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We propose a conceptual as well as practical distinction, possible in voice mail systems, between the traditional telephone genre of voice answering and a new genre of telephone communication of voice messaging. This distinction should be reflected in comments provided by respondents who report that they use voice mail more for messaging than for answering, and by those who send more voice messages than do others. Semantic network analysis identified different clusters of concepts found in responses to open-ended questions on a survey completed by these kinds of users. For example, all users had common word clusters concerning the ability to overcome temporal constraints and leave messages through voice mail. However, responses of "senders" and "messagers" included word clusters such as "group distribution" and greater concern with issues such as critical mass and problems of traditional telephone usage (such as busy signals), while responses of low senders and answerers included clusters indicating concern about the impersonal nature of voice mail. We discuss implications both for this method of analysis as well as for implementation and management of voice mail systems.

Is It Really Just Like a Fancy Answering Machine? Comparing Semantic Networks of Different Types of Voice Mail Users

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In the past 20 years, computer-mediated communication systems such as computer conferencing, electronic mail, computer bulletin boards, group decision support systems, electronic blackboards, intelligent information retrieval systems, and groupware systems have been developed and used to support organizational coordination and collaboration.

Despite calls for better conceptual descriptions of new media (Ellis & Nutt, 1980; Heeter, 1989; Nass & Mason, 1990; Rice, 1987, 1992), such systems are often described or analyzed as though there were no potential differences in what features a system might offer or how a system might be used, or as though conventions for use of traditional media will simply carry over to similar new media. These approaches, while apparently simplifying the task of marketing and implementing new media, reify such systems into immutable technologies and confound social practices with media, denying both the flexibility of such systems as well as the adaptability and innovativeness of users (Rice & Associates, 1984; Sproull & Kiesler, 1991).

Rather, each medium differentially involves a range of technical, social and perceived constraints, such as the number and type of senses involved, whether communicants must use the medium simultaneously or in the same place, can send the same message to multiple people at the same

time, can process or re-process the message, and can obtain or provide rapid feedback (Rice, 1987). Further, old forms may be embedded in new media, or new genres of communicating may emerge (Yates & Orlikowski, 1992). Because of the range of possibly new characteristics due to the combination of capabilities of both computers and telecommunications networks, new media have the potential to change patterns of constraints in organizational communication, to support new ways of conducting work, and to foster new genres of media use (Rice & Steinfield, 1992; Sproull & Kiesler, 1991; Yates & Orlikowski, 1992).

It *is* true that the store-and-forward nature of voice mail (VM) allows initiators to ask questions when they wish and allows respondents to prepare detailed responses at their convenience, rather than having to reply immediately without full preparation (Hiltz & Turoff, 1978; Rice & Shook, 1990). In this sense, VM simply extends the traditional media genre of telephone usage. However, due to the ability of VM systems to support the *processing* of (oral) message content among multiple users (described in more detail below) rather than just the asynchronous *transmission* of messages between a sender and a receiver, a distinction between voice *answering* and voice *messaging* seems important, implying a potentially new genre of telephone usage.

Of course, users do not necessarily distinguish or explore such a new genre, whether due to social influences on developing interpretations of a new medium (Fulk, Schmitz, & Steinfield, 1990; Rice & Aydin, 1991; Rice, Grant, Schmitz & Torobin, 1990), expectations about a new medium based on gratifications and experiences derived from use of traditional media (Blumler, & Katz, 1974; Pool, 1973), beliefs in limited substitutability between old and new media (Rice & Associates, 1984; Short, Williams, & Christie, 1976), or carrying over familiar media genres and conventions into new media practices (Ehrlich, 1987; Yates, & Orlikowski, 1992). For example, Manross and Rice (1986) found that partially because respondents felt that their organization's new "intelligent telephone" system seemed more like a computer than a telephone, they typically only used two or three of the nearly 100 sophisticated features available to them via push button combinations. Yates and Orlikowski (1992) argued that over time, organizations and individuals develop accepted conventional forms of usage of particular media, which may or may not be transferred over to new media. They described the example of the development of the memo genre (such as the use of header, date, and limited topic focus) as it emerged from the rise of systems management in the early 20th century, through standard half-page memo forms in most organizations, to memo-like automatic formatting of electronic mail messages. They also warned

that conceptualizations of new media that are limited to familiar genres may constrain the use and application of those new media.

