Explicating Web Site Interactivity

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Impression Formation Effects in Political Campaign Sites

This study identifies two distinct conceptualizations of interactivity in the communication literature—the functional view and the contingency view. Although the functional view has predominated academic research on interactivity, this study operationalizes the contingency view in the context of an experiment designed to investigate the impression formation effects of interactivity in Web-based mass communication. A third of the participants in a between-participants experiment (N = 60) were exposed to the low-interactivity version (no hyperlinks) of a political candidate's Web site, another third to the medium-interactivity version (a single layer of related links), and the remaining third to the high-interactivity version (two hierarchical layers of related links). The results indicate that the level of Web site interactivity influenced participants' perceptions of the candidate as well as their levels of agreement with his policy positions. Implications for conceptual development of interactivity are discussed.

Keywords: interactivity; human-computer interaction; technology effects; dual-process models; political Web sites; impression formation effects; media effects

The low cost and wide reach of the World Wide Web has attracted not only commercial advertisers (Brannigan, 1996) but also political campaigners (Corrado & Firestone, 1996) to the Internet. Recent elections have seen a dramatic growth in the use of the Web to spread the messages of political candidates (e.g., Casey, 1996; Raney, 1998b; Wayne, 2000). Increasingly, politicians are turning to Web-based campaigning, especially in highly competitive
races for elected office (Raney, 1998a). The new medium offers exciting possibilities for candidates: It allows them to reach out to their constituents more directly than is possible with television (Corrado & Firestone, 1996) and lets them present issues without interference by gatekeepers (Grossman, 1999; Raney, 1998c). Perhaps most important, it enhances public participation in the political process, thanks largely to certain technological elements unique to the Web medium (e.g., Jones, 1998).

One such element is interactivity. Recent research indicates that an increase in the interactivity of a political Web site contributes to a corresponding increase in the level of liking (Ahern & Stromer-Galley, 2000) as well as the level of psychological affinity (Sundar, Hesser, Kalyanaraman, & Brown, 1998) felt by a voter toward the candidate featured on the site. There appears to be an emotional advantage to imbuing one’s Web site with higher levels of interactivity. This is perhaps because interactive Web sites are reminiscent of the “pressing-the-flesh” or “whistle-stop” campaigns of the past (Selnow, 1998). A structural feature such as interactivity appears to provide politicians with that affective edge needed for winning over voters (Soteropoulos, 2000). However, it is still an open question whether the increases in liking and affinity generated by heightened interactivity are simply reflections of users’ appreciation for a well-designed Web site’s functional ability to generate a dialogue between users and a candidate, or the result of psychological closeness (i.e., engagement) brought about by actual online interaction with the Web site (and the consequent transfer of voter-relevant information). In particular, does increased Web site interactivity promote more positive impressions of candidates as well as their policy positions, even when interactivity is conceptualized strictly in terms of message transmission (i.e., without the bells and whistles)? Furthermore, are the effects of interactivity moderated by users’ levels of interest in the content area (in this case, politics)? Are politically savvy users as likely as politically apathetic ones to be bowled over by the interactive features of modern-day political Web sites?

The present investigation was designed in part to answer these questions. Specifically, it addressed the following research question: For voters viewing the Web site of a political candidate, controlling for Web site content, what is the relationship between the level of Web site interactivity, the level of interest in politics (LIP), and the level of positive impressions of the candidate as well as his or her policy positions?

This article first explicates the concept of interactivity and identifies two major species of conceptions in the literature. It then describes an experiment designed to critically contrast the two views of the concept. Finally, it
discusses the study’s implications for further conceptual development of interactivity.

Interactivity

Several researchers have claimed that interactivity is a key variable for studying the uses and effects of new media technologies (e.g., Jankowski & Hanssen, 1996; Morris & Ogan, 1996; Rafaeli, 1988; Sims, 1997; Sundar et al., 1998; Williams, Rice, & Rogers, 1988). However, different researchers have used different conceptualizations of interactivity (Heeter, 1989). With the increasing convergence of media, *interactivity* often refers to users having the potential to be both sources and recipients of content and interaction (e.g., December, 1996). In other words, “interactivity means a process of reciprocal influence” (Pavlik, 1996, p. 135). Paisley (1983) defined interactivity as “the ratio of user activity to system activity” (p. 155). Other researchers have characterized interactivity by identifying a series of interesting distinctions between various communication technologies, especially as they relate to new functions and features (Bretz, 1983; Durlak, 1987; Hanssen, Jankowski, & Etienne, 1996; Heeter, 1989; Rafaeli, 1988; Steuer, 1992; Williams et al., 1988). One such approach is to classify new media and technologies according to their respective levels of interactivity. Durlak (1987) examined hardware, software, tools, and people to create a typology for determining the degree of interactivity in a given medium. Heeter (1989) described six dimensions of media interactivity: available choice, user effort, medium responsiveness, system use monitoring, contributing information, and the facilitation of interpersonal communication. Both approaches share a multidimensional view of interactivity but lack a measurement orientation; instead, they offer methods to designate whether or not a medium or technology is interactive (Rafaeli, 1988). Other researchers have moved beyond a mere nominal or dichotomous characterization of interactivity to conceptualize it at higher levels of measurement. Steuer (1992), for instance, defined interactivity as the extent to which an interface allows users to modify “the form and content of a mediated environment in real time” (p. 84). Williams et al. (1988) defined interactivity as the degree to which participants in a communication possess control and exchange roles in mutual discourse. Such definitions allow for three levels of interactivity, with face-to-face interactivity being highest and information-retrieval systems (which do not allow changes in system content) lowest (see also Hanssen et al., 1996). In sum, the bulk of the literature points to an ordinal (or higher) level conceptualization of interactivity as an independent variable.
The level of interactivity present in a given medium is implicitly based on the degree to which its features not only enable interaction by a receiver but also hold out the promise of a dialogue or mutual discourse (Roehm & Haugtvedt, 1999). Under the functional view, increased interactivity simply translates to an interface’s capacity for conducting a dialogue or information exchange between users and the interface. This view has predominated the nascent area of empirical research on the interactivity of Web sites. Following Heeter’s (1989) suggestion that interactivity resides in technological aspects of the medium, several researchers have operationalized the concept in terms of functional features such as e-mail links, feedback forms, chat rooms, and audio or video downloads (e.g., Ahern & Stromer-Galley, 2000; Massey & Levy, 1999; Sundar et al., 1998). The sheer presence of these and other functions on an interface is sufficient evidence of interactivity. The higher the number of functions included on a Web site, the greater its interactivity. The degree to which these functions are used and the extent to which they actually serve the dialogue or discourse function do not appear to be part of the concept’s definition.

