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Discrete, Sequential, and Follow-Up Use of Information and Communication Technology by Experienced ICT Users

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Most prior media use research has assumed that people use information and communication technologies (ICTs) independently of other ICTs, that is, as *discrete* media. This study uses cross-organizational, in-depth interview data to uncover the important role that ICT *sequences* play in persuasion, information exchange, and documentation. The primary occasions for sequential ICT use were (a) preparing for meetings, (b) performing daily tasks, and (c) following up to persuade. When people need to follow up initial communication episodes, the overall groupings of ICTs represent two underlying attributes: *degree of connection with others* and *extent of synchroneity*. These findings support an expanded perspective on media richness theory and information theory by illustrating that ICT sequences can expand cues and channels and provide error-reducing redundancy for equivocal and uncertain tasks.

Keywords: *media choice; ICT use; media richness; persuasion; multiple media use*

By 2010, the number of World Wide Web users will top 1.8 billion (Computer Industry Almanac, 2006). Similar worldwide trends are found with the mobile phone—reaching 2 billion in 2005—and with the personal computer—exceeding 1 billon in 2007. The Web, the Internet, especially e-mail, and mobile phones are extensively used in the workplace (Pew Internet and American Life Project, 2006; Rice & Webster, 2002). Now that information and communication technologies (ICTs) are an accepted part of many work situations, communication scholars have become particularly interested in how ICTs are used as forms of, and influences on, communication processes.

Most research, such as media richness theory (MRT; Daft & Lengel, 1984, 1986; Daft, Lengel, & Trevino, 1987) and social presence theory (Rice, 1993), has focused only on attributes of individual media, "immediate incidents" (Saunders & Jones, 1990, p. 29), or structuration processes involving a single ICT (Orlikowski, 2000). Yet when we observe people in organizations using technology, we quickly see that people use combinations of these ICTs, such as e-mail, face-to-face (FtF) conversations and meetings, desk telephones, mobile phones, BlackBerry phones, smartphones, instant messaging, and fax machines (Sørnes, Stephens, Browning, & Sætre, 2005). So the typical approach fails to explain how and why ICTs are actually used as part of communication over time in different work contexts and how usage of a specific ICT may be part of a more pervasive sequence of ICT usage. Researchers in interpersonal communication (e.g., Walther & Parks, 2002), psychology (Hesse, Werner, & Altman, 1988), and management (Boczkowski & Orlikowski, 2004; Saunders & Jones, 1990) have issued calls to study the phenomenon of ICT combinations. As Walther and Parks (2002) suggested, "Communication efficiency may rest on sequences or combination of media rather than isolated choices about a discrete ICT" (p. 534).

Recent research has begun to develop theoretical and qualitatively descriptive accounts of how people use ICTs in combination (Chudoba, Watson-Manheim, Lee, & Crowston, 2005; Munkejord, 2007; Osterlund, 2007; Stephens, 2007; Turner & Reinsch, 2007; Watson-Manheim & Belanger, 2007). Although empirical research has begun to establish the prevalence of this phenomenon, it has tended to rely on data from only one or two organizations. The work has also been largely descriptive and more focused on uncovering the sequences rather than comparing discrete to sequential media use. Furthermore, there has been limited attention paid to how ICTs are used to follow up a communicative attempt.

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The present research attempts to advance this area of research in several ways. We focus on understanding and comparing the frequency of and reasons for (a) *discrete* (with no mention of sequential media), (b) *sequential* (explicit mentions of two media), and (c) *follow-up* (the second ICT in a sequential pair) ICT use. Furthermore, it does so by providing quantitative analysis of nonprompted reports of interaction episodes from expert ICT users across 64 organizations.

To accomplish these objectives, we first define the different types of ICT use and then develop a theoretical rationale for our research questions that is based on an expanded understanding of MRT (especially the four dimensions of richness) and information theory (especially channel redundancy and cost minimization). An important part of MRT is linking ICT use to task requirements. The content coding scheme of tasks examined in this study is derived from research using a uses and gratifications perspective. The major findings are discussed in terms of their theoretical, practical, and agenda-setting contributions.

Literature Review

Different Types of ICT Use

Traditional media use studies have assumed that people use ICTs *discretely*—one at a time and independent of any prior media use. However, recent research—and general observation—has indicated that people can and do use ICTs in combination, whether *simultaneously* or *sequentially* (Chudoba et al., 2005; Munkejord, 2007; Osterlund, 2007; Stephens, 2007; Watson-Manheim & Belanger, 2007). *Sequential* ICT use occurs when people communicate about an activity or project, with one or more other people, through a series of ICTs. Using multiple ICTs at the same time is considered *simultaneous* use (Monge & Kalman, 1996), recombinant use (Lievrouw & Livingstone, 2002), multicommunicating (Turner & Reinsch, 2007), media mixes in educational settings (Rice, Hiltz, & Spencer, 2004), or multitasking (a topic of special interest to those studying use of new media, especially mobile phone use by adolescents; Baron, 2008; Kim,

Kim, Park, & Rice, 2007; Rideout, Roberts, & Foehr, 2005). Although sequences can become quite complex and can span considerable time, the focus in this study is discrete, paired sequential, and follow-up use of ICTs.

Theoretical Guidance on Sequential ICT Use

Studies of sequential ICT use are only beginning to appear in the literature, and the theories used to guide this research are quite varied. Three qualitative studies examining the use of multiple media have applied a "genre" framework (e.g., Chudoba et al., 2005; Osterlund, 2007; Watson-Manheim & Belanger, 2007) to carefully articulate multiple media practices. A genre framework is particularly relevant when the research can show how a specific organization's context helps shape the form and pattern of media use over time (Yates & Orlikowski, 1992). One other study of a single organization used a variety of theoretical perspectives (Turner & Reinsch, 2007).

Researchers have examined sequencing of message content (e.g., influence strategies; Falbe & Yukl, 1992; Yukl & Tracey, 1992) and even sequencing of decision-making strategies (e.g., Poole, 1983; Saunders & Jones, 1990), but the role that the ICT itself plays is much less understood. In their theoretical work on dyadic influence, Barry and Fulmer (2004) made several broad claims concerning how ICTs might be used sequentially. They said that unsuccessful influence attempts using lower bandwidth ICTs might cause people to attribute the failure to the ICT and thus use a higher bandwidth ICT in subsequent attempts. But there are few, if any, empirical studies examining how people use ICTs for following up communication attempts.

For several decades, organizational technology scholars have relied heavily on media trait theories, such as MRT (Daft & Lengel, 1984, 1986) or social presence theory (Rice, 1993; Short, Williams, & Christie, 1976), to derive predictions linking tasks and the ICTs used to accomplish those tasks. Although MRT does not explicitly mention the use of sequential media, examination of several core assumptions in the theory can help guide our understanding of sequential ICT use.

Daft and Lengel (1986) claimed that communication media differ in their capacity to carry rich information. The four media traits that are considered to directly affect richness evaluations are (a) timeliness of immediate feedback, (b) cues and channels embedded, (c) personalization capability, and (d) language variety (Daft & Wiginton, 1979). Using these traits as a guide, FtF is almost always rated as the richest medium (Daft & Lengel, 1986; Rice, 1992; Rice, D'Ambra, & More, 1998). Much of this research has labeled discrete media according to richness perceptions and then made predictions about discrete task-medium choice and outcomes. Previous research has demonstrated that MRT is not always predictive (e.g., Rice, 1992) and that, over time, people can develop strong perceptions of media richness in media, such as e-mail, that are typically considered lean (Markus, 1994a; Rice, 1993; Walther & Parks, 2002).

