



‘Extending society’: the role of personal networks and gratification-utilities in the use of interactive communication media

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Abstract

This study examined the relationship among personal network characteristics, gratification-utilities and the frequency of use of three interactive communication technologies (landline telephone, email and instant messaging). A conceptual framework is presented, providing a rationale for three hypotheses predicting positive relationships between personal network characteristics (size, intimacy and physical proximity), gratification-utilities and frequency of use. The participants were 286 college students, whom research shows are primary users of interactive media. Hypotheses 1 and 2, proposing a link between network characteristics and gratification-utilities with frequency of use, were supported, while Hypothesis 3, predicting a link between the prior two variables, was only partially supported. Frequency of use was associated more strongly with network characteristics than with gratification-utilities across the three technologies. Of the network characteristics, network size was significantly associated with gratification-utilities. Directions for future research are discussed.

Key words

email • gratifications • instant messaging • interactive communication technologies • personal networks • telephone

In order to understand the newer interactive media such as email and instant messaging, it is useful to set these cultural innovations within the broader context of human social evolution. The British anthropologist Clive Gamble has remarked that 'human social evolution is the process of extending society beyond the physical links between individuals' (quoted in Pitts and Roberts, 1998: 271). This quotation is particularly appropriate to characterize the evolution of interactive media. In the beginning, communication within human societies was limited to the spoken word and only millennia later did the invention of writing and printing extend communication beyond the restrictions of time and space. The Industrial Revolution brought the telegraph and telephones into society while, in our own lifetime, email and instant messaging have emerged as a part of life in the Information Age. These newer media, to use Gamble's words, further 'extend society beyond the physical links between individuals'.

Although the cellphone, email and instant messaging have provided more ways for people to keep in touch, casual observation as well as systematic research suggests that it is young people who are the most avid users of the newer interactive technology (e.g. Pew Internet & American Life Project, 2002). Brown and Cantor (2000) characterize this extension of society by using the term 'perpetual linkage' to describe the near-constant interaction of peer groups of young people mediated by email and the cellphone and, more recently, instant messaging. Communication among members of youthful peer groups is hardly a new phenomenon. What has made 'perpetual linkage' possible is that the newer media such as email, cellphones and instant messaging multiply the gratification opportunities (Dimmick et al., 2000; Ramirez et al., 2004) for mediated communication. It is the gratification opportunities afforded by these media which enable us to 'extend society' beyond the limitations of face-to-face interaction.

The emergence of email and instant messaging has prompted a large number of studies of mediated interaction (Wellman, 2001). In their review of this literature, Bargh and McKenna (2004) contrast two perspectives – the 'engineering' perspective and the 'social science' perspective – which have emerged in the research and theorizing on interactive media. The 'engineering' model emphasizes the limitations of interactive media, compared with face-to-face communication, while the 'social science' model asserts 'that personal goals and needs drive the uses and influences of interactive media' (2004: 578). They conclude their review by observing that

people are not passive in their interaction with technology, but rather they actively shape technology and its influences.

This article pursues this shaping of the use of interactive media by people's membership in personal networks and the gratification-utilities associated with interactive media. Specifically, it addresses the continuing evolution of interactive media by asking what roles personal networks and gratification-utilities play in influencing the frequency of use of the telephone, email and instant messaging. The role of social networks in the frequency of use of email and instant messaging has been examined sparsely in the communication literature.

THEORETICAL FRAMEWORK

Every day people make many decisions or choices about the numerous media in their environment. For the purposes of this article, these choices can be classified into two categories: media selection or choices about which media to use; and how often each medium is used. The individual in contemporary society has more choices of media than ever before in history. Once a medium has been adopted and added to the individual's repertoire of media (Reagan, 1996) it becomes one way among others of establishing communication with the wider world beyond the self. Adding the computer or digital video disc (DVD) player to one's repertoire, for example, widens one's entertainment choices of movies. In the case of interactive media, there may be several media with which to contact and stay in touch with other people. This article uses the phrase 'interactive media' to denote media through which human beings actually interact, thus excluding human-machine interaction. How often a particular medium in the repertoire is used may depend on the behavior of other people in one's environment. These choices may be arrayed along the continuum shown in Figure 1.