In the present case, conceptualizing VM as similar to the familiar telephone with a recording device (voice *answering*) might preclude individuals and organizations from taking advantage of the possibilities of a new genre whereby telephone messages may be re-processed, distributed, and generally managed as digitized content (voice *messaging*). For example, Adams, Todd and Nelson (1993) concluded from their comparative study of 68 electronic mail and VM users in 12 organizations, that, whereas e-mail was seen as having "a significant impact on how individuals communicate in an organization," "voice mail is viewed as only a supplement to the telephone and has minimal perceived impact on intraorganizational communication." This seems largely due to the fact that VM was perceived primarily as a passive answering service. The authors explicitly noted that because users perceived VM as similar to the telephone, they would have a hard time developing novel ways to use the new system. Trevino and Webster (1992) suggested that the lower assessment of VM compared to e-mail in their study might have been due to the fact that VM was primarily used in that organization as an answering machine.

Thus, this study asks, *Do differing conceptualizations of voice mail exist among different types of VM users*? This study analyzes semantic networks of comments by people who use VM in line with the traditional telephone genre or as a new, messaging genre to determine if those types of users also conceptualize VM in these different ways.

VOICE MAIL AS A COMMUNICATION MEDIUM WITH MULTIPLE GENRES

Voice mail is a computer-aided telephone system capable of handling digitized spoken messages. First commercially implemented around 1980, it has been adopted by numerous companies in recent years (Barrington & Baker, 1990; Parker, 1987), and simplified versions are now being offered by some regional telephone operating companies. We propose two distinct forms of VM usage.

Voice answering is the interception, receipt and storage of messages until the receiver is prepared to hear them — an asychronous store-and-forward system. This form of system use occurs when someone calls intending to reach and talk to an organizational representative who is away from the telephone or busy. The VM system simply records the message in the receiving user's voice mailbox, much like a telephone

answering machine, and the intended receiver listens to the recording when convenient, and responds as appropriate, perhaps by a "reply" to the voice mail message, a return telephone call or a memo.

Voice messaging is the intentional use of the system for asynchronous and coordinated ongoing communication, employing VM capabilities for processing the communication. This form of use occurs when a user dials directly into his or her VM account, and then communicates directly to other users' VM accounts. One may choose to use VM this way even though the other parties are near their respective telephones. Users may also store incoming messages for reference, forward messages to other users, record and store a message for future delivery, "broadcast" a single message to a number of users, change the greeting message, control the volume and speed of messages, use an online directory of names to find another user's voice mailbox, and attach comments to a received message and forward both to another user. Use of voice mail for its messaging capabilities is not only best understood in the context of shared tasks and managerial coordination, but also is likely to foster greater communication benefits than will use of VM only for its voice answering capabilities (Rice & Shook, 1990).

Research on voice mail (as opposed to descriptions in trade magazines vendor pamphlets) has only just begun to appear. Studies of technological developments (Philip & Young, 1987), surveys on levels of use and attitudes toward voice mail (Adams, Todd & Nelson, 1993; Barrington & Baker, 1990; Beswick & Reinsch, 1987; Grantham & Vaske, 1985; Nicholson, 1985), tests of choice and outcomes of voice mail (DiFiore, 1986; Reinsch & Beswick, 1990; Rice & Shook, 1990; Trevino & Webster, 1992), and implications for implementing voice mail (some of the above as well as Ehrlich, 1987 and Finn, 1986) are beginning to provide useful information on how people perceive, use, and evaluate voice mail in organizations.

SOME FOUNDATIONS OF SEMANTIC NETWORK ANALYSIS

This study is not primarily a methodological treatise. However, this section briefly provides an overview of semantic network analysis in relation to traditional content analysis. Then it summarizes several strands of past research — cognitive processing, information retrieval, and network-based content analysis — that form the foundations of semantic network approach in investigating this research question. Danowski (1988) provides more detailed background on these and related issues.

Why Semantic Network Analysis?

While we describe the specific method in greater detail below, the essence of semantic network analysis is rather straightforward. Text is analyzed to determine some measure of the extent to which words are related. One measure of this relationship is the extent to which word pairs co-occur within a given meaning unit. Then, this measure of relatedness is used to group, cluster, or scale the words (or some subset, such as the more frequently used words). These clusters can be directly interpreted, or used to derive more quantitative measures for use in other analyses.