Several concepts from MRT can contribute to understanding sequential ICT use. When Daft and Lengel (1986) articulated their logic behind "information richness," they acknowledged that managers are bounded rationally and are often pressed by time, so that "communication transactions that can overcome different frames of reference or clarify ambiguous issues to change understanding in a timely manner are considered rich" (p. 560). Their mention of "communication transactions" could be extended to include sequential ICT use. For example, if people use FtF for an initial interaction that is followed up by an e-mail message, the number of cues and channels has been expanded.

Although communicating by FtF or the phone will generally provide the most timely feedback (yet text messaging and instant messaging can be very timely as well), there are likely situations in which timely feedback is less important than some, if not all, of the other three characteristics. Conversely, asynchronous media are generally necessary to arrange FtF interactions, especially meetings (Fish, Kraut, Root, & Rice, 1993), and the pervasive phenomenon of telephone tag belies the claim that telephones necessarily provide "timely" communication. One study applying social presence theory to analyzing relationships between patterns of media use and organizational structure found that although all of the sample organizations could be characterized by the same primary medium—meetings—each of them had varying secondary media, such as e-mail (Rice & Shook, 1990). It is also possible that personalization and language variety can be expanded though the use of multiple media. Perhaps including sequential ICT use will provide more opportunities to apply and test MRT.

Information Theory, Media Redundancy, and Media Cost Minimization

Information Theory provides a foundation for the possible redundancy benefits of sequential ICT use as well as how sequential ICT use can minimize information and communication costs (Marschak, 1968; Marschak & Radner, 1972; Rice & Bair, 1984; Shannon & Weaver, 1949). Dahle (1954)

applied Shannon and Weaver's information theory to examine simultaneous ICT use. He found that transmitting information using both oral and written channels was most effective for comprehension. His study defined "oral" as FtF in a group setting and "written information" as a printed letter format. Dahle claimed that redundancy is largely responsible for how people perceive communication efficiency and dependability. Hsia (1968) confirmed these findings in his experimental study by demonstrating that the accuracy of message transmission was increased by using auditory plus visual information. Hsia used information theory to justify why he disagreed with Broadbent's (1958) claim that receiving information via multiple channels would overload people's processing abilities and lower comprehension and recall. Hsia argued that that people's processing capacity is not easily exceeded and they do not necessarily become overloaded even when they receive information from multiple channels. Rather, in multichannel situations, one channel simply provides additional cues that may reinforce, not interfere with, information provided by other channels—what he called "between-channel redundancy" (p. 326).

Marschak's (1968) economic theory also relied heavily on Shannon and Weaver's information theory. He showed how encoding and decoding are related to the decision-making components of inquiring, transmitting, and deciding and that every step in the process has associated costs. Reinsch and Beswick (1990) used Marschak's cost minimization theoretical perspective to study voicemail implementation. They identified three types of costs relevant in a media use environment: access, error, and delay. Access costs are the efforts and expenses associated with using a channel (Marschak & Radner, 1972). Examples of access costs previously studied in ICT use are critical mass (Markus, 1990; Rice, Grant, Schmitz, & Torobin, 1990), search and uncertainty (Rice & Shook, 1988), and user experience with an ICT (King & Xia, 1999).

Error costs involve communication breakdowns between senders and receivers that occur throughout communication processes because of channel capabilities and transforming and misunderstanding message content across several media (e.g., receiving a telephone call and trying to write down the important information unambiguously on a "while you were out" memo sheet). For example, emotional conversations and persuasion may be better handled using a medium that is "richer" or has more social presence and thus would be less likely to foster misinterpretations (Daft & Lengel, 1986; Rice, 1993; Rice & Bair, 1984; Wilson, 2003). Conversely, using lean media to exchange detailed information is likely to reduce errors in accuracy and completeness. Finally, delay costs include the time it takes to

compose messages, send messages, and get feedback from others (Marschak & Radner, 1972; Rice & Bair, 1984).

Access costs could be relevant to sequential ICT use (e.g., it may be much easier to arrange a FtF meeting through e-mail than through individual FtF interactions and then follow up that FtF conversation with an e-mail clarification than try to arrange a follow-up meeting), but error and delay costs are more pertinent because they more clearly link to redundancy considerations. Essentially, when communication topics or goals are important or errors are costly, using ICTs sequentially seems more valuable or successful. For example, Reinsch and Beswick (1990) noted that "dual channel messages heighten redundancy and reduce errors" (p. 807).

Reasons People Use ICTs

Uses and gratifications research provides a consistent set of *reasons* people use media in general (Katz, Blumler, & Gurevitch, 1974). People are actively engaged in choosing and using media to meet their needs, which in turn results in gratifications that influence future use of those media. Katz and his associates (1974) described this approach as one that considers "the social origins of, needs that generate, expectations of, sources that lead to, differing patterns of media exposure . . . resulting in, need gratifications, and other consequences" (p. 20). Uses and gratifications research was originally developed to study television and radio, but more recently studies have also used this approach to analyze organizational media use (Charney & Greenberg, 2002; Dobos, 1992; Flanagin & Metzger, 2001) and new media use (Charney & Greenberg, 2002; Flanagin & Metzger, 2001; Lin, 2002; Newhagen & Rafaeli, 1996; Papacharissi & Rubin, 2000).

In particular, Flanagin and Metzger's (2001) study extended the uses and gratifications domain by studying the Web, FtF communication, and four computer-mediated ICTs in the context of workplace needs. A factor analysis of their 21-item questionnaire resulted in 10 clusters of uses: information, learning, play, leisure, persuasion, social bonding, relationship maintenance, problem solving, status, and insight into oneself. Most ICTs fulfilled the important organizational need of seeking information. The learning need was primarily fulfilled by the information retrieval and giving functions of the Web. E-mail, the telephone, and FtF were used heavily when people maintained relationships, bonded socially, and persuaded others (Flanagin & Metzger, 2001). Their study did not, however, consider reasons for either simultaneous or sequential ICT use.

Research Questions

Applying the prior discussions of an expanded view of MRT, the redundancy and cost-minimization aspects of information theory, and uses and gratifications motivations, we pose the following research questions:

Research Question 1 (RQ1): What are the relative frequencies of discrete, sequential, and follow-up ICT use?
Research Question 2 (RQ2): What are the reasons for using discrete, sequential, and follow-up ICTs?
Research Question 3 (RQ3): Do the reasons vary across discrete, sequential, and follow-up ICT use?
Research Question 4 (RQ4): To what extent is the proportional sequential ICT use explained by the various reasons?
Research Question 5 (RQ5): What are common patterns of sequential ICT use?

Method

To address the research questions in this study, we content analyzed a large interview data set. The individuals participating in this study were advanced ICT users, and they represented a broad cross-organizational sample. Quantifying qualitatively gathered data allowed us to address frequency and reason variation and to use statistical techniques to identify patterns of sequential ICT use.