One recent experiment with political Web sites adopted the functional view of interactivity by exposing participants to three ordinal levels of interactivity (low, medium, and high). The three manipulated conditions were operationalized as follows: a Web site for a political candidate with no extra links (low interactivity), the same site with a link to access extra information about the candidate (medium), and a form function with a link to the candidate’s e-mail address to facilitate correspondence with the candidate (high). The study found that participants in the medium- and high-interactivity conditions tended to perceive the candidate as significantly more caring and sensitive than participants in the low-interactivity condition. On other dependent variables, there were individual differences. In general, participants with little or no interest in politics were swayed by Web site interactivity such that greater interactivity was associated with greater affinity (or closeness in feeling) to the candidate. However, politically savvy participants did not differ in their affinity for the candidate as a direct linear function of Web site interactivity. Rather, greater interactivity tended to elicit more negative perceptions of the candidate. In particular, for politically savvy participants, medium interactivity tended to enhance their affinity for the candidate, whereas high interactivity tended to detract from it (Sundar et al., 1998).

Although this experiment discovered hitherto unexplored psychological consequences of interactivity, there are several methodological limitations to
such an operationalization. Because the functional view of interactivity seems to be based more on promoting an appearance of interactivity and does not adequately specify the outcomes of interactive communication (i.e., how threads of communication are related to one another), the above-mentioned operationalization of interactivity may lack discriminant validity. Given that the different interactivity conditions differed solely on the basis of the types of hyperlinks provided to participants, it may be argued that the functions served by the extra hyperlinks (such as accessing more candidate information and enabling users to correspond with the candidate) indicate not only greater interactivity but also differential functionality, not to mention other embedded variables underlying structural differences between relational links (used to access more information) and button links (used to submit an e-mail form).

Furthermore, the lack of outcome specification in the functional view makes operationalizations of interactivity vulnerable to alternative explanations. For example, in the high-interactivity condition of Sundar et al.’s (1998) study, the reason why the politically involved participants felt less affinity for the candidate could be the disappointment resulting from a lack of immediate responses to their e-mails. If participants were expecting responses from the candidate during the course of the experiment, this might explain their disillusionment by way of lower affinity levels in the high-interactivity condition.

A different conceptualization of interactivity may help researchers avoid such a possibility by specifying a looping mechanism for the transmission and reception of messages as an integral part of the concept’s definition. That is, for interactivity to be perceived, not only should the interface possess the functionality needed for mutual discourse, it should also ensure that the resulting messages are interconnected. For interactivity to be realized, messages should be exchanged between senders and receivers in a manner that leads to a thread of interdependent messages.

**Contingency View**

A message-based conceptualization of interactivity, therefore, seems more promising for studying the psychological effects of this technological feature. Rafaeli (1988) proposed one such definition. In his conceptualization, interactivity was seen as “an expression of the extent that in a given series of communication exchanges, any third (or later) transmission (or message) is related to the degree to which previous exchanges referred to even earlier transmissions” (p. 111). Interactivity is conceptualized as a process involving users, media, and messages, with an emphasis on how messages relate to one
another. Under such a definition, communication roles need to be interchangeable for full interactivity to occur, and interactants need to respond to one another. This transfers the concept of interactivity from the perceptual to the behavioral realm, but more important, it stresses the idea of message contingency—that subsequent messages are contingent or dependent on previous messages.

On the basis of how earlier messages relate to others, three levels of interactivity exist: two-way/noninteractive, reactive, and responsive/interactive. According to Rafaeli (1988), two-way/noninteractive communication is present when messages flow bilaterally. However, in this bilateral flow, when later messages refer to (or cohere with) ones immediately preceding them, it is said to be reactive communication. If later messages refer not only to those immediately preceding ones but also to previous messages exchanged (i.e., messages flow in a related or threaded manner), it is said to be fully interactive/responsive communication (Rafaeli, 1988). In effect, although two-way communication flow is necessary for interactivity, it does not itself translate into interactivity. For example, in a chat room environment on the Internet, hypothetically, two people (A and B) may be typing messages with no coherence or acknowledgment of each other (noninteractive). If B types in a response to a message posted by A, then that exchange may be considered reactive. To complete this loop and become interactive, A must not only respond to B in a direct, related manner but also somehow incorporate his or her own initial posting. In other words, “interactivity is feedback that relates both to previous messages and to the way previous messages related to those preceding them” (p. 120).