As Figure 1 shows, leisure-time reading is an act of purely individual choice and while the choice of a particular book, for example, may be influenced by another's recommendation, the choice itself is an individual act motivated by a person's own internal needs or gratification-utilities. In the middle of the continuum is a group of media whose choice may be influenced by gratification sought by the individual or may be influenced by negotiation with some social group such as family members. Similarly, a group of friends gathered to watch a sporting event on TV is the result of a joint decision. Obviously, for those who live alone or family members (teenagers, for example), with their own TV sets, the choice of whether and what to watch is an individual one. However, the use of interactive media on the right side of the continuum necessarily involves not only individual choice but also the choice of at least one other person. In other words, the choice of interactive media presumes not merely the individual's expected

Individual choice	Individual or interpersonally influenced choice	Interpersonal choice
print (magazines, books newspapers) personal CD player	television radio home music system	interactive media (phone, e-mail, instant messaging, chat rooms)

• Figure 1 A continuum of media choice behavior

utility but the joint expected utility of at least two individuals. Both the decision to use an interactive medium and how frequently to use it depends on the willing cooperation of others.

Figure 1 implies that choice behavior vis-à-vis the media is influenced for all media, except possibly print, by both gratification-utilities at the individual level and the behavior of other people. The ‘other people’ in the previous sentence should not be taken to mean only dyads, even though communication via phone, email and instant messaging is perhaps most often dyadic. The communicating dyads who use interactive media are also members of larger entities called ‘social networks’.

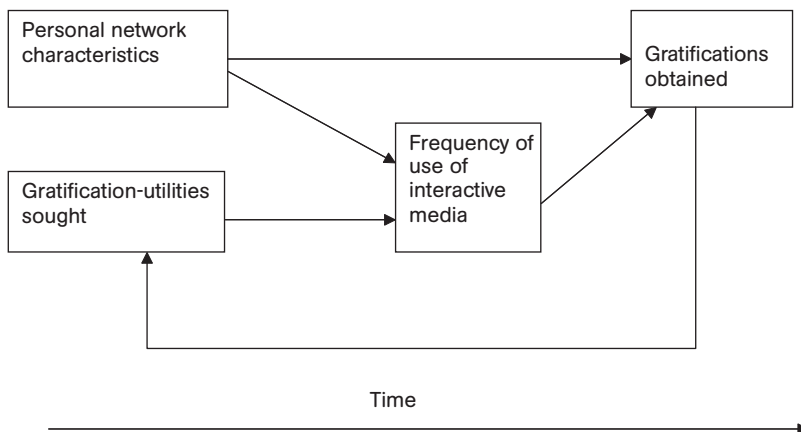
In this study, users of interactive media have been conceptualized as network participants. Wellman and Tindall (1993) appear to have been the first to apply network concepts to the users of an interactive medium, the telephone. These authors found that the telephone provided a means of connecting members of a network beyond face-to-face communication. Dimmick et al. (1996) formulated and tested a typology of telephone networks which was based on a cross-classification of network members’ intimacy and geographic proximity (for a remarkably similar conceptualization, see Baym et al., 2004) In the diffusion literature, the notions of critical mass and network externalities (see Markus, 1987; Schoder, 2000) explicitly recognize the crucial role of social networks in the adoption of interactive media.

A personal or ego network consists of all the people with whom a focal individual interacts with some regularity, both face-to-face and through communication media. Personal networks vary in size, the intimacy of members, geographic location of members (Dimmick et al., 1996) and on other variables. Within the network, some members may be instant messaging ‘buddies’ of the focal individual, while others may be contacted more frequently by telephone or seen face-to-face. Network characteristics may be associated with the frequency of mediated communication. For example, email might be used to communicate frequently with intimates, while instant messaging might be used more often to talk with less intimate acquaintances (Baym et al., 2004).