Participants

The data consisted of transcripts from 66 individuals representing 64 different organizations from two nations. This research is part of a larger study on how people use technology to learn in the workplace (for more details, see Browning, Sætre, Stephens, & Sørnes, 2008; Sørnes et al., 2005). This data set was particularly appropriate for this study because it represented workers from many organizations who were by their own definition experienced ICT users. The 34 organizations from the United States and 30 from Norway were from industries such as banking, software development, management consulting, fish farming, water purification, semiconductors, e-learning, and sales. To select the participants, we used a snowball sampling technique and consciously sought industry diversity. The resulting participants were quite varied demographically as well.

Males composed 71% of the sample, 68% of the participants were from established (as opposed to entrepreneurial) organizations, and 36% were managers. We chose to include members from two countries that have often been considered quite similar with respect to their pervasive ICT use and Internet use (Bauer, Berne, & Maitland, 2002). Prior analysis of these participants indicated that despite theoretical predictions that they might use ICT differently because of cultural differences, their ICT use followed very similar patterns (Sørnes et al., 2005).

Data Gathering

In-depth interviews were conducted with all 66 experienced ICT users. The interview guide used was based on Spradley's (1979) "grand tour type" design that seeks both to relax participants during the interview process and to encourage them to share details. The questions on the interview schedule relevant to the current study were the following: (a) "Walk me through your typical day." (b) "How do you use ICTs in your daily work?" and (c) "How do you learn new job-related information?" Additional probes were used to further explore the specific ICTs used, personal preferences, and opinions of others' ICT use. All of the interviews were audiotaped and transcribed, resulting in a total of approximately 2,500 pages of double-spaced text.

Data Analysis

The data were analyzed using the content analysis framework articulated by Krippendorff (2004). First, we focused on finding a theoretically meaningful unit of analysis that was also capable of being reliably coded. To meet both of these criteria, we used sentences as the unit of analysis, resulting in 24,152 sentences or coding units. Each coding unit had the potential to contain data concerning three different categories: (a) the ICT(s) used, (b) the type of ICT use (discrete, sequential, or follow-up), and (c) the reason or reasons for use.

To code the *ICT used*, we identified different ICTs named by the interviewees (listed in Table 3 below). This process is similar to that found in studies conducted by Ducheneaut (2002), Markus (1994b), Reinsch and Beswick (1990), and Rice, McCreadie, and Chang (2001). The categories of e-mail, Web, and computer required distinct definitions to facilitate reliable coding: e-mail (specific mentions of sending or receiving electronic mail), Web (online access, searching, or any use when e-mail was not specifically mentioned), and computer (offline applications and software

Table 1
Reasons for Use Definitions and Collapsed Coding Scheme

Reason for Use	Definition	Final Collapsed Category
Information	To get information	Information
Learning	To generate ideas, learn about oneself, others, and how to do things	
Gain insight into oneself	To understand more about oneself	
Problem solving	To solve problems on an immediate task	
Persuasion	To negotiate, bargain, or get someone to do something for you	Persuasion
Personal status	To impress people or feel important	
Documentation	To communicate to another person in writing	Documentation
Play	To play	Entertainment
Leisure	To be entertained	
Social bonding	To make you feel less lonely and have something to do with others	Social
Relationship maintenance	To get to know others, provide others information, stay in touch	
Multiple uses	Mentions of multiple uses	Multiple uses

Note: The reasons were derived from Flanagin and Metzger's (2001) list of media uses and gratifications, except documentation, which was generated during the coding process.

other than e-mail applications). We also coded whether the ICTs were mentioned as *discrete* ICTs (e.g., FtF or e-mail) or ICT *sequences* (e.g., FtF followed by e-mail), with the subsequent ICT being the *follow-up*.

To code the data for *reasons for use,* we began with Flanagin and Metzger's (2001) 10 categories of reasons (gratifications) why ICTs are used at work. During coding training, we found that the framework was too detailed for reliable coding. We also found that a new category, "need for documentation," emerged. To accommodate these findings, we collapsed the 10 categories and added that one additional category, resulting in the following six reasons for use: *information* (getting it, giving it, learning from it, and problem solving with it), *persuasion* (influencing, controlling, or actively managing impressions with others), *documentation* (documenting communication or providing written organization to communication), *social* (being social with others in a work context), *entertainment* (being entertained or entertaining oneself in a work environment), and *multiple uses* (see Table 1 for a summary).

Coding Reliability

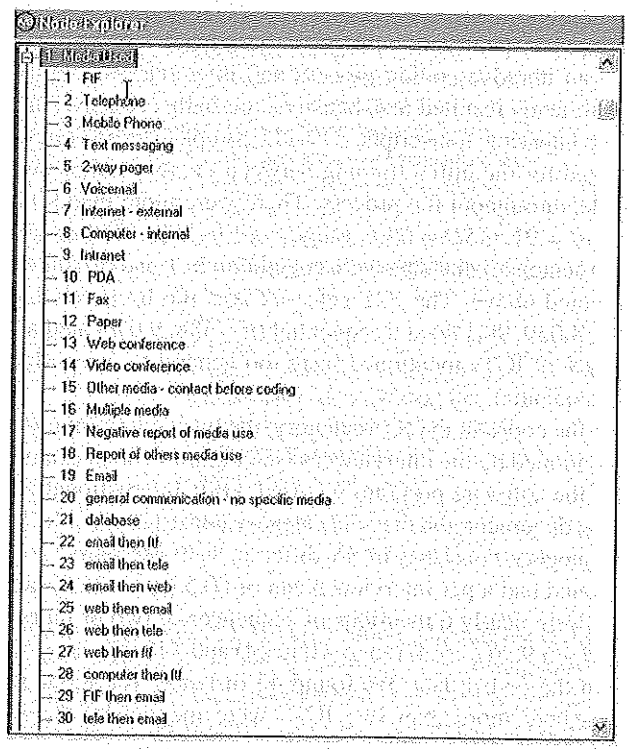
Because this data set was collected under a broader research project, the first step was to narrow the 24,152 units of analysis down to the ones that included mentions of any specific ICT use. This resulted in a reduction to 4,448 sentences or qualifying units of analysis (18.4% of the total data).

We used an iterative coding process and intercoder reliability concessions that ultimately resulted in exhaustive, mutually exclusive, and reliable codes. Of the interview transcripts, 23% (15 complete transcripts) were randomly selected for the initial training between the two coders and for reliability checks throughout the process. There were more than 90 codes per participant ($M = 91.3$, $SD = 53.6$, range = 24 to 309). Within each unit of analysis (the sentence), the data were coded into ICT and reason for use categories as noted above. The ICT category was the basis for determining discrete ($n = 4{,}039$, 90.1%) and sequential ($n = 388$, 9.0%) media uses. The remaining .9% of ICTs mentioned were too general to categorize into the discrete or sequential categories.

To create the codes in the ICT category, the two coders simply identified the ICTs mentioned by the interviewees (see Figure 1 for an example screen listing from the software program we used, QSR International N6). In the actual coding document, the discrete category consisted of 13 ICTs, and the sequential category consisted of 45 different ICT use pairs. The discrete ICTs mentioned had a per interview mean of 60.5 ($SD = 36.0$, range = 5 to 192). There were nearly 6 mentions of sequences of two or more ICTs per interview ($M = 5.9$, $SD = 7.4$, range = 0 to 44) and 346 instances of ICT pair sequences in the coded data. We found 42 instances (or about 11% of all sequences) where more than two ICTs were mentioned. Because these instances represented many different sequences of three and four ICTs, we limit our analysis to the 346 pairs of paired sequential ICT use.