Empirical research with older technologies applying an approximation of the contingency view has shown that increased interactivity is associated with increased satisfaction, a greater sense of self-efficacy, and higher memory, among other things (see Rafaeli, 1988, for a summary of these findings). A recent content analysis of group computer-mediated communication (CMC) messages applied the contingency view of interactivity to classify messages as reactive and interactive (Rafaeli & Sudweeks, 1997). The researchers found that interactive messages were significantly more humorous, less anonymous, and more likely to contain first-person plural pronouns in reference to members in the group. From this, the authors concluded that interactivity is associated with a higher sense of involvement and belonging.

The present study sought to extend these correlates of interactivity to the domain of Web-based political communication and investigate whether the contingent transmission of information from a Web site used essentially for mass communication is capable of (a) conveying a sense of interactivity
among individual users and (b) replicating psychological effects obtained in prior studies that have used the functional type of interactivity.

**Hypotheses**

The current investigation adopted the contingency view of interactivity and operationalized the three levels specified by Rafaeli (1988) by employing hierarchical hyperlinks in a political candidate's Web site. Assuming that the ontological requirements for interactivity set forth by Rafaeli (1988) have psychological validity, the following hypothesis was proposed for this study:

**Hypothesis 1:** Participants' ratings of a Web site's interactivity will be a direct positive function of the degree of message contingency present in the site.

That is, participants exposed to a Web site that features exclusively two-way/noninteractive communication will rate the Web site as less interactive than participants exposed to a similar site with reactive communication. The latter in turn will perceive less interactivity in the Web site compared to participants exposed to a similar site that is responsive or fully interactive.

Support for the first hypothesis would act as a successful manipulation check of the independent variable, thereby permitting us to proceed with the investigation of the impression formation effects of interactivity. If message contingency is indeed psychologically relevant to participants' perceptions of interactivity, then we would be able to replicate the main effect finding in previous interactivity research with political Web sites (Ahern & Stromer-Galley, 2000; Sundar et al., 1998). That is, by stripping our Web sites of all the functionally oriented bells and whistles and instead focusing exclusively on content delivery to users in a contingent fashion, the core meaning of interactivity (at least as conceptualized by Rafaeli, 1988) would be realized, leading to effects noticed in previous interactivity studies and resulting in greater feelings of engagement with the content (in this case, the politician featured on the site). Therefore, we proposed the following hypothesis:

**Hypothesis 2:** Increased interactivity of a political Web site will lead to more positive impressions of the candidate as well as his or her policy positions.

This hypothesis offered the possibility of testing similarities and differences between the two views of interactivity. If this hypothesis received support in our data, we could conclude that the functional and contingency
conceptions of interactivity described earlier, although ontologically different, are psychologically similar. In the absence of support, we could begin to unravel theoretical mechanisms governing the process by which interactivity affects users’ perceptions of Web sites and their content. That is, the functionality for dialogue offered by interactive interfaces may differ in its influence on impression formation from actual dialogue on the basis of the contingency of messages in interactive communications.

As mentioned in the research question earlier, this study also attempted to investigate whether the effects of interactivity are in some way dependent on individual differences. For instance, the impression formation effects of interactivity may be conditioned by online users’ levels of interest in the topic of a Web site (politics in this case). That is, users’ motivations and abilities to process information will be contingent on their levels of interest in the topic. Indeed, such a premise is consistent with dual-process models in social psychology (see Chaiken & Trope, 1999, for an exhaustive account of various dual-process theories). Dual-process formulations posit that people process information in one of two ways (Epstein & Pacini, 1999), either in a mindless, top-down manner or in a mindful, bottom-up fashion (Moskowitz, Skurnik, & Galinsky, 1999). The latter mode of processing necessitates the expenditure of cognitive resources and is contingent on a person’s ability, motivation, and involvement to process a message. On the other hand, the former mode of processing involves more simplistic strategies because it involves minimal disbursement of cognitive resources.

Sundar et al.’s (1998) study found that Web site interactivity affected affinity toward a political candidate only if a participant had little or no prior interest in politics. From a dual-process perspective, we may speculate that the presence of Web site interactivity may have triggered the mindless, top-down processing of given information for such participants. That is, for those participants who evinced little or no interest in politics, perceptions of affinity toward the political candidate were based on the inherent appeal of Web site interactivity rather than on careful scrutiny of the candidate’s issue-based attributes. Because the present experiment sought to measure participants’ impressions of not only the candidate as a person but also his policy positions, the dependent variable proposed here (impression formation) may be considered isomorphic with the concept of attitude change (as studied by dual-process theorists). In addition, the present study sought to measure participants’ levels of political interest prior to their participation in the experiment. Therefore, the dual-process logic was invoked to propose the following final hypothesis for the study:
Hypothesis 3: There will be an interaction between Web site interactivity and the level of interest in politics (LIP) on impression formation, such that the relationship (between interactivity and impression formation) proposed in Hypothesis 2 will be more pronounced among voters with low, rather than high, LIP.

That is, apathetic voters are more likely than politically interested voters to exhibit the positive impression formation effects of increased interactivity.

Method

All participants \( (N = 60) \) in a between-participants experiment were exposed to one of three conditions, each with identical content but a different level of Web site interactivity, designed to serve as the campaign Web site for a fictitious political candidate. A third of the participants were exposed to a single Web site with low interactivity, another third to a Web site containing medium interactivity, and the remaining third to a Web site with high interactivity. Before being exposed to the experimental Web site, participants’ LIPs were measured by a battery of political knowledge and political involvement questions administered via a paper-and-pencil prequestionnaire. After exposure to the Web site, participants’ impressions of the candidate as well as their agreement with his policy positions were measured via a paper-and-pencil postquestionnaire. Several content-based questions were also included in the postquestionnaire to rule out potential confounds.