Figure 1 and the associated discussion imply that there should be a relationship between gratification-utilities and frequency of interactive media use. The uses and gratifications tradition has a long history in the field of media research, beginning with Herzog's (1940) pioneering study and landmarked by theoretical reviews by Katz et al. (1974) and Palmgreen et al. (1985) In the research literature on the older media such as television, it is well established that use of a medium is positively associated with derived gratification-utility. For example, Palmgreen et al.'s (1985) review found 20 studies in which gratification-utilities were associated with frequency of exposure as well as choice of both medium and content. However, fewer studies of gratification-utility and frequency of use of interactive media have been conducted. Dimmick et al. (1996) found a significant association between gratification-utilities and frequency of telephone use. Leung (2001) employed 26 gratification-utility items grouped into seven factors which, as a block, explained ten percent of the variance in the frequency of use of instant messaging in a sample of college students. Lee (2004) used ten individual gratification-utility questions but found that only two of them were related to the use of telephone and email.

Thus far, the review and discussion of relevant research suggests that both gratification-utilities and network characteristics will be related to the frequency of interactive media use. Figure 2 depicts the theoretical relationships derived from the previous discussion.

The theoretical portrayal in Figure 2 employs Palmgreen et al.'s (1985) important distinction between gratification-utilities sought or expected from a communication medium and the gratification-utility actually obtained or derived from use of the medium; this critical distinction has been employed sparsely by subsequent media researchers. As the theoretical depiction in Figure 2 shows, the frequency of interactive media use is influenced both by



• Figure 2 Theoretical relationships between networks characteristics, gratification-utilities and choice or frequency of use

a focal individual's expectations concerning the gratification-utility to be derived from mediated interaction, and by the characteristics of the sub-network of the personal network which engages in a form of mediated interaction such as email with the focal individual. In the next stage of the process the gratification-utility actually obtained from a mediated form of interaction is influenced by frequency of use. The gratification-utilities actually obtained, in turn, influence the expectations of 'predictions' about the level of gratification-utility sought from a medium.

Finally, as Figure 2 shows, there is a theoretical linkage between the network characteristics and gratifications obtained from interactive media. Over time, for example, network size may change through estrangement or death, the proximity of members may alter because of geographic mobility and network members may become more or less intimate. These changes in network characteristics may be associated with changes in the levels of gratification-utility derived from interactive media.

The following study tests some of the theoretical linkages portrayed in Figure 2. However, it measures only the obtained gratification-utilities. Measuring both sought as well as obtained gratification-utilities as well as network characteristics for three media would place a burden on the participants which would probably result in severe cooperation problems. Further, since the study performed is cross-sectional, the relationship over time between sought and obtained utilities depicted in Figure 2 has not been measured. The data collected in this study, as outlined in the 'Method' section, allowed us to test three hypotheses relevant to the theoretical depiction in Figure 2:

H1: There will be a positive relationship between network characteristics and the frequency of use of the telephone, email and instant messaging.

H2: There will be a positive relationship between frequency of use of the telephone, email and instant messaging and gratification-utilities obtained from these media.

H3: There will be a positive relationship between network characteristics and the gratification-utilities derived from telephone, email and instant messaging.

METHOD

Participants

The participants were 286 students recruited from communication classes in a midwestern university and offered extra credit for their participation. The overall sample was primarily white/Caucasian (81%), female (55%) and averaged 20.52 years of age ($SD = 4.53$). The use of college students as participants in this study was considered to be appropriate due to its focus on examining the networks of telephone, email and instant messaging, which research indicates are popular forms of communication among traditional college-aged students (e.g. Pew Internet & American Life Project, 2002).

Procedures and measures

During the data collection period, each participant was provided with the study materials, which included a consent form and the survey instrument described below, and instructed to complete and return the materials within one week.

The survey instrument contained two parts. The first part focused on the gratifications and gratification opportunities obtained through the use of three technologies: landline telephone, email and instant messaging. Gratification-utilities is a hybrid term used by Dimmick (2003) to reflect both the gratifications tradition of studying motives for media use as well as the economic tradition, and the term 'utility', which is closely related to the gratifications construct (see Picard, 1989). Gratification opportunities (Dimmick, 2003) refer to the relative ability of media to obtain gratification. For example, a medium which offers more of a given type of content or interaction at a greater number of times offers users a higher probability of obtaining the gratifications sought. Twenty-three gratification and gratification opportunity statements (as listed in the Appendix) were presented for each technology. The items were drawn from prior research on telephone (Dimmick et al., 1996), email (Dimmick et al., 2000) and instant messaging use (Ramirez et al., 2004), which utilized pilot studies to assure the validity of the gratification statements. In the pilot studies all 23 items were used by the participants in response to open-ended questions to describe their use of the telephone, instant messaging and email. The participants in the present study were asked to think about their own uses of each of these three technologies and indicate the extent to which they perceived each one as helpful in accomplishing that given need or function. The participants then rated each statement on three seven-point Likert-type scales (where 1 = 'not helpful at all', to 7 = 'extremely helpful'), for assessing each interactive technology. For example, the participants were presented with the statement, 'To send and receive personal messages', then rated how helpful each technology was for fulfilling the need.