The percentages of reasons for use were 62.7% information, 21.7% persuasion, 10.3% documenting, 2.4% social, 2.1% entertainment, and 0.8% multiple uses or other. We used Scott's (1955) *pi* to calculate intercoder reliability, which adjusts for coder agreement resulting strictly by chance. After several rounds of initial training, the resulting intercoder reliabilities were .86 (unit of analysis), .92 (ICT), and .82 (uses). There was also a midpoint check and adjustment of operationalizations. A random sample of 10% (33) of the sequences was subjected to double coding (i.e., to assess which specific ICTs were involved) and resulted in a reliability of .91. The final reliabilities were .92 (unit of analysis), .93 (ICT), and .79 (uses).

Figure 1
Screenshot of N6 List of First 30 Information and Communication Technology Codes Developed From the Data



Results

RQ1: What Are the Relative Frequencies of Discrete, Sequential, and Follow-Up ICT Use?

Table 2 provides the counts and percentages of the most frequent discrete ICTs, ICT sequences, and follow-up ICTs in each sequence. For space considerations, only the most frequent ICTs are presented in the table and discussed. The Web was the most frequently used discrete ICT, followed by e-mail, FtF, the computer, paper, and the telephone. There were 13 ICTs involved in 346 sequences with 45 unique pairings. The eight most frequent

Table 2
Frequency and Reasons for Discrete Information and Communication Technology (ICT) Use, Sequential ICT Use, and Follow-Up ICT Use

	n	Total (%)	Information (%)	Persuade (%)	Document (%)	Social (%)	Entertainment (%)
Discrete ICT[a]							
Web	1,406	38.0	77.0	15.0	3.0	1.0	3.0
E-mail	709	19.0	61.0	14.0	19.0	5.0	2.0
Face-to-face	523	14.0	43.0	46.0	1.0	8.0	2.0
Computer	248	6.7	26.0	24.0	48.0	0.0	2.0
Paper	201	5.4	76.0	7.0	17.0	0.0	0.0
Telephone	142	3.8	61.0	37.0	0.0	0.0	3.0
ICT Use Pair Sequence[b]							
Web–face-to-face	46	13	63.0	37.0	0.0	0.0	0.0
Computer–Web	31	9.0	32.0	0.0	68.0	0.0	0.0
Face-to-face–e-mail	26	7.5	23.0	50.0	19.0	8.0	0.0
E-mail–face-to-face	18	5.2	67.0	33.0	0.0	0.0	0.0
E-mail–telephone	17	4.9	59.0	29.0	0.0	12.0	0.0
Web–telephone	15	4.3	80.0	20.0	0.0	0.0	0.0
Web–e-mail	14	4.1	86.0	14.0	0.0	0.0	0.0
Face-to-face–Web	14	4.1	64.0	36.0	0.0	0.0	0.0
Follow-Up ICT[c]							
Face-to-face	81	23.4	61.0	38.0	0.0	0.0	1.0
E-mail	67	19.0	55.0	30.0	12.0	3.0	0.0
Web	57	16.5	47.0	13.0	41.0	0.0	0.0
Telephone	47	13.6	72.0	24.0	0.0	4.0	0.0
Paper	24	6.9	42.0	42.0	17.0	0.0	0.0
Computer	22	6.4	55.0	27.0	18.0	0.0	0.0

a. Overall *N* of discrete ICTs coded for reasons is 3,716. This section includes the top six ICTs, representing 86% of that total.
b. Overall *N* of all ICT use pairs coded for reasons is 346. This section includes the top eight ICT pairs, representing 52.3% of that total.
c. Overall *N* of all follow-up ICTs is 346. This table includes the top six follow-up ICTs, representing 86.1% of that total.

sequences were Web–FtF, computer–Web, FtF–e-mail, e-mail–FtF, e-mail–telephone, Web–telephone, Web–e-mail, and FtF–Web. The six most frequent follow-up ICTs in those sequences were FtF, e-mail, Web, telephone, paper, and computer.

RQ2: What Are the Reasons for Using Discrete, Sequential, and Follow-Up ICTs?

Discrete ICT use. Table 2 shows that the Web was used most frequently for information seeking, which was the top reason for using e-mail, paper, and the telephone as well. FtF was used most commonly to persuade (with the telephone being heavily used for that purpose as well), and the computer was used most often to document.

Sequential ICT use. The most frequent ICT sequence, the Web followed by FtF, was used about two thirds of the time for information reasons and one third for persuasion. Using the computer followed by the Web, the second most frequent ICT use pair, was motivated by information about one third of the time but about two thirds of the time for documentation. Overall, information was the most common reason for all of the top eight pairs except computer–Web and FtF–e-mail, which were used most frequently for persuasion.

Follow-up ICT use. Information was the most likely reason for using any of the six most frequent follow-up ICTs, except for paper, which was used equally for information and for persuasion. FtF was also used frequently for persuasion.

Comparing reasons for discrete and follow-up ICT use. The reasons people used the telephone were similar (primarily for information, secondarily for persuasion) regardless of whether it was used discretely or sequentially. But there were striking differences in the Web and FtF categories. When people used the Web as a discrete ICT, primarily it was for information purposes, somewhat for persuasion (which likely suggests that even discrete Web use is connected in some way to the involvement of others), and rarely to document. But when the Web was used as a follow-up medium, only about half of the time was it used for information, still somewhat less for persuasion, but about 10 times more frequently for documentation. When FtF was used discretely, it was used about evenly for information and persuasion, but when used as the follow-up medium it was used much more for information and just a bit less for persuasion.

RQ3: Do the Reasons Vary Across Discrete, Sequential, and Follow-Up ICT Use?

Discrete ICT use. To address this question and still be cognizant of chi-square assumptions about cell size, we chose the 10 most frequently used discrete ICTs and tested their association with the five reasons for use. The overall chi-square was highly significant ($\chi^2 = 998$, $df = 36$, $p < .001$). We examined the chi-square values for each of the ICTs across the five reasons to understand the discrete ICT use variance more completely. The significant separate reason chi-squares were for information ($\chi^2 = 135.18$), persuasion ($\chi^2 = 238.34$), documentation ($\chi^2 = 529.62$), and social ($\chi^2 = 82.71$) (all $df = 9$, $p < .001$). For these, the greatest differences between observed and expected frequencies were

Information (Web more frequent; FtF and computer less frequent than expected)
Persuasion (FtF and telephone more; Web, e-mail, paper, and intranet less)
Documentation (e-mail, computer, intranet, and database more; Web, FtF, telephone less)
Social (FtF more; Web less)

Sequential ICT use. As Table 2 shows, social and entertainment reasons were sparsely populated, so to address chi-square assumptions they were omitted from the analysis of the top ICTs used sequentially (and for follow-up, below). The overall chi-square was highly significant ($\chi^2 = 98.9$, $df = 14$, $p < .001$). ICT use varied significantly within persuasion ($\chi^2 = 16.5$, $p < .05$) and documentation ($\chi^2 = 70.7$, $p < .001$) reasons (both $df = 7$). The greatest differences between observed and expected frequencies were

Persuasion (FtF–e-mail more frequent; computer–Web less frequent than expected)
Documentation (computer–Web more; Web–FtF less)

Follow-up ICT use. The overall chi-square was highly significant ($\chi^2 = 59.53$, $df = 10$, $p < .001$). However, only documentation ($\chi^2 = 45.89$, $df = 5$, $p < .001$) was significant. The greatest differences between observed and expected frequencies were that the Web was more frequent than expected and paper was less frequent.