Participants

Sixty undergraduate students enrolled in communication classes participated in the experiment for extra course credit. They were randomly assigned to one of the three interactivity conditions. All participants signed an informed consent form prior to their participation in the experiment.

Stimulus Material

Three political Web sites were constructed for a fictitious political candidate running for office. In each of the Web sites, an oval picture of the candidate appeared at the top of the Web site, with the following words underneath: “Welcome to Candidate Simon Andrews’ Website!” The top-of-page picture was flanked on both sides by an animated American flag.

Participants were asked to surf through the content detailing personal information about the candidate as well as his stances on various issues affecting the electorate. These issues were classified under education, econ-
omy, crime, and civil rights. Each of the four issues was categorized into three sections: education was subdivided into higher education, financial aid, and technology in the classroom; economy was subdivided into jobs, taxes, and trade and commerce; crime was subdivided into gun control, protection on educational campuses, and sex and child offenders; and civil rights was subdivided into equal protection, free expression and privacy, and sexual harassment. The views expressed by the candidate were carefully chosen and worded to convey a moderate and noncontroversial stance, without leaning toward any extremity of the political spectrum.

**Experimental Treatment Conditions**

All three versions of the stimulus were made to look as similar as possible to avoid any incidental confounds. That is, the Web sites in the three conditions were identical in content and differed only in their levels of interactivity. The low-interactivity condition did not have any hyperlinks. Participants were able to read a brief biography of the candidate and his platform stances on education, economy, crime, and civil rights by scrolling down the screen. Each major policy area was broken into subissues. Underneath each subissue was a brief paragraph indicating a policy position (see Appendix A for a visual depiction of information organization in this condition).

The medium-interactivity condition was operationalized on the basis of Rafaeli’s (1988) conceptualization of reactive communication. On the initial page, a brief biography of the candidate was present, along with links to four main policy issues. For example, if a participant wanted to read the candidate’s views on education, he or she could click on the “Education” link. This would lead the participant to another page with the heading “Candidate Andrews’ Policy on Education,” listing all of the subissues and the related policy descriptions (see Appendix B). At the bottom of the page, a link was provided to take users back to the initial page.

The high-interactivity condition was operationalized in terms of Rafaeli’s (1988) conceptualization of fully interactive/responsive communication. Like the medium-interactivity condition, the initial page of the high-interactivity condition featured a brief biography and links indicating four policy areas. However, on selection of a particular hyperlink, participants were led to another page (with the relevant heading), which simply consisted of links listing the three subissues of the selected policy area (and a link back to the initial page). By clicking on one of the three subissues, participants were led to a subsequent page (with the relevant heading) describing the policy position of the selected subissue (followed by a link back to the previous layer of the site at the bottom of the page). For example, clicking on the “Education”
link would direct the participants to a page with the heading “Candidate Andrews' Policy on Education.” Under this heading, participants were presented with three further links for accessing the candidate’s views on the three subissues of higher education, financial aid, and technology in the classroom. Upon clicking on the “Financial Aid” link, participants were presented with a page (again with the heading “Candidate Andrews’ Policy on Education”) detailing the candidate’s policy stance with respect to the specific subissue of financial aid. By adopting a hierarchical structure for hyperlinking (Mohageg, 1992), this condition communicated to participants the idea of message relatedness. The heading at the top of the page detailing the candidate’s stance on financial aid was designed to remind participants that they had arrived at this particular part of the site as a direct function of their previous clicking activity. That is, participants sent the computer a message by clicking on the “Education” link. The computer responded by giving them a subsequent page with three subissues. They responded by clicking on one of the subissues (e.g., financial aid), and the computer responded by providing them with the candidate’s policy position on this subissue. This last response is related not only to the participants’ previous action (i.e., clicking on that subissue) but also to the computer’s earlier response (i.e., providing them with the “Education” site with the three subissues). This operationalization reflects the interactive loop described by Rafaeli (1988). Thus, in the high-interactivity condition, future messages were contingent on previous messages, as conceptualized by Rafaeli (1988). The high-interactivity condition differed from the medium-, reactive-interactivity condition in the degree to which previous links and current messages were contingent on one another (see Appendix C).

**LIP**

Participants’ LIPs served as our second independent variable. Their LIP scores were measured via the prequestionnaire administered before their exposure to the stimulus Web site. The literature on political apathy (Kendrick & Fleming, 1983; Kunkel, 1991; Lodge & McGraw, 1995) was consulted to arrive at a questionnaire involving measures of interest as well as involvement in politics. A set of 13 questions was designed to create a distinction between politically interested participants and politically uninterested participants. These questions included recall and recognition questions measuring political knowledge (e.g., “Which of the following was never a candidate for President of the United States: a) Richard Gephart; b) Patrick Buchanan; c) Michael Dukakis; d) Dick Morris; e) Lamar Alexander?”), as well as scaled questions measuring participants’ interest (e.g., “I believe a
Dependent Measures

The dependent variable of impression formation was operationalized in the form of 24 different questions on the paper-and-pencil postquestionnaire. Sixteen of these questions measured participants’ impressions of the personal attributes and characteristics of the candidate (e.g., charismatic, sensitive, caring, interesting, likely to make a good representative of his constituents). The remaining 8 questions asked participants to indicate their levels of agreement with the candidate’s positions on specific policy issues (e.g., “Mr. Andrews’ policy on education,” “Mr. Andrews’ policy on crime,” “Mr. Andrews’ policy on taxes”). Ten-point, Likert-type scales ranging from 0 (do not agree at all) to 9 (strongly agree) were used to obtain participants’ levels of agreement with statements concerning the candidate’s characteristics as well as his policy positions.