The second part of the survey instrument assessed participant communication networks. To access networks within and across three communication media, the second part included three subsections. In the first subsection, the participants were asked to think about the people whom they call or those who call them, then to provide the first and last initials of those people. In order to include both non-intimate and intimate associates in the study, we followed the design in Dimmick et al. (1996) instructing participants to 'think about the people whom they call or those who call them'. We also informed the participants that 'those people may be friends, family, significant others, acquaintances, classmates, etc.'. The participants were informed that we were interested in the calls they made from their home or residence and also in their non-work-related use that occurs in their workplace.

For each network member identified, the participants also responded to the following three questions: 'How often do you talk to him/her on the phone?'; 'How often do you exchange email with him/her?'; and 'How often do you use instant messaging with him/her?' Each question was rated on seven-point Likert-type scales (where 1 = 'not at all', to 7 = 'every day').

In the second subsection, the participants were asked to identify any individuals with whom they exchange email, but do not speak to on the telephone. Again, they followed the same procedure as in the first subsection (e.g. listing first and last initials, rating the frequency of email exchange and instant messaging use) using seven-point Likert-type scales (where 1 = 'not at all', to 7 = 'every day').

The third subsection measured instant messaging networks exclusively and mirrored the procedure employed in the prior two subsections. Specifically, the participants were instructed to think about any individuals with whom they use instant messaging but do not exchange emails or speak to on the telephone. They were then asked to indicate the initials of those members and provide the ratings described above (e.g. frequency of use on a seven-point Likert-type scale).

Using the above information collected for each communication technology (telephone, email, instant messaging), participant sub-network size was calculated as the proportion of the participant's overall network with whom the individual employed a given technology. This variable was computed for each of the three technologies.

Following Dimmick et al. (1996), all three subsections also included indices of two other network variables: intimacy and physical proximity. The participants were asked, for each name listed in each section, to indicate their relationship with each member on a six-point Likert-type scale (where 1 = 'not at all close', 6 = 'very close') and whether the person lived a local (coded '0') or a long distance (coded '1') phone call away.

RESULTS

Preliminary analysis

The first step in the data analysis was to perform a factor analysis on the gratification-utility items for the telephone, email and instant messaging. The participants' ratings for the 23 items were submitted to a principal axis factor extraction routine, and since the initial results demonstrated that the factors were correlated, an oblique (direct oblimin) rotation was used for the final solution. Table 1 reports the items, factor loadings, eigenvalues and reliability coefficients (alpha) for each factor scale for each of the three mediums; the reliabilities for each scale exceeded .80, indicating acceptable stability. Items were considered to belong on a factor-scale if they had a minimum loading of at least .30 and did not cross-load on another factor.

As Table 1 shows, two factors emerged in the analyses for each of the three media. Following Dimmick et al. (2000), the first factor was called sociability

• Table 1 Factor loadings for sociability gratifications and gratification-opportunity statements by medium