RQ4: To What Extent Is the Proportional Sequential ICT Use Explained by the Various Reasons?

We first created two ratio-level variables suitable for a regression and normalized the data to account for differences in number of codes per interview. Each person in the data set received a value reflecting the percentage of mentions of each of the five major reason categories—the predictors—and a value that reflected the percentage of mentions of sequential ICT use—the outcome variable. Examination of the raw data revealed three outliers that had excessively high mentions of the outcome variables, and they were removed from this analysis.

There was a significant negative correlation between two of the predicting reasons, information and persuasion ($r = -.82$, $p < .01$), and both were correlated ($r = .27$, $p < .05$) with percentage of sequential ICT use (positively for persuasion, negatively for information). Only one other correlation among the reasons was significant—between persuasion and social reasons ($r = -.30$, $p < .05$)—and none of the other reasons were significantly correlated with percentage of sequential ICT use. (Two regressions, each with one of the two correlated predictors removed, reinforced this lack of influence of the other reasons.)

As the two predictors were highly correlated but information was negatively associated with percentage of sequential ICT use, we concluded that the single best reason for using sequences (here, a pair) of ICTs is *to persuade* (to negotiate, bargain, get someone to do something for you, impress people or feel important). Alternatively, if one's primary reason is to *get information* (to learn, generate ideas, understand more about oneself, and solve problems), then one is equally likely not to use sequential (paired) ICTs. Persuasion seems to require uncertainty reduction through media redundancy and equivocality reduction through a mix of media richness attributes.

RQ5: What Are Common Patterns of Sequential ICT Use?

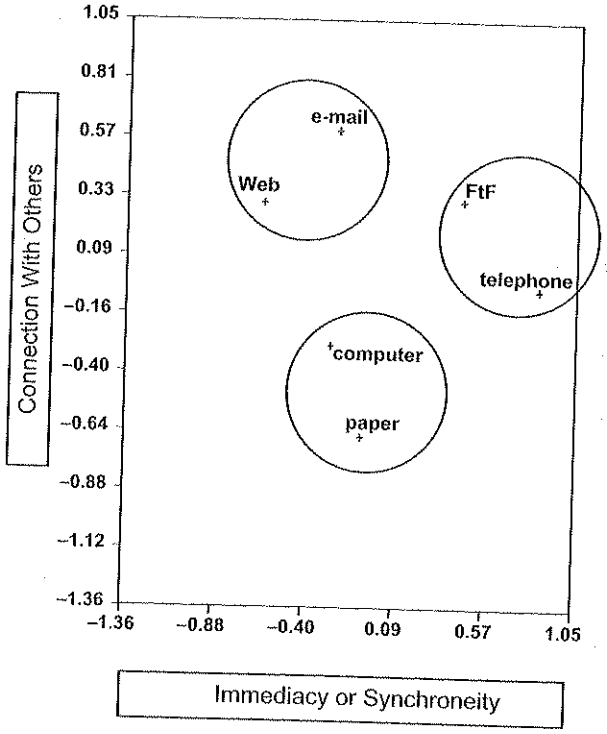
The rows of Table 3 list the first-used ICT, and the columns list the second-used ICT. The frequency of each paired sequence is indicated in the respective cells. The most frequently used follow-up ICTs in sequential ICT pairs were (in decreasing order of frequency) FtF, e-mail, Web, telephone, paper, and computer. These are the same as the most frequently used discrete ICTs but in a different order (the order for discrete ICTs is Web, e-mail, FtF, computer, paper, and telephone) and for different reasons.

Table 3
Information and Communication Technology (ICT) Use Pairs

First ICT Used in a Sequence	Second ICT Used in a Sequence														Total First ICT
	Web	Face-to-Face (FtF)	E-mail	Computer	Paper	Telephone	Intranet	PowerPoint (PPT)	News Group	Database	PDA	Mobile Phone	Fax		
Web	—	47	14	9	11	16	1	16	1	5	8		2		130
FtF	14	—	26		9	9			4	1					63
E-mail	8	18	—	3	4	18					4	1			56
Comp	31	7	11	—											48
Paper	3	2	1	7	—	2							4		24
Tele			10	1		—	1								14
Intra	1		1			2	—								4
PPT			1					—							1
News									—						0
Database		1								—					0
PDA											—				1
Mobile			2	2								—			4
Fax			1										—		1
Total	57	81	67	22	24	47	2	16	5	6	12	1	6		346
Second ICT															

Note: These are the total ICTs used in sequences regardless of whether the sequence was also coded for reason for use. There were also 42 sequences with more than 2 ICTs; these are not included in this table or in the analyses.

Figure 2
Spatial Clustering of Information and Communication Technologies Used Sequentially



Note: FtF = face-to-face.

To portray the relationships among the sequential combinations, we first created a submatrix involving only the six most frequently used sequential ICT pairs, and we used that matrix to create a correlation matrix. Then, we performed a hierarchical cluster analysis and a multidimensional scaling using that 6 × 6 correlation matrix. The agglomeration dendogram for the cluster analysis showed that the three-cluster solution was clearly distinct from the other solutions. As Figure 2 shows, the sequentially used ICT relationships occur in three clusters: (a) paper and computer, (b) telephone and FtF, and (c) Web and e-mail.

Discussion and Implications

As researchers continue studying ICT use in organizations, it is important to take a more complex view of this use and explore sequential ICT use. The present study compared discrete, sequential, and follow-up ICT use across 64 different organizations in two nations. Although the six most frequently mentioned ICTs were the same whether used as discrete or follow-up media, they were not used with similar frequency (Web and computer relatively more frequently as discrete and FtF and telephone relatively more frequently as follow-up ICTs). They also had slightly different motivating reasons for use. FtF was used more for persuasion as a discrete medium and more for information as a follow-up medium. The computer was used much more for information as a follow-up medium, whereas paper was used much less to follow up. Finally, the computer was primarily used for documentation when used discretely, whereas the Web was used more for documentation when following up.

Sequences (pairs) of ICTs were generally used most frequently for information, except for computer–Web (primarily for documentation) and FtF–e-mail (primarily for persuasion). Even though information was the most frequent reason associated with most sequence pairs, the overall percentage of sequential ICT use was positively predicted by persuasion reasons and negatively by information reasons. Thus, the experienced ICT users in this study used sequences of ICTs when they needed to persuade others. The many kinds of sequential pairs generally were represented by three clusters: Web–e-mail, computer–paper, and FtF–phone.

Contexts of Sequential ICT Use

To better understand the usefulness of three frequently mentioned ICT sequences identified in this study, we provide just a few qualitative examples from the interview transcripts. These provide explanations of the sequences of ICT use to prepare for FtF meetings, to perform independent daily tasks, and to use as follow-up strategies to persuade others.