Control Measures

To test whether memory differences mediated impression formation effects of the different levels of interactivity, measures were included in the postquestionnaire to assess participants’ memory for Web site content. In all, five questions comprising both recall and recognition measures were used to test for content memory.

Because the content was constant across all three conditions, we wanted to ascertain that participants in one condition did not perceive the content as being more or less informative than their counterparts in the other two conditions. To control for this potential confounding effect, we asked the following question: “On a scale of 0 to 9, with 0 being non-informative and 9 being very informative, how informative would you rate this Website?”

Manipulation Check

The effectiveness of our manipulation was checked by the following general measure on the postquestionnaire: “On a scale of 0 to 9, with 0 being noninteractive and 9 being very interactive, how interactive would you rate this Website?” Given that the purpose of Hypothesis 1 testing was to verify whether our operationalization of Rafaeli’s (1988) ontological specification of message-relatedness translated to a psychological recognition of interactivity,
this item was designed to tap into laypersons’ understanding of the term *interactivity*. Therefore, we purposely avoided giving our participants any academic definitions of the buzzword or otherwise influencing their conceptions of interactivity by administering scaled items pertaining to specific interface and performance components (such as speed, feedback, choice, and control), touted as defining characteristics of interactivity by scholars working with particular definitions of the concept.

**Procedure**

The experiment was administered to groups of individuals in campus computer laboratories. All the laboratories were equipped with Power Mac computers arranged in rows. To avoid contamination, the experimental setup was designed such that all participants in a given row of computers belonged to the same experimental condition. Participants were randomly assigned to one of the three conditions. They were all told that they would be participating in an experiment concerning politics, the Internet, and the World Wide Web. After they signed the informed consent forms, participants were asked to fill out the prequestionnaire. The computer monitors were then turned on, and they were asked to surf through the experimental Web site without visiting any other Web sites. They were asked to browse the site on their own, without consulting with other participants. After participants finished viewing the Web site, the monitors were switched off, and they were asked to fill out the postquestionnaire. Participants were then debriefed, thanked for their participation, and dismissed.

**Data Analysis**

A one-way analysis of variance (ANOVA) was first conducted, with interactivity as the independent variable and the manipulation-check item as the dependent variable. Similar analyses were performed, with the control measures of perceived informativeness and memory for Web site content as dependent variables, entered separately one at a time.

The 13 LIP items were standardized first because they were measured on different scales. They were then additively combined to obtain each participant’s LIP score, which served as the measured independent variable in the study. Adjustments to the LIP index were made on examining the influence of each of the 13 items on overall scale reliability.

Exploratory factor analyses were conducted on both sets of dependent measures separately—those pertaining to impression formation and those pertaining to policy agreement (or attitude change). Items with their
principal loadings under a given factor were weighted equally and additively combined to form an index. The internal consistency of each index was computed before proceeding with further analyses.

The indices obtained from the 16 impression formation items were entered separately, one at a time, in a series of ANOVAs, with the three-level interactivity manipulation and the continuous LIP scores serving as independent variables. The indices obtained from the eight policy agreement items were similarly analyzed, with as many ANOVAs as there were indices.

Results

Manipulation Check

The one-way ANOVA with the manipulation-check item as the dependent variable (“On a scale of 0 to 9, with 0 being non-interactive and 9 being very interactive, how interactive would you rate this Website?”) showed a statistically significant difference in participants’ perceptions of the Web site’s level of interactivity, $F(2, 57) = 11.35, p < .001, \omega^2 = .25$. In accordance with our design, participants in the low-interactivity condition rated the site as being least interactive ($M = 1.75, SD = 1.8$), whereas participants in the high-interactivity condition rated it significantly higher in interactivity ($M = 4.70, SD = 1.78$), with participants in the medium-interactivity condition falling in between the two ($M = 3.65, SD = 2.32$) on this measure. Post hoc comparisons using one-tailed $t$ tests showed that all condition means differed significantly from one another at $p \leq .05$, even after applying Holm’s sequential Bonferroni procedure to control the family-wise error rate. Therefore, Hypothesis 1 was fully supported.

Effect of Control Variables

As expected, the ANOVAs with the two control measures as dependent variables yielded no statistically significant differences between the three interactivity conditions. On perceived informativeness, participants in all three conditions gave about the same ratings, $F(2, 57) = .34, p > .10$. On an overall index of memory items, participants in the three conditions did not differ in their ability to recall and recognize factual details from the content of the Web site, $F(2, 57) = 1.29, p > .10$. 

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Index Construction of Impression Formation Measures

The exploratory factor analysis of the 16 questionnaire items pertaining to participants’ perceptions of the candidate (i.e., impression formation items) yielded four factors with eigenvalues > 1, together accounting for 79.73% of the variance. Fifteen of the 16 measures were clearly differentiated, whereas 1 measure (participants’ levels of agreement with the statement “Mr. Andrews is interested in making a difference”) cross-loaded across factors and was dropped from all further analyses. Items loading under the four factors were additively combined to create four indices to serve as dependent variables in ANOVAs designed to detect impression formation effects of both the manipulated independent variable (Web site interactivity) and the measured independent variable (LIP) in the study. The 5 items with their principal loadings under the first factor (personable, intelligent, charismatic, articulate, and strong leadership qualities) were summed to create an index entitled “dynamism.” Intercorrelations among the 5 items revealed a highly satisfactory level of internal consistency for the index (Cronbach’s α = .89). Similarly, the 4 items loading under the second factor (sympathetic, trustworthy, sensitive, and caring) were additively combined to form an index titled “character” (Cronbach’s α = .91). The third factor was composed of 4 items pertaining to the candidate’s preparedness for political office (agreement with his political platform, appears to be well qualified, is in touch with the future, and likely to be a good representative of his constituents), which were summed to form an index named “competence” (Cronbach’s α = .91). The remaining 2 items (attractive and interesting) constituting the fourth factor were summed to form an index labeled “likeability.” The 2 individual items in this index were positively correlated with each other (Pearson’s r = .56). For ease of interpretation, all indexes were reduced to 10-point scales.

