other-orientation. Furthermore, this interaction effect was more pronounced than that observed for self-relevant search. Examined from the other-orientation point of view, self-orientation had no effect on the other-relevant information search frequency of those who were highly other-oriented. At moderate and low levels of other-orientation, however, increasing levels of self-orientation were related to decreasing search frequency.

Further examination of the difference between the self- and other-relevant search frequencies also is revealing. At every level of self- and other-orientation, individuals reported searching more often for information with personal relevance than they did for information that would be important to someone close to them. However, the extent to which self-relevant search frequency exceeded other-relevant search frequency depended on self- and other-orientation. The smallest gap between the two was reported by low-self/high-other individuals, whereas the greatest disparity was observed among high-self/low-other respondents.

Discussion

Recall that we posed three broad research questions pertaining to the prediction of Web information-seeking behavior from self-concept orientation and biological sex. The first of these asked whether self- and other-orientation could predict how often individuals search the Web for self-relevant and other-relevant information. In both cases, we found that these gender-related traits interacted to predict search frequency. Among high-self individuals, those who were also high-other searched most often, whereas those with lower levels of other-orientation searched less. High-self/low-other individuals did the least searching of all, and this pattern was even more pronounced when they were looking for information with relevance to others.

We also asked if self- and other-orientation were better predictors of search frequency than biological sex. Our results show that this indeed was the case: Regardless of content relevance, we found no relationships between sex and search frequency. Furthermore, associations between biological sex and gender were far weaker than has been assumed in previous information-seeking research. Half the women in our sample had Self-orientation scores that exceeded their Other-orientation scores and about a quarter of the men had scores in the opposite direction of what gender stereotypes would predict. Our individual differences self-concept orientation framework can account for the information-seeking behavior of individuals such as these, whereas an explanation that relies on sex as an operationalization of gender fails to do so.

Our third research question addressed the adaptation of the selectivity model, with its male–female distinction, to the individual differences approach specified by our self-concept orientation framework. Reframing selectivity model predictions in terms of self- and other-orientation suggests the following: 1) self-orientation is associated with effort minimization and lower search frequency, regardless of the information's relevance for oneself or for others; 2) other-orientation is related to a more effortful search strategy and higher search frequency for both self- and other-relevant information; and 3) such patterns would be amplified when searching for other-relevant information. Our results do in fact support a self-concept orientation model of Web information seeking. High-self scorers engaged in progressively less searching as their other-orientation scores declined, and those who were highly agentic (high-self/low-other) reported the lowest search frequencies in our sample. Conversely, communal individuals—those concerned with both self and others—reported high search frequencies. Moreover, these relationships were even stronger when participants were asked about searching for other-relevant information. High-self individuals were even more inclined to minimize effort when they were looking for information that had relevance for others rather than themselves.

Limitations

We acknowledge that the generalizability of our results is affected by our reliance on a convenience sample composed primarily of students. Such samples are appropriate for theory testing (Calder, Phillips, & Tybout, 1981) and we believed that it was appropriate to initiate investigation with a demographic that is described as the most connected to date (PR Newswire, 2004). However, we recognize the need to pursue exploration of our self-concept orientation framework among a more representative sample of Internet users than those found at a single university. Our sample, composed primarily of young students, was comparable to the high-frequency Canadian user profile in terms of age, education, and Internet usage (Dryburgh, 2001), but the *typical* or *average* Internet user profile is likely to shift as older users continue to move online. If an older cohort conforms more closely to traditional gender stereotypes, we may observe sex differences that we did not detect in the young sample we studied.

Like other survey research, ours may be limited by its reliance upon self-reports of Web information seeking (Johnson, Moe, Fader, Bellman, & Lohse, 2004). However, behavioral indicators such as click-stream data and transactions logs are not always appropriate for assessing higher-level information use and in this case would not have allowed us to determine whether respondents were seeking information that reflected self-interest versus concern for others. By asking subjects about their search habits for self- and other-relevant content, we were able to draw conclusions about how individual differences appeared to motivate search frequency. Analysis of lower-scale activity such as session length or page hits would not have afforded such an understanding, but these behavioral measures of effort and search strategy will be important for subsequent investigation.