Preparing for an FtF meeting. The most frequently mentioned ICT sequence was using the Web followed by FtF. Almost two thirds of the time that this sequence was used it was for information reasons, and the remaining third was for persuasion. The people in this study used the Web as a first information-gathering step in this process. When they met FtF, sometimes the goal was persuasion and sometimes the goal was information. But regardless

of the reason for the meeting, these expert ICT users searched the Web to prepare for the meeting. Salespeople in our sample typically talked about visiting a customer's Web site to appear more credible when they later met the customer FtF. Engineers spoke of researching details to be more knowledgeable when they talked with others FtF. The Web was used as a preparation step, and this use worked well in the complex process of establishing source credibility and managing impressions. In qualitative studies of specific organizations, both Watson-Manheim and Belanger (2007) and Chudoba et al. (2005) also found evidence that ICTs were used to coordinate and share information prior to meetings. This study quantified the prevalence of this practice and identified the important role that searching the Web for information played in changing the subsequent FtF interaction.

The prevalence of the need to prepare for meetings highlights the important role that access to information (arguably easier access in the case of the Web) plays in the communication process. Today, people are expected to have "done their homework," and if they skip this vital preparation step their reputation might suffer. This also indicates how information and communication are intrinsically linked, and it raises a question: How does this access to information change the subsequent communicative activities?

Working individually to accomplish daily tasks. The second most frequent sequence, using the computer followed by the Web, also speaks to the important role that information plays in the communication process. (Using the computer meant using the standalone functions of a computer such as word processing or PowerPoint, whereas using the Web meant connecting to online resources.) This pairing was exclusively used for documentation and information reasons, and never for persuasion. One interviewee explained this by saying that she put together a PowerPoint presentation and then searched the Web to find specific information to complete the slides. These activities were not directly communicative, yet they were so intertwined with the subsequent sharing of this information that this sequence provided an important context for how the participants used ICTs.

Following up to persuade. Another frequent ICT sequence was using FtF followed by e-mail. This was the only sequence in the study that involved persuasion half of the time. It was also one of the few sequences that was used frequently to document. People in this study felt that when they followed-up a FtF meeting with an e-mail (an asynchronous textual ICT), they could be persuasive. Perhaps this also plays a role in understanding how people use ICTs

in sequences to enhance credibility. A small business owner explained how this works and how it actually helped him get business:

> If I e-mail them and send an attachment with a picture of something and I say that I don't think I really explained this to you [when we met FtF] quite as well as I need to, so here is a picture that may help you in making your decision a little bit more, I'm not being pushy and it comes across a whole lot better.

Here the "information" served as a supplement to FtF communication and helped him reinforce his credibility. This ultimately expanded the number of channels he was using with the customer and might have made him more persuasive.

Sequences, MRT, and information theory. Two of these prominent sequences, Web followed by FtF and FtF followed by e-mail, illustrate how using sequential ICTs can expand the number of cues available through media and provide communicative redundancy that might reduce errors. In both cases, FtF appeared to be cue expanded by the use of another ICT that offered slightly different features. For example, FtF does not have a documenting capability, but by following up a FtF conversation with e-mail the written channel was combined with and supplemented the attributes found in FtF. This finding supports an expanded conception of MRT and highlights the importance that the richness factor of social cues and the use of multiple channels played in equivocal tasks such as persuasion. These sequences also suggest support for information theory (specifically its focus on error reduction). By combining ICTs with different yet complementary features, redundancy helped fill in the communication gaps and reduced errors.

Use Varies Across Reasons

The analyses and comparisons of discrete, sequential, and follow-up uses of ICTs show that people use ICTs for different reasons. These expert ICT users chose some discrete ICTs proportionally more frequently than others in all the studied reasons except for entertainment. Documentation had the highest significant variation across the discrete ICTs, followed by persuasion, information, and social reasons. Sequentially used ICTs also varied across reasons. Documentation once again had the highest variation across the sequential ICTs, but differences were not significant for information or persuasion reasons. Follow-up ICTs also varied across reasons, with documentation again having the highest variation.

Documentation. The frequent use of documentation in both discrete and sequential use of ICTs is directly explained by the inherent documenting function present in some of the ICTs but not others. Some, such as e-mail, can be used to document every communication attempt. Here, e-mail was used for documentation 19% of the time. People in this study were aware of the power of e-mail for documentation. For example, one U.S. manager said, "It's always good to have a paper trail of task requests so that there's an auditing capability there. '[Saying] oh yes, we did ask you on Monday, see, here's my e-mail.'" Other ICTs, such as FtF and the telephone, have no documenting ability. People said that they used them for documentation 1% and 0%, respectively. It is important to note that sometimes this lack of documentation is also desirable. A personnel manager said, "On the personnel issues, we really don't want that stuff on e-mail." Yet recent research has shown that in addition to FtF, managers have a strong preference for written materials (Sheer & Chen, 2004), and documentation requirements tend to necessitate the use of some ICTs and preclude the use of others.

Documentation as a sequential, follow-up strategy relates quite well to error reduction and information theory. In Reinsch and Beswick's (1990) voicemail study, organizational members of fairly low managerial levels expressed a need to document their voice messages. Reinsch and Beswick claimed that this can be connected back to cost minimization theory by showing that people lower in the organizational hierarchy are concerned about blame-assignment issues and use dual channels to help eliminate their concerns. We believe that their perspective on this finding can be widened to include more error costs than simply avoiding blame. For example, after meeting FtF, people can send an e-mail to many others who might have missed the conversation but need to be kept informed. Using a written channel to document a verbal conversation can also serve to reshape understanding or influence other parties. Essentially, it helps reinforce commitments because it is easier to forget, misinterpret, or repudiate an oral commitment than a written one. Finally, using a written channel can help to organize the information and verify understanding.

Persuasion. Persuasion reasons also varied across discrete use but not sequential use. When used discretely, FtF and the telephone were the two media used most frequently for persuasion (46% and 37%, respectively). The frequency that the phone was used for persuasion increased even more if the mobile phone category (43%) was combined with the telephone. These findings, although not measuring the effectiveness of these strategies, support other work that has focused on the persuasive role of FtF communication. Persuasion scholars have long touted the value of using FtF

over mass media to persuade others (e.g., Berelson, Lazarsfeld, & McPhee, 1954), and many have empirically demonstrated that it can be more persuasive than computer-mediated communication (e.g., Wilson, 2003). In this study, speaking with someone synchronously was prioritized by these experienced ICT users when their goal was persuasion. Persuasion tasks would likely be viewed as highly equivocal, and MRT predicts that using FtF will provide the richest environment to make this conversation more efficient. Correspondingly, the Web, e-mail, and paper (less information rich media) were used least frequently (15%, 14%, and 7%, respectively) for persuasion.

Persuasion Predicts Higher Percentage of Sequential Use

When attempting to persuade, experienced ICT users tended to employ a greater percentage of ICT sequences. Persuasion activities are higher risk, and in some cases the outcomes of that persuasive attempt can directly affect a task, job, or career. These persuasion findings contrast with information needs because people choose a discrete ICT for that task. Perhaps information needs are more personal than dyadic in nature, and, as prior research has suggested, people have varying individual preferences for ICTs (King & Xia, 1999).