	TELEPHONE	E-MAIL	INSTANT MESSAGING
Sociability gratifications			
1. Personal	.51	.72	.68
2. Touch	.71	.73	.77
3. Time	.62	.62	.55
4. Far	.63	.66	.68
5. Information	.73	.67	.72
6. Close	.65	.74	.69
7. Share	.80	.74	.73
8. Fun	.79	.64	.69
9. Care	.66	.59	.63
10. Companionship	.63	.63	.62
11. Advice	.61	.61	.62
12. Resolve	.64	.56	.54
13. Coordinate	.67	.59	.64
14. Pass	.57	.58	.70
Eigenvalue	6.60	6.41	6.65
Cronbach's coefficient alpha	.91	.91	.92
Gratification opportunities			
1. Economical	.43	.55	.41
2. Fast	.71	.66	.77
3. Simple	.79	.83	.89
4. Hold	.67	.58	.68
5. Fit	.58	.67	.60
6. Zone	.56	.63	.62
7. Conversational	.49	.47	.57
8. Convenient	.73	.70	.68
9. Different	.52	.60	.68
Eigenvalue	3.44	4.07	4.01
Cronbach's coefficient alpha	.82	.83	.86

Notes: Statement labels shown correspond to those shown in the Appendix.

while the second factor consisted of gratification opportunities. The sociability factor consists of items such as 'keep in touch', 'contact with others far away', 'to feel or express caring' and 'a feeling of companionship'. Most of the items on this first factor illustrate the gregarious nature of the species and specifically, seem to bear on the process of relationship maintenance. The second factor is composed of items such as 'economical', 'quick and fast' and 'fits people's work schedules'. This gratification opportunities scale seems to measure the attributes of the medium which make for efficient communication.

However, preliminary analysis of the factor scales demonstrated that they were so highly correlated as to be co-linear ($r > .60$, $p < .001$). Therefore, the

sociability and gratification factors were summed into a single gratification-utility score for each participant and the combined scales were used in the initial analyses. In analyses in which the combined gratification-utility factor produced significant results, a set of follow-up analyses were conducted utilizing the individual sociability and gratification factors, each centered prior to entry, in order to provide a more detailed assessment of the findings.

Hypotheses 1 and 2

H1 and H2 predicted that network characteristics and gratification-utilities would be related to the frequency of use of the telephone, email and instant messaging. Table 2 contains the results of a multiple regression which tests these two predictions.

The R^2 changes for both gratification-utilities and network characteristics are significant for all three media, indicating that both hypotheses were supported by the data. However, the strength of the associations varied markedly from medium to medium. Network characteristics and gratification-utilities explained the least variance in telephone use ($R^2 = .089$) The frequency of email use was better explained by the independent variables ($R^2 = .157$) than telephone use. Instant messaging use was best explained ($R^2 = .663$) by both network and gratification variables.

A follow-up hierarchical multiple regression analysis utilizing the individual network variables (intimacy, proximity, sub-network size) and the two gratification factors (sociability, gratification-opportunities) shows that for the telephone, frequency of use was associated only with intimacy ($\beta = .253$, $p < .001$), indicating that increased intimacy of the sub-network predicted greater telephone use. We use the term 'sub-network' to refer to those network members who communicate with the focal individual or participant using a particular medium. The variable of sub-network size is the proportion of the personal network that communicates with the participant using a particular medium. However, for email and instant messaging, sub-network size and sociability gratifications were associated with frequency of use. The results indicated that the larger the sub-network associated with instant

• Table 2 Multiple regression of frequency of use on network characteristics and gratification-utilities (N = 286)

MEDIUM	R-SQUARE CHANGE		
	NETWORK CHARACTERISTICS	GRATIFICATION-UTILITIES	TOTAL VARIANCE EXPLAINED
Telephone	.059**	.013*	.089
E-mail	.065**	.035**	.157
IM	.236**	.052**	.663

* $p < .05$; ** $p < .01$.

messaging ($\beta = .656, p < .001$) and email ($\beta = .263, p < .001$) and the greater the degree of sociability gratifications derived from each (instant messaging: $\beta = .298, p < .001$; email: $\beta = .240, p < .001$), the greater their use. Thus, although sociability gratifications predicted both instant messaging and email use to a similar degree, sub-network size was associated more strongly with instant messaging than email.