Traditional content analysis might seem a more straightforward approach to understanding respondents' text. Traditional methods for content analysis are rather straightforward procedures that assign units of content or behavior to nominal categories. But these categories typically require *a priori* definitions on the basis of some theoretical framework (Krippendorf, 1980). In exploratory analyses, or where the researcher is interested in emergent meanings, such pre-defined categorizations may suppress new insights. And, especially for large bodies of text, content analysis can require considerable resources. But computerization by itself does not solve the problem of masking emergent meaning. Even most computer-based content analysis procedures (Ogilvie, Stone, & Kelly, 1982; Weber, 1984; Zull, Weber, & Mohler, 1989) are essentially categorizers, looking up text in a dictionary of meanings and then providing summary statistics about each category of meaning.

Thus computerized semantic network analysis may have some useful benefits, particularly in studies such as this one. First, it analyzes the natural text of respondents, rather than abstracted indicators such as *a priori* content categories. Second, it identifies emergent clusters of potential meaning. That is, it analyzes relations and distinctions among words rather than frequencies of isolated words. Third, while it can be used on single texts, as can quantitative content analysis and qualitative approaches such as semiotic, rhetorical or hermeneutical methods, it can also be used to identify global structures across large samples of text. Fourth, in some manifestations, it can automate large portions of what would otherwise be a difficult text management problem. And fifth, it allows the integration of qualitative (textual) and quantitative (numeric measures of usage or effects) approaches.

Some Prior Foundations for Semantic Network Analysis

Network approaches have been applied to the study of semantic memory and association processes (see, for instance, Chang, 1986, and

Flores-d'Arcais & Schreuder, 1987). For example, Collins and Quillian (1969) conceptualized memory as a hierarchical network in which words are nodes linked in relationships of facilitated and inhibited association. While such studies focus on intrapersonal cognitive processes, they helped to develop the argument that relations among words reflect cognitions and, in turn, influence responses.

Associations among words have been used as the basis for information retrieval algorithms and systems. For example, Pincus (1988) computed the closeness between words as the extent to which their morphemes are derived from the same linguistic word stem. These and other studies (such as Belkin, Oddy, & Brooks, 1982; Savoy, 1992) helped develop the argument that co-occurrences or other relations among words are useful indicators of meaning.

Citation analysis provided one of the earliest applications of network-based content analysis (Small, 1973). Danowski and Martin (1979) developed methods for overlaying the network of keyword descriptors that co-appeared about articles in databases onto a co-citation network (how pairs of authors both cite other authors' works). Callon, Courtial, Turner, and Bauin (1983); Lievrouw, Rogers, Lowe, and Nadel (1987); and Rice and Crawford (1992) provide examples of different approaches to analyzing co-occurrences of words derived from citation, title or article data.

The semantic network approach has also been applied to content analysis of media. By first coding the direction and valence of relationships among actors and issues in newspaper stories, and then analyzing those relationships using graph-theoretical methods, Cuilenburg, Kleinnijenhuis, and de Ridder (1986) and colleagues have developed a program of research analyzing such issues as the match between writers' intents and readers' perceptions, and journalists' perceptions of world events and readers' perceptions. Danowski (1982) coded pairs of messages exchanged on computer bulletin boards to produce a concept co-occurrence matrix. These concepts were then multidimensionally scaled, and the coordinates used to generate messages that could be sent to the bulletin board to help guide the course of discussion.

Recently, semantic network analyses have used other sources of content, such as responses to open-ended questions. The use of open-ended questions as a source of data was once highly controversial within the research community (Lazarsfeld, 1944), and debates about open- and closed-ended questions have resumed (Converse, 1984; Sheatsley, 1983; Shuman & Presser, 1981). Open-ended questions are less likely to impose bias in respondents' answers than are closed-ended questions, and they allow respondents to reveal what is salient to them, and to answer more

from their own frame of reference, in their own language, and for as long as they choose. Despite this flexibility, or perhaps because of it, detailed data from open-ended questions are not frequently used. Researchers typically use such questions mainly for a variety of specialized purposes such as exploratory interviewing and pretesting to develop a closed-ended instrument (Sheatsley, 1983). It sometimes seems that the main reasons why open-ended questions are not used are the cost and effort required for the necessary manual coding.

Carley and Palmquist (1992) have integrated several approaches into what they call "cognitive mapping," whereby respondents' mental models are extracted from various texts or verbal responses (including responses to open-ended questions), then represented by visual mappings, and finally described or compared to expected or prior mappings of the same respondents.

Essentially, these and other prior studies provided the underlying arguments about representing cognition and meaning through content associations. Computer-based text-management and network analysis methods enhanced and applied such conceptualizations and results to provide the basis for a variety of semantic network analysis approaches.