Another explanation for the persuasion finding is that failure may have high costs, so if the initial attempt did not go so well, people will want to try again. Two of the three patterns of sequential use found in this study, preparing for a meeting and following-up to persuade, illustrate how multiple ICTs can bolster a communicative attempt. Although there are no outcome data in this study, this explanation could support Barry and Fulmer's (2004) claim concerning influence attempts and a subsequent use of a richer or higher bandwidth ICT. The finding that FtF was the most commonly used second ICT could support this perspective. Yet these findings could also indicate that when people need to persuade, they strategically plan to use sequential ICTs in general. Perhaps people acknowledge that persuasion needs are complex, requiring redundancy and error reduction, and thus are more likely to need multiple communicative attempts.

This finding also supports the expanded view of MRT articulated earlier. If immediacy of feedback were the most important trait for a highly equivocal task such as persuasion, then FtF as a discrete medium should be considered better than engaging in sequential ICT use. However, because people said that when they needed to persuade they used multiple ICTs, it appears that other traits such as timely feedback, cue expansion, personalization, or language

variety might prove more important in this more process-oriented perspective of media use.

Common Patterns of Sequential ICT Use

The cluster analyses and multidimensional scaling plot (Figure 2) provided another perspective on describing relationships between ICTs used in sequences. The three clusters were (a) FtF and telephone, (b) computer and paper, and (c) Web and e-mail. Each of the three two-ICT clusters may be tentatively described on the basis of two underlying dimensions: degree of connection with others and availability of synchronous modes. We label the first cluster *synchronous connecting* because both FtF and telephone have the ability to connect people in real time. The second cluster is the *asynchronous–personal* group because both the computer and paper, as defined in this study, are primarily controlled by an individual, and if information is communicated, it happens asynchronously. The final cluster is called the *asynchronous–connecting* group because the Web and e-mail both link organizational members to the outside world, but asynchronously.

These two dimensions support and extend existing theoretical work. The *availability of synchronous modes* is essentially a media trait that is closely related to one of Daft and Wiginton's (1976) reasons for richness perceptions, immediacy of feedback. It appears that when a communicator wishes to follow up a prior interaction, a medium's synchroneity ability is an important trait. It is important to note that this study does not suggest that synchronous modes are always desirable as follow-up strategies, but rather that people might achieve productive redundancy by using complementary sequential ICTs. Furthermore, acknowledging that the *need for connecting with others* varies also supports optimizing perspectives, such as MRT (Daft & Lengel, 1984, 1986). It demonstrates that when choosing ICTs, those that do not directly connect people are still a vital part of the process of communication, even if they are not used as frequently.

ICTs Used for Following Up

The present study also contributes to our understanding of the reasons people use ICTs to follow up a communication interaction. FtF was the most commonly used follow-up ICT, closely followed by e-mail and then the Web (Table 3, column totals). Considering discrete ICT use, the Web was used twice as frequently as e-mail and nearly 3 times as frequently as FtF (37%, 20%, and 14%, respectively; Table 2).

ICTs were used second in a sequence for slightly different reasons than they were used first. For example, paper was used for persuasion only 7% of the time when it was used discretely yet 42% when it was used sequentially. Perhaps this finding also relates to the previous suggestion that people use multiple ICTs for credibility-enhancing reasons. Using paper as a follow-up to another ICT (e.g., FtF) might help people expand the number of modalities available for reinforcing messages and reducing errors. E-mail as a sequential ICT also experienced a doubling in its persuasive use from discrete (14%) to follow-up (30%). E-mail, like paper, has the ability to textually convey and document information. Because FtF is so often used as a first ICT in persuasion, the sequential use of paper and e-mail provides access to a modality—that is, writing—missing from FtF.

Figure 3 summarizes the overall results from this study from the theoretical perspectives of MRT, information theory, and uses and gratifications.

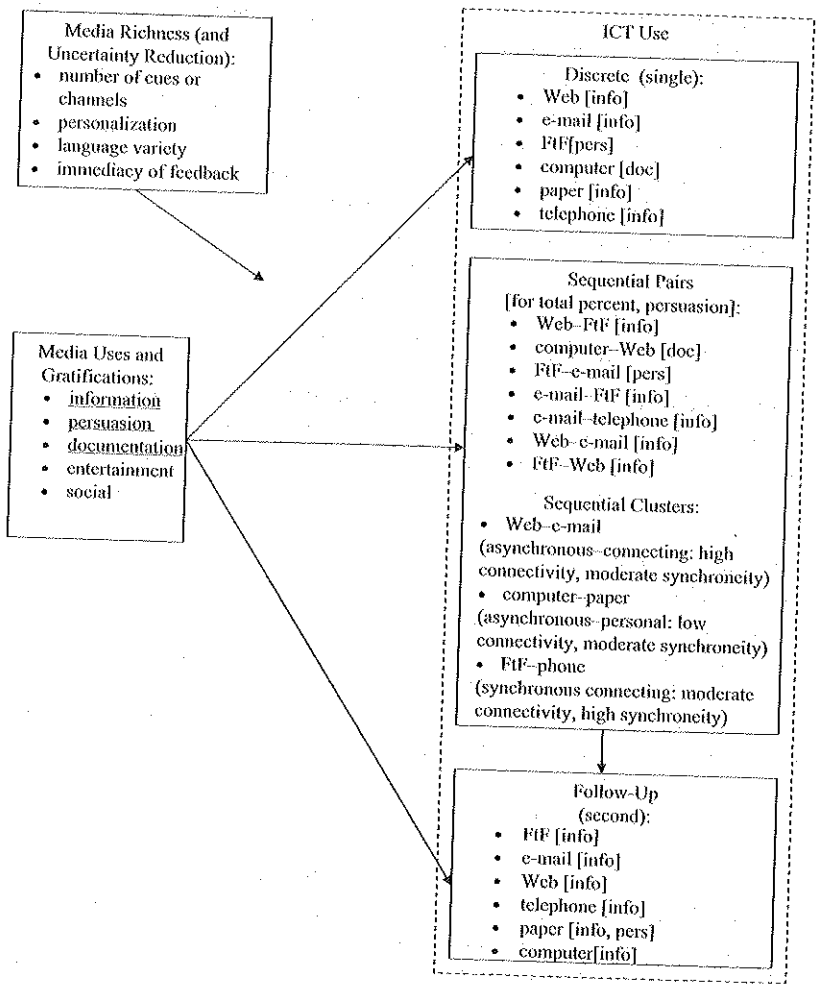
Strengths and Limitations of This Study

One of the key strengths and unique contributions of this research is the focus on obtaining responses from a wide variety of organizations. This variety provides greater potential variance to explore the boundaries of the results and avoids context-specific biases from analyzing one organization.

With every research approach come trade-offs (Weick, 1979), and this study is no exception. There are limits to the type of data available through the text of an interview. Analyzing relations between ICT use and reasons (even when they are mentioned spontaneously and not in response to specific questions, as was the nature of this study's transcripts) assumes that people use ICTs for strategic reasons and that they are aware of their reasons and influences. Scholars such as Timmerman (2002) have suggested that people (sometimes) use ICTs mindlessly, but measuring this concept is quite difficult. Although we do believe some use in a work setting is mindless, habitual, or routinized, much use is intentional, even required, and observable to the participants.