This interpretation is supported by the differences in sub-network size for the three media. The mean network size for that subset of the personal network, which engages in the use of at least one interactive medium with the focal participant, was 15.30 ($SD = 7.28$). The mean sub-network size for the telephone was 8.98 ($SD = 4.04$), 8.11 for email ($SD = 5.08$) and 9.73 ($SD = 7.65$) for instant messaging. Two of the sub-networks were significantly different for each other in size and the other comparison approached statistical significance. Comparisons between telephone and email ($t = 3.36, df = 285, p = .001$) and email and instant messaging ($t = -4.36, df = 285, p < .001$), respectively, showed statistically significant differences, whereas the telephone and email difference ($t = 1.90, df = 285, p = .059$) only approached significance. These differences in sub-network size – with the telephone being the smallest sub-network and email and instant messaging the largest – support the inference that the telephone is reserved for a smaller intimate circle, while instant messaging and email serve the purpose of interaction with a larger group of acquaintances.

Hypothesis 3

H3 stated that there would be a relationship between network characteristics and gratification-utility levels obtained from the three media. Table 3 depicts the results of the regression analysis testing this hypothesis.

As the table shows, only the betas for sub-network size achieved statistical significance. In Table 3, the sub-network size variable had the strongest association with instant messaging gratifications ($R^2 = .367$) and a weaker association with email ($R^2 = .158$) and the telephone ($R^2 = .135$). The coefficients for intimacy and proximity were not significant ($p > .05$). Hence, H3 is supported for sub-network size only.

As in the analyses associated with H1 and H2, follow-up analyses were conducted utilizing the individual sociability and gratification-opportunities factors. The results associated with the telephone and email paralleled those reported above for the overall gratification-utility factor. Specifically, only sub-network size was significantly associated with sociability gratifications (telephone: $\beta = .312, p < .001$; email: $\beta = .387, p < .001$) and gratification-opportunities (telephone: $\beta = .263, p < .001$; email: $\beta = .366, p < .001$). However, the results associated with instant messaging indicated that sub-network ($\beta = .613, p < .001$) and intimacy ($\beta = .103, p < .05$) were associated significantly with sociability gratifications, whereas only the prior, sub-network size, was associated with gratification-opportunities ($\beta = .609, p < .001$).

• Table 3 Results of regression analysis of gratifications on network variables (N = 286)

MEDIUM	R-SQUARE	BETAS		
		SUB-NETWORK SIZE	INTIMACY	PROXIMITY
Telephone	.135	.301*	.101	.047
E-mail	.158	.395*	.075	.002
IM	.367	.621*	.086	.028

* $p < .001$.

In summary, H1 and H2 were supported: both gratification-utilities and network characteristics were associated significantly with use of the three interactive media. The strongest associations were exhibited with instant messaging. H3 was partially supported. Of the three network characteristics measured in this study – sub-network size, intimacy and proximity – only sub-network size was related to gratification-utilities. The more detailed analyses employing the individual sociability and gratification factors produced similar results, with only intimacy producing an additional significant association with the sociability factor for instant messaging. In the two analyses, which tested the three hypotheses, instant messaging use was associated most strongly with the independent variables.

DISCUSSION

The evolution of society has been mirrored by an accompanying growth in ways to connect its members with each other beyond simply their physical reach. As stated at the outset, such developments have brought about cultural innovations in the form of interactive communication technologies, each employed to maintain social connections and at the same time providing some degree of gratification to individual users. It is from this perspective that the present study examined the role of network characteristics and gratification-utilities in the use of interactive communication technologies (telephone, email and instant messaging).

The overall results indicate that both network characteristics and gratification-utilities were significant influences on the use of interactive communication technologies. The analyses employed in assessing H1 and H2 provide support for the predictions that both factors (network characteristics and gratification-utilities) would be associated with telephone, email and instant messaging use. Of the three technologies under study, use of instant messaging, the newest of the three, was associated most strongly with the two independent variables; whereas the association with the use of the telephone, the oldest technology, was the weakest. However, supplemental analysis

provided more detail as to the consistency of the effects of network characteristics on the use of each technology.