METHOD

A large insurance organization in the process of implementing a voice mail system was the setting for the study. The initial study population included all organizational members in two field offices and the home office in three cities who, because of the characteristics of their primary organizational applications, were targeted as potential users of the VM system and thus had received voice mailboxes (accounts) (N=488), excluding system administrators, general office accounts, and those working on the VM study (resulting in N=458). Organizational applications using the VM system included claims processing, marketing, and employee benefits in one field office; marketing, two classes of claims processing, and administration in another field office; and corporate audit, litigation, telecommunications, and corporate technology planning in the home office.

We distributed 458 questionnaires through organizational mail approximately five months after installation of the system, to assess recent experiences with and attitudes toward VM. From that population, 243 (53 percent) responded by returning the questionnaires to the researchers, and 230 (50 percent) of those provided open-ended comments used in the analyses below. Respondents included organizational members from all

hierarchical levels (47 percent secretarial and clerical, 14.5 percent administrative and executive assistants, 12.7 percent technical staff and middle management, and 26.2 percent upper management and legal professionals.) Because job categories were provided by the organizational representative only for those who answered the questionnaires, we cannot assess whether respondents proportionately represented the job categories of all VM account holders or not.

As Beswick and Reinsch (1987) note, training is important when implementing new technologies such as voice mail. All training materials in these sites explicitly emphasized the distinction between voice answering and voice messaging, to increase awareness of, and variance in, these different kinds of usage.[1] Participants were able to obtain one or more of three types of training when they obtained their account: within a group (72 percent had this type of training), one-on-one with a system coordinator (18 percent) or using various printed materials and the system-based tutorial by oneself (40 percent).

Data and Measures

The present data are part of a much larger, multi-site, longitudinal study of voice mail implementation. The full study also collected personal interviews and transcripts of focus group discussions as well as "while you were out" phone message slips and other archival data (Rice & Shook, 1990; Rice & Steinfield, 1993.) The present study analyzes only two sets of questionnaire measures, and one system-monitored measure, collected during the first post-implementation survey. Only users are analyzed.

Questionnaire Data: Textual Responses

The textual data are individuals' responses to five open-ended questions on the questionnaire developed in consultation with our organizational contacts: (a) "How has voice messaging changed the way you communicate with others?" (b) "In what specific applications or opportunities could voice messaging be especially useful?" (c) "How might voice messaging affect the company's relationship with customers or agents?" (d) "What did you like best about using voice messaging?" and (e) "What did you like least about using voice messaging?" We used these specific open-ended questions, rather than other textual data such as interviews and focus group transcripts, because we wanted short, focused comments about just these specific areas. Note that the full textual response of each respondent was used, so there is no intermediary categorical or numeric measure of the text, and so there is no corresponding measure of reliability or validity as would be associated with traditional content coding of these comments.

Questionnaire Data: Self-Reported Type of Usage

The questionnaire asked respondents to indicate the percent of their use of the system for voice answering, and the percent for voice messaging,[2] and to make sure these two added up to 100 percent. The mean of these two variables combined was 99.2 percent, so only the second measure is necessary. The self-reported *percentage of use of VM for messaging* (M=30.6 percent, SD=33.3, median=20 percent, max=99 percent) was dichotomized at the median to create two groups, *answerers* (low use of VM for messaging) and *messagers* (high use of VM for messaging) (total N=232).

System-Monitored Data: Messages Sent

The computer-monitored measure of *number of messages sent* per business week since first using the system (M=1.9, SD=4.0, median=0.5, max=24.7) was dichotomized at the median to create two groups, *high senders* and *low senders* (total N=294).

Comparing Usage Measures

Because this study is interested in responses that are based on some experience with the new system, rather than on identifying anticipated uses or predicting adoption, only individuals who either reported using VM for messaging at least one percent of their usage, or who sent at least one voice message, were included in the analyses.

The two usage measures correlated significantly but weakly (r=.33), so they seem conceptually and empirically to measure two moderately different aspects of VM use. Self-report usage data may be more valid measures of respondents' own conceptualizations of their type of use, but may be less reliable due to imperfect memory or imperfect understanding of the conceptualization. Computer-monitored usage data are reliable measures of system behavior, but may not be completely valid indicators of users' conceptualization of the distinctions between voice answering and voice messaging, or of the importance of system usage (Rice, 1990; Williams, Rice, & Rogers, 1988). There were no significant differences across the organizational levels or across the three types of training in either of these two usage measures.

Procedure

Each respondent's open-ended comments were "cleaned up" by removing plural forms or proper names and standardizing variants of words. They were then aggregated across the five questions for each respondent. Then four text files were produced: one text file each for high or low VM senders (441 and 268 comments, respectively), and one each for VM messagers or answerers (431 and 451 comments, respectively), for a total of 1042 comments, with 657 comments in common between those respondents with computer-monitored usage data and those with self-reported messaging data.