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Implications for Future Research and Practice

Having established the usefulness of the self-concept orientation framework for examining search frequencies for information that varies in its relevance for the user, we now plan to assess the extent to which self- and other-orientation predict other indicators of search effort. Specifically, we will determine whether these individual differences also are related to behavioral measures of effort that reflect a selective versus comprehensive search strategy. For example, high levels of self-orientation should be associated with a selective strategy and horizontal search moves, while other-orientation should predict a comprehensive approach and the use of vertical navigation. Additional behavioral indicators of search effort could include the total amount of time that is spent on a certain subject, the duration of a single information seeking session, the number of sites visited, or the number of search engines that are used.

To further develop the self-concept orientation model, we plan experimentation that assigns specific search prompts concerning either self- or other-relevant topics. Search frequency and behavioral indicators of strategy, whether selective or comprehensive, are useful indicators of effort and search style. However, none of these measures consider the trade-offs that are made when individuals are looking for information and do not address either the quality or quantity of the information they acquire. Searching more often does not necessarily ensure that search goals are achieved, nor does searching less frequently mean that users fail to find important information. Similarly, a selective strategy may locate pertinent information in less time, but a comprehensive style may identify information that quicker processing overlooks.

By using predetermined search tasks with objective (e.g., amount of target-specific information located) and subjective (e.g., user perceptions of effort and satisfaction) dependent measures, we will be able to compare outcomes of selective strategies to those achieved with comprehensive approaches. These comparisons will help to establish when a selective strategy becomes overly superficial, or when a comprehensive style leads to information overload, frustration, and the location of fewer target-specific facts. Varying the search prompt relevance also will allow us to determine whether performance differences occur when the task concerns self-relevant versus other-relevant information seeking. In our initial investigation, we controlled for the subject domain by creating matched pairs of questions concerning self-relevant and other-relevant information. Subsequent research, however, might also address the extent to which certain domains appear to be inherently more other-oriented than others (e.g., relationship advice versus financial information). Finally, analysis with self- and other-orientation will allow us to examine how self-concept traits, in conjunction with experimental manipulations, affect information-seeking strategy and outcomes. Are high-self individuals especially prone to superficial search and even more so when they are looking for other-relevant information? Are high-other searchers the most likely to experience information overload?

What exactly could a Web site do if it knew each user's self- and other-orientation? Knowing, for example, that a particular user is highly self-oriented, designers could use search personalization tools (Bazeley, 2004) to adjust the display and presentation of information on the Web interface. If this individual also scored high on other-orientation, then the site could focus and restrict the presentation of information. High-self/high-other users also could be provided with tips or prompts that streamline searching and prevent them from becoming bogged down in their comprehensive strategy. Likewise, if a high-self/low-other individual were browsing, then the Web site might expand or diffuse information presentation, or perhaps offer suggestions for broadening and enriching the search strategy. Such interventions would be even more important when people were searching for other-relevant information.

All this would entail an assessment of user self-concept characteristics before the search task is initiated. Like e-commerce sites that have used personality quizzes to tailor their product recommendations (Lee, 2000), information provision sites (e.g., digital libraries) could ask visitors to respond to the self- and other-orientation items before they begin to search. The information provider would have to monitor user interaction with the site, determine the relevance of the information being sought or examined (e.g., self vs. other-relevant information), and perhaps deduce their browse or search information-seeking mode (Choo, Detlor, & Turnbull, 1999; 2000a; 2000b). Once a person's self-concept orientation is known, and the nature of the information-seeking task is defined, sites can react with an appropriate information display. Doing so should improve search effectiveness and user satisfaction.

Conclusions

We believe that our self-concept orientation research makes an important contribution to the information seeking literature. As one of a very few studies of gender differences in Web information seeking, our paper begins to address a significant research gap. Interpreting the existing literature from the consumer behavior selectivity model standpoint, we have articulated the model's usefulness as a basis for understanding previous reports of gender-related differences in information seeking. Our self-concept orientation framework is a novel adaptation of the selectivity model that incorporates gender, effort, and content as factors that affect Web information seeking. Importantly, the self-concept orientation framework allows examination of gender differences in Web information seeking in a manner that questions the commonly assumed equivalence of sex and gender. Defining gender on an individual difference basis, the self-concept orientation model specifies the measurement of gender-related traits that assess concern for self versus concern for others. Our empirical results demonstrated that self- and other-orientation interacted in a manner that supported the

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self-concept orientation model. Sex, however, predicted neither self-relevant nor other-relevant information search frequency. These findings underline the need for additional information-studies research that reconsiders the sex–gender relationship. If traditional gender distinctions become less important with successive generations, models that incorporate individual gender-related differences will become increasingly important in explaining information-seeking motivation and behavior.

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