Network characteristics emerged as more potent predictors of use of the three communication technologies than gratification-utilities. Network characteristics, in the form of network size, intimacy and physical proximity, explained incrementally more variance in use of the telephone, email and instant messaging than gratification-utilities. Yet, distinct characteristics emerged as significant predictors in the analysis of each technology, suggesting divergent underlying influences. Although physical proximity failed to surface as a significant factor in the use of any of the three technologies, the degree of intimacy between relational partners predicted telephone use, whereas the size of the sub-network predicted email and instant messaging use. Coupled with differences in the size of each sub-network across the three mediums examined in the present study, the findings suggest that, at least to some degree, the technologies differ in terms of the primary types of social connections that they are utilized to support (Baym et al., 2004). That is, the overall findings suggest a 'quality/quantity' distinction. The telephone seems to be used for talking with those to whom the participant is close or intimate. The other two media – email and instant messaging – are used for interaction with those who are perhaps less intimate. For email and instant messaging, it appears to be a case of 'the more, the merrier' – as sub-network size increases, so does their frequency of use. This is not to say that each technology only specializes in this manner or is not capable of being used to fulfill each other's needs. It may be that email, for example, is better suited to communicating with sub-networks of larger sizes (e.g. mass emailing) rather than the telephone, and so forth.

Consistent with H3, network characteristics were also potent predictors of gratification-utilities derived from use of the interactive communication technologies. The fact that network characteristics emerged so prominently is consistent with the theoretical framework offered in Figure 1. As reflected in Figure 1, the use of interactive communication technologies is a product of the joint influence of the user and at least one other member of their personal network. Sub-network size in particular emerged as a significant factor in the gratification-utilities obtained from the telephone, email and instant messaging; intimacy and physical proximity failed to achieve statistical significance in any of the associated analyses. Thus, the results suggest that the greater the sub-network size associated with a given interactive communication technology, thereby providing users with more opportunities to employ the medium, the greater the associated gratification-utilities derived. As shown in Figure 2, perspectives on media use assume that this should facilitate continued use over time (e.g. Palmgreen et al., 1985)

The present study suggests several directions for future study. One technology left unexamined here has been the cellphone. Although it is unclear how or whether personal network characteristics and gratification-utilities associated

with cellphone use differ from those of the other technologies examined here, future research should replicate and extend the present study to assess these questions (e.g. how and whether they differ). Similarly, the present study examined the role of three network characteristics, two of which (intimacy, physical proximity) were drawn from previous research on telephone networks (Dimmick et al., 1996). This suggests two potentially fruitful directions for future research. First, the role of other network characteristics either in addition to, or beyond, those assessed warrant examination. Second, Dimmick et al. (1996) utilized the two aforementioned characteristics to create a four-category typology of telephone networks. Future research should assess the extent to which the typology is applicable to other interactive communication technologies.

In closing, the study of the interactive media reported here shows that these technologies 'extend society' by providing more possibilities for linkage between members of personal networks. Moreover, these interactive media appear to play different roles or occupy somewhat different niches within the personal networks. On the one hand, the landline telephone was associated with communication by the focal individual with more intimate network members. The more intimate the network member, the more frequent the telephone use. It is possible that these intimates are family members, but verification of this hypothesis must await further study. On the other hand, instant messaging use was associated with the number of network members that use instant messaging. The greater the instant messaging sub-network size, the greater the use of the medium. These media 'extend society' but they do so in very different ways – ways that enrich communication among network members.

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APPENDIX: SOCIABILITY GRATIFICATIONS AND GRATIFICATION OPPORTUNITY STATEMENTS

Sociability gratifications

1. To send and receive personal messages (personal).
2. To keep in touch with people (touch).
3. To keep in contact with people you don't have enough time to see in person (time).
4. To keep in contact with others who live far away (far).
5. To give and receive information with people you know (information).
6. To communicate personal messages with those closest to you (close).
7. To share ideas and opinions (share).
8. For fun or pleasure of communicating (fun).
9. To feel or express caring (care).
10. For a feeling of companionship with people you know (companionship).
11. To give or receive advice on personal matters or issues (advice).
12. To resolve conflicts (resolve).
13. For coordinating social events with people you know (coordinate).
14. To pass time (pass).

Gratification opportunities

1. For communication that is economical (economical).
 2. For communication that is quick and fast (fast).
 3. For communication that is simple and easy (simple).
 4. For ease in getting a hold of someone (hold).
 5. For communication that fits people's work schedules (fit).
 6. For communication with people in different time zones (zone).
 7. For communication that is conversational (conversational).
 8. For communication that is convenient (convenient).
 9. For communication that is "different" than face-to-face (different).
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