Data Preparation for ANOVAs

One of the 13 LIP items was removed to ensure acceptable reliability of the index (Nunnally, 1979). The remaining 12 items were summed to obtain the LIP score for each participant (Cronbach’s α = .74).

In preparing for the ANOVAs, a bivariate outlier belonging to the low-interactivity condition was noticed. Closer examination of the participant’s responses revealed that the participant had a low LIP score and had circled “0” on all the dependent measures. Analyses with this participant included in the sample produced vastly different results compared to analyses performed after excluding this person. In all cases, the outlier boosted the significance of findings in the hypothesized direction, to the extent of turning otherwise
insignificant effects into statistically significant ones. Therefore, this case was removed from the sample for all further analyses. The distribution of LIP scores among the remaining participants was significantly normal, as determined by the Shapiro-Wilk W test.

ANOVA With Impression Formation Indices

The ANOVA with the dynamism index as the dependent variable yielded no significant effects. On the character index, however, both the independent variables registered statistically significant main effects. Participants’ perceptions of the candidate’s positive character seemed to follow a nonlinear pattern (see Table 1 and Figure 1), with participants in the low-interactivity condition giving lower ratings ($M = 6.11, SD = 1.37$) than their counterparts in the medium-interactivity condition ($M = 6.68, SD = 1.16$) but participants in the high-interactivity condition providing the lowest rating ($M = 5.08, SD = 1.58$). The differences between these three conditions were statistically significant, $F(2, 53) = 5.44, p < .01, \omega^2 = .12$. Furthermore, participants’ LIP scores were positively related to their ratings of character, $F(1, 53) = 4.06, p < .05, \omega^2 = .04$. The interaction term, however, failed to show statistical significance. When the competence index was subjected to the same analysis, a significant main effect for interactivity was observed such that increased interactivity contributed to more positive evaluations of the candidate’s preparedness for political office, but too much interactivity resulted in negative evaluations, $F(2, 53) = 3.28, p < .05, \omega^2 = .07$. The direction of means for the three interactivity conditions followed the same pattern noticed earlier with the character index: Participants in the low-interactivity condition gave lower ratings ($M = 6.23, SD = 1.59$) than their counterparts in the medium-interactivity condition ($M = 6.73, SD = 0.7$), but participants in the high-interactivity condition produced the lowest average rating ($M = 5.25, SD = 2.33$) on the measures that constituted the competence index (see Table 1 and Figure 1). The main effect for LIP and the interaction between interactivity and LIP were both statistically insignificant on this index. On the fourth index, likeability, interactivity showed a significant main effect, $F(2, 53) = 4.76, p < .05, \omega^2 = .10$, with participants in the three conditions producing an inverted V pattern of means (see Table 1 and Figure 1). Participants in the low-interactivity ($M = 3.89, SD = 1.68$) and high-interactivity ($M = 3.55, SD = 1.64$) conditions gave significantly lower ratings of likeability than participants in the medium-interactivity condition ($M = 5.38, SD = 1.45$). The LIP variable also showed a significant main effect on likeability in the positive direction, $F(1, 53) = 4.48, p < .05, \omega^2 = .04$. 

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The exploratory factor analysis of the eight questionnaire items that pertained to policy agreement (or attitude change) yielded two factors with eigenvalues > 1. Six of the eight items were ideally differentiated while two items (Economy and Taxes) cross-loaded across factors (and were hence dropped from further analyses). Items that elicited participants' agreement with the candidate's policy stance on civil rights, crime, sex offenders, and equal protection loaded on the first factor. An index was created by summing across these four items and was titled “Public Policy.” The index had an acceptable level of internal consistency (Cronbach’s $\alpha = .81$). The remaining two items (participants’ agreement with the candidate’s policy on education and technology in the classroom) loaded on the second factor, and were summed to form an index titled “Education Policy.” The two items were positively correlated (Pearson’s $r = .79$).

**ANOVA With Policy-Agreement Indices**

In the ANOVA with the “Public Policy” index as the dependent variable, the main effect for interactivity approached significance, $F(2, 53) = 2.40, p = .10$, $\eta^2 = .04$, with the means producing another inverted-V pattern. Participants in the medium interactivity condition ($M = 7.58, SD = 1.1$) agreed significantly more with the candidate’s position on public policy issues than participants in the low interactivity ($M = 6.31, SD = 1.48$) and high interactivity.
Summary of Results

In sum, the results of this experiment suggest that although participants in the three interactivity conditions did not perceive differences in the informativeness of content on the political Web site, and although they did not show differential memory for content, they differed significantly in their perceptions of the level of interactivity of the experimental Web site. In keeping with the manipulation, participants in the low-interactivity condition perceived the Web site as being less interactive than participants in the medium-interactivity condition, who in turn perceived it as being less interactive than participants in the high-interactivity condition.

Furthermore, the results indicate that the interactivity of the Web site had an influence on participants’ impression formation of the candidate as well as their levels of agreement with his positions on policy issues. However, these findings lend only partial support to Hypothesis 2. This is because, across the various indices, interactivity was linked with the valence of

\[ M = 6.42, SD = 2.21 \] conditions (see Table 1 and Figure 1). There were no other significant effects. On the “Education Policy” index, none of the three effects approached statistical significance.