We probably also obtained fewer examples than if we had explicitly prompted for multimedia use. But our approach also has considerable strengths. We allowed talk about sequences to emerge during the interview *without* prompting. This is similar to the approach used by Watson-Manheim and Belanger (2007) in their study of using multiple media to communicate. We also did not prompt the interviewees for specific reasons they use certain ICTs because we wanted these to emerge from their discussion of daily organizational activities relating to ICT and work information. The examples

Figure 3
Summary Model of Influences on Discrete, Sequential (Percentage, Pairs, and Clusters), and Follow-Up Information and Communication Technology (ICT) Use by Experienced ICT Users



Note: FtF = face-to-face. Brackets indicate the primary reason (information, persuasion, documentation) for each ICT pattern (discrete, sequential pair, follow-up).

provided by the participants are thus probably more salient and less affected by positive response bias.

Another limitation to this study concerns the multifaceted nature of the ICT termed *Web*. Because of the convergence across multiple digital modes, personal choice and interactivity, and the constantly evolving nature of the Internet, the "Web" includes a wide array of information and communication resources and processes (Katz & Rice, 2002). People can and do use the Web in many different ways. Future studies need to find ways to clearly differentiate between the Web's information search functions and communicative functions and among media richness attributes, such as extent of synchroneity and use of multiple media modes. As our respondents rarely mentioned specific functions or modes of their Web use, results relating to Web use probably involve considerable measurement error, thus reducing the likelihood of significant associations with reasons for use. Another coding limitation that decreases the likelihood of capturing all possible ICT sequences mentioned by the respondents is the use of the sentence as the unit of analysis. The only sequences captured in this study were those mentioned within a single sentence. Although this is necessary for content analysis, it does pose a limitation to this study, as it probably underestimates sequential ICT use.

We also note that we did not conceptualize or code for media multitasking—whether overlapping media use or completely simultaneously and whether with one or more other communicants. Some of the research on media multitasking—especially use of mobile phone by adolescents or college students—is noted in the review section, but clearly this is an increasing phenomenon in organizational settings as well—such as texting during meetings.

Opportunities for Future Research

Perhaps the most promising findings from this study are how these advanced ICT users employ ICTs sequentially to persuade. At different points in time, everyone needs to persuade others, but the success and livelihood of people such as salespeople, consultants, CEOs, and academic deans critically depends on their ability to persuade. Current research often provides the advice "use FtF," but is that complete advice? Rarely is persuasion accomplished in one interaction; ICT sequences are likely involved. Future studies should more completely examine the structure of these persuasion-motivated ICT use sequences and link them to outcomes. Further exploration of the ICT pairs used to prepare for meetings, do daily tasks, and follow up to persuade will help us understand more about how to order our ICT use.

One way to begin this research is to build on the two dimensions discussed here that describe how people use ICTs sequentially. First, why are people using an asynchronous–personal ICT followed by a synchronous–connecting one? People might search using an asynchronous–personal source to help them appear more knowledgeable before they proceed interpersonally. Theoretically, the literature on impression management (Goffman, 1959; O'Sullivan, 2000), uncertainly reduction (Berger & Calabrese, 1975), and social costs and symbols of knowledgeability (Falcione & Wilson, 1988; Feldman & March, 1981) explains this behavior. These areas are ones in which information science and communication might combine efforts to more completely explore this process of ICT use.

Although there are many theories about information-seeking behavior in general, Ramirez, Walther, Burgoon, and Sunnafrank's (2002) model considers how people use computer-mediated strategies when they seek information in communication situations. They claim that "it is likely that communicators begin by gathering information passively, evaluate said information, and begin formulating impressions of others, which serves as the basis for determining whether or not to proceed interactively" (pp. 224-225). This area is certainly one for additional research.

There is also a need for more research on which ICTs to use when following up a particular task or after using a prior ICT. As an example, several interviewees in this study suggested that e-mail seems less pushy than FtF or the telephone when following up a prior client contact, so it avoids several social communication costs, though possibly at the expense of delay and error costs. Testing theoretical propositions found in ICT succession theory (Stephens, 2007) might offer explanations concerning the use of complementary (often modality expanding) ICT use.

We also do not know how people can best use the Web for research to enhance their personal credibility before they meet FtF or have a telephone call. Past research has shown that source credibility matters in interpersonal persuasion (McCroskey, 1966; McCroskey & Teven, 1999) and Web use and evaluation (Metzger, Flanagin, Eyal, Lemus, & McCann, 2003). The particular dimension of credibility that is likely influenced by this type of sequential ICT use is expertise, although trustworthiness could also play a role. When people search the Web and become more knowledgeable, they might change the type of synchronous interaction. Perhaps they can skip certain more basic topics and progress to decision making more quickly.

Another opportunity for research is to examine sequences of ICTs used in the organizational meeting process. Recent research on multitasking and

multicommunicating during completely virtual, colocated, and FtF organizational meetings (Chudoba et al., 2005; Turner & Reinsch, 2007) has suggested that people are increasingly using multiple ICTs to communicate with a variety of partners. Although this type of use is most likely simultaneous and near simultaneous, we cannot forget that meetings are themselves processes, not simply discrete events. The findings here clearly point to viewing meetings from a more process-oriented prospective, one that likely involves sequences of ICT use.

Exploring the timing involved in the use of a sequential ICT is another area for research, which could be integrated with more general theory and research on temporality in organizational communication (Ballard & Seibold, 2004, 2006). For example, how long should one wait after sending an e-mail request to another person before following up with that person? Furthermore, should one send another e-mail, or would a telephone call or FtF be more appropriate? Although the importance of follow-up is found in virtually every sales, persuasion, and training text (e.g., American Management Association, 2005; Burg, 1991; Cialdini, 2001), there are rarely discussions of timing and the specific ICTs used for following up.

There are, of course, other, perhaps more subtle and less theoretically generated, reasons for using sequential or follow-up media. For example, as people vary in their experience and comfort with new technologies, they may become frustrated during use and switch to another medium, or they may use a follow-up medium to clarify or provide more comments than they were able to manage with the more demanding ICT. Certainly exploring and expanding the typology of reasons for use, especially of sequential or overlapping media, would be a fruitful avenue for future research.

Finally, it is important that we also examine the potential negative effects of sequential and simultaneous (or multitasking) ICT use. Broadbent's (1958) claim that people become overloaded when they receive information from multiple channels is likely in some contexts. Even though scholars have shown that this is not the case with simple two-channel situations (Hsia, 1968), in real, process-oriented communication attempts there is probably a media saturation point. In Farhoomand and Drury's (2002) interview study on causes of overload, 16% of participants mentioned that multiple ICT sources of the same information defined overload for them. It may also be the case that although sequential ICT use can reduce some access, error, delay, shadow, and transaction costs, it could also increase others.

Conclusion

This study contributes to the expanding research on sequential ICT use at work by employing a cross-organizational quantitative approach. A key contribution of this study is that when experienced ICT users need to persuade others, they use more ICT sequences, although specific sequences are largely motivated by information needs. This finding generates many possibilities for future research and provides a point at which organizational scholars and those studying human communication and technology can collaborate to better understand workplace uses of technology. The prominent frequencies and patterns of sequential use also highlight the importance of approaching ICT use from more of a process orientation. This study demonstrates that in future sequential, and possibly simultaneous and more complex, combinations, ICT research can benefit by carefully considering the MRT predictors of media richness and information theory and the needs identified by uses and gratifications.

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