Figure 1. Effect of Web Site Interactivity on Impressions of Political Candidate
impressions in a nonlinear pattern. Moderate interactivity seemed to enhance the candidate’s appeal as well as his character, but high interactivity seemed to detract from it. Similarly, the level of voter agreement with the candidate’s position on policy issues was enhanced with moderate interactivity but not with high interactivity. Overall, the perceptual effects of high interactivity were statistically indistinguishable from those of low or no interactivity. However, in moderation, interactivity was positively associated with positive perceptions.

Because the interaction term between interactivity and LIP was not statistically significant on any of the dependent measures, Hypothesis 3 did not receive any support from our data. However, regardless of the level of Web site interactivity, participants’ LIPs were positively associated with their ratings of the politician’s character and likeability.

Discussion

The result obtained by analyzing the manipulation-check item in this study is more than ordinarily significant—not just because it provides convincing perceptual verification of the intended manipulation but because it constitutes strong evidence for the isomorphism between our simple operationalization and Rafaeli’s (1988) conceptualization of interactivity. Simply embedding a Web site with a series of hierarchical links (Mohageg, 1992) seems to effectively convey the idea of message contingency—or “dependency among messages” (Rafaeli & Sudweeks, 1997)—to users. This feeling of contingency seems strongly associated with layperson notions of the term interactivity and is therefore of profound psychological consequence.1

From a user’s point of view, interactivity appears to be associated with some simple cues in the context of Web-based mass communication. Users’ perceptions of interactivity seem to be positively associated with the number of hyperlinks present on a Web site, as also the number of linking actions initiated by the user. However, the key perceptual determinant of interactivity seems to lie in the relatedness of the links and the corresponding pages, that is, the overall navigational structure of the Web site. This includes both the layout of the content and behavioral aspects of the linking strategy employed. The actions initiated by the Web site (by guiding the user through a series of hierarchical hyperlinks) are as important as the organization of message content in determining the degree of interactivity of a Web site, especially as perceived by a user.

Aside from successfully operationalizing interactivity in the context of Web-based mass communication, a significant outcome of this study lies in the strength as well as direction of the main effects of interactivity on various
measures of impression formation. The discovery of a systematic, nonlinear pattern across a number of variables is a strong indication that for the purpose of impression formation, there exists such a thing as too much interactivity. Participants in the high-interactivity condition of our experiment consistently gave lower ratings than their counterparts in the other two conditions on a number of impression formation items. Perhaps they were annoyed by the fragmentation of information into too many layers, thus calling for greater clicking effort. This is consistent with claims in the navigation literature about extra navigational steps resulting in a perceived reduction of local as well as global coherence in a site (Thüring, Hannemann, & Haake, 1995), increased cognitive overhead, and the potential for user disorientation (Kerr, 1990). Indeed Sundar (2000) argued that when site elements require additional navigational maneuvers, users are likely to be perturbed about site layout and hence tend to be negative in their evaluations of site content. The broad theoretical implication here is that interactivity at higher levels may impose greater navigational demands on users, which serve to counteract its positive effect on users’ impressions of the site. Therefore, any operationalization of interactivity that involves navigation is a double-edged sword: Increasing clicking activity among users may boost their engagement with content but also concurrently induce tedium.

Another surprising discovery in this experiment pertains to the absence of a significant interaction between interactivity and LIP on any of the dependent measures. In other words, the magnitude of the impression formation effects of interactivity did not differ statistically between apathetic and politically interested voters. This finding not only failed to support our third hypothesis but also contradicted findings with some of the affinity measures reported by Sundar et al. (1998). As noted earlier, the main difference between the two studies lies in the operationalization of the independent variable, stemming from their differences in the conceptualization of interactivity. Sundar et al.’s conceptualization of Web site interactivity falls under the functional view of interactivity, and therefore, that operationalization was based on the types of hyperlinks (relational links are relatively less interactive than button links because the former are used merely to access extra information, whereas the latter are used for initiating a one-on-one exchange with the political candidate). Because it did not involve the element of message relatedness, the function-based operationalization of that study more closely reflects the sender-based approach common to traditional mass media. This may have encouraged passivity among study participants, leading them to process interactivity as a “peripheral cue” (Petty & Cacioppo, 1986). Because our study followed the contingency view of interactivity, it called for greater user activity, especially in terms of their involvement at the
level of messages. That is, our operationalization of interactivity may have encouraged all participants (politically interested as well as uninterested ones) to process Web site content “centrally” rather than “peripherally.” The fact that all our participants reacted in a manner similar to the politically savvy participants in Sundar et al.’s study (by exhibiting the same nonlinear pattern in their perceptual ratings) underscores the ability of contingency-based interactivity to engage even the uninitiated. Moreover, the lack of differences across the three conditions on perceived informativeness of—and memory for—Web site content suggests that contingency-based interactivity did not hinder users’ attention to content. Given the absence of bells and whistles in our operationalization, greater interactivity did not directly translate into simple association with attitudes toward candidate. Nor was it associated with increased cognitive miserliness. On the contrary, greater interactivity generated greater user activity, without concomitantly increasing heuristic processing.

By specifying a looping mechanism for message relatedness, our operationalization went well beyond merely inducing a feeling of interactivity—or perceived interactivity (Newhagen, Cordes, & Levy, 1995)—which in itself is quite powerful, according to theorists who argue that it has the potential for profound short-term effects such as flow (Hoffman & Novak, 1996) as well as long-term consequences such as community-building (e.g., Jones, 1998). As suggested earlier, much of the academic discourse on interactivity has concentrated on the functional view, perhaps motivated by recent technological advances that offer Web users the functionality to choose and modify online content in dramatic ways. But many of these so-called interactive features of the Web medium do not achieve the full interactivity conceptualized by Rafaeli (1988). They are at best examples of reactivity, not interactivity. Our study is an attempt to operationalize the core concept of interactivity without masking it under the glitz of functional features, thereby allowing us to examine the effects of content transmission made possible by the interactive capabilities of the technology of transmission. In that sense, we have documented the effects of interactive communication rather than merely looking at the effects of interactive features present in the interface.

A major contribution of this study lies in the empirical demonstration of the conceptual distinction between two important views of interactivity in communication research that we posited in our literature review. Furthermore, the nature of the differences in the effects produced by these two kinds of interactivity has significant theoretical implications. For instance, previous studies using function-based operationalizations encourage us to consider interactivity as a feature of the medium, whereas contingency-based operationalizations (such as the one employed here) prompt us to think of
interactivity as a message feature. This line of research offers exciting possibilities for integrating different types of interactivity at the operational level by demonstrating areas of overlap between the two conceptualizations. The combination of medium-centered interactivity (functions that promise dialogue) and message-based interactivity (contingency between contiguous messages) may have interesting psychological effects, leading new media research into theoretically venturesome realms as well as encouraging design innovations in Web interfaces. Some researchers have already suggested such dimensionality by making a distinction between “form-oriented interactivity” and “content-oriented interactivity” (Roehm & Haugtvedt, 1999). In addition, recent technological developments such as intelligent agents and customizable portals on the Web have made it possible for users to experience potentially richer levels of both functional and contingent interactivity, especially longitudinally. Clearly, more research is needed to document the nature as well as effects of interactivity in a wide variety of technological as well as content domains. This will further our understanding of interactivity at both ontological and psychological levels.

Future research should also address an important limitation of the present experiment by exploring the effects of interactivity in a user-to-user interaction (as in computer-mediated communication) as opposed to a user-system interaction of the kind investigated in this study. The use of a Web site to operationalize message contingency, although offering the advantage of minimizing random error due to uncontrolled interactions (which may compromise treatment equivalence across experimental conditions), has the disadvantage of minimal external validity. Findings from studies such as the one reported here apply only to those interactions in which a user is interacting directly with the computer (human-computer interaction or HCI) and preclude us from generalizing to numerous situations in which a user is interacting with other users via a computer (CMC). To make general conclusions about interactivity in new online media, more experiments are needed with a variety of computer-based interactions more complex than browsing Web sites.

Nevertheless, the findings reported here have significant implications for the theory and practice of Web-based mass communication. This study adds to a growing body of research documenting both cognitive and psychosocial aspects of structural elements unique to new media (e.g., May, Sundar, & Williams, 1997; Reeves & Nass, 1996). This is important not only to traditional effects researchers but also to political communicators because tools of new media such as interactivity are shown by such experiments to help in redressing problems caused by previous technologies such as television. By encouraging political participation, they hold out the promise of minimizing
the evil of psychological distance associated with television-based campaign-
ing (Hart, 1994). As our study demonstrates, contingency-based interactivity has the potential to involve even politically apathetic voters in the democratic process, thus providing empirical support for Newhagen's contention that the Internet “engages users in cognitively effortful tasks and challenges them to be active” (Newhagen & Rafaeli, 1996, p. 12).

A clear practical implication of this study for Web site designers is that they have to be cautious in their use of new media tools. They have to understand that when it comes to message contingency, reactivity is sometimes more effective than full interactivity. As Rafaeli noted, “crafty implementation of interactivity” is key to realizing a successful Web site (Newhagen & Rafaeli, 1996, p. 6). Web sites promoting products as well as politicians can gain some affective advantage by departing from the noninteractive nature of traditional mass media campaigning. However, too much interactivity has the potential to take away that advantage.
Appendix A

Information Organization in the Low-Interactivity Condition

Welcome to Candidate Simon Andrews’ Website

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Appendix B
Information Organization in the Medium-Interactivity Condition

Note. Unlike in the low-interactivity condition, the information on the Web site of the medium-interactivity condition was distributed between two levels. On the initial page, the biographical information was followed by the title of each of the four issues, appearing as hyperlinks (shown underlined). Clicking on one of these links took users to the next page or level. (Following the visual convention used by Mohageg, 1992, the downward arrows indicate new pages, leading users to the next level of information.) The repetition of the title on the next page served to remind users that they had arrived at that page as a function of their action (clicking on the hyperlink of that title) on the previous page.
Appendix C
Information Organization in the High-Interactivity Condition

Note. The high-interactivity condition featured one extra level of navigation compared to the medium-interactivity condition. There were three levels in all, including the first page.
1. It must be noted, however, that the mean score on the manipulation-check item for the high-interactivity condition was only 4.7, quite below the maximum value of 9. Therefore, our operationalization of interactivity, although successful in distinguishing between three ordinal levels, does not capture the higher end of the interactivity spectrum, as perceived by users. Perhaps online systems that offer chat functions and instant exchanges of text, audio, and video messages may be required to elicit high ratings from participants on this measure. However, most of these “highly interactive” features are possible with systems that are designed for CMC, wherein a computer (or online site) is simply a medium for human interactants. A political campaign Web site is not a CMC system because it is not simply a medium but also a source of interaction (Sundar & Nass, 2000). Here, a user is interacting with a computer or online site, not with another human being in real time. Therefore, the level of interactivity that is possible in such an interaction is necessarily lower than what one may be able to experience in CMC environments such as instant messaging, where messages fly back and forth among interactants at a rapid pace.

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