Each of these four text files was then run through a word co-occurrence program (Woelfel, 1991; however, the algorithmic procedures used for this study are general, and many other approaches are possible.) The program first excludes generic "stop" words such as articles, verbs of being and related prepositional words, and pronouns (as well as any other specified words, such as acronyms, place names, and company identifiers). Many social cognition analysts might argue that the concept "I" is crucial to the entire word network; however, because we were concerned with semantic structures across *types* of users, rather than for *individual* respondents, we dropped all pronouns. Then the program counts the number of times each pair of words appears within each separate marked "meaning unit" — here, each individual's separate response to each open-ended question. The program drops all words that only occur once in a response. Then for each of the four text files, the program creates a co-occurrence matrix, where the cell value is the number of times each pair of words occurs together within each response, aggregated over all responses in that file. The program then applies diameter hierarchical clustering to each matrix to identify clusters of words at any given clustering threshold (though the co-occurrence matrix may be also analyzed by other clustering or network programs — see Rice & Richards, 1985). Ruge's (1992) experiments on ways of measuring and clustering word associations found that the difference between using the total number of co-occurrences as a measure of word association, rather than a simple presence or absence of co-occurrence, improved the results far more than did differences in ways of calculating clustering distances among words. In order to highlight the more frequent word sets, the program was set to cluster only those words that occurred at least five times. For high senders, the number of total and unique words was 1627 and 121, respectively; for low senders, 729 and 61; for messagers, 1584 and 118; and for answerers, 1586 and 116.

RESULTS

The clustering results for all four subsamples of text are summarized in Table 1 and appear in Figures 1 through 4.

Word Clusters Common Across Usage Types

The clusters "leave (detailed) message" (cluster #1 in Table 1) and obtaining "better or needed information" (#8) are of concern to all four categories of users. These capabilities are available by using VM simply as a store-and-forward answering machine. All four kinds of users also mentioned "voice messaging" (#4), although for high senders it was clustered close to "customers and agents" (#7), whereas for answerers it was close to "answering machine" (#6). Note that low senders and answerers are particularly concerned that talking to a machine might be harmful for customer relationships, and that people might perceive the company as treating them as "just a number."

All four types of users also used the terms "field office" (#5) or "home office," as well as "away [from] desk" (#11) (except for messagers) indicating the ability to use the asynchronous store-and-forward capabilities of VM to coordinate activities among travelling agents, branch offices, and the home office. In this company, as in insurance companies in general, the problem of coordinating communication across applications and divisions, and with field offices and customer agents, was so serious that it motivated the organization to implement voice mail in the first place.

All types of users had clusters of words concerned with "not call" (#3) referring to the decreased necessity of having to actually get a specific person when calling in order to exchange information. However, high senders and messagers used "caller" or "person" while the others used "phone," implying that high users conceptualize how the system enables them to manage communication with other people, while lower users conceptualize VM as a way to reach someone else's phone — that is, using VM as an asynchronous store-and-forward system.

Word Clusters Unique to Different Usage Types

Only high senders and messagers had the cluster "group distribution" (#6), indicating they were particularly aware of the ability to process communications by sending a single message to many, pre-defined people, such as a group working on a proposal, or a supervisor's subordinates. High senders and messagers also referred to "busy signal" (#12), an explicit indicator of concern with one of the problems with attempting to communicate synchronously via the traditional telephone. Thus it should

Table 1
Summary of Word Clusters, Across High and Low Senders, Messagers and Answerers

	MAIN CONCEPT	SYSTEM-MONITORED USAGE		SELF-REPORTED USAGE	
		High Sender	Low Sender	Messagers	Answerers
1	Leave Message	x Detailed	x (Detailed)	x	x (Detail)
2	Phone Tag	(Play) x	—	(Avoid) x	Time Tag
3	Not Call	x (Caller)	Call Phone	x (Person)	(Not) Call Phone
4	Voice Messaging	x	x	x	x
5	Field Office	x	x	x	Home Office
6	Machine	talking[a]x	Not (Talk)[a]x	talking[a]x	Answering Machine
7	Customer Agents	x	—	x	x
8	Request Info.	x	needed info	(better) x	(allow) better info
9	Improve Comm.	x	—	x	—
10	Dial Tone	x	—	x	—
11	Away Desk	x	person away	—	x
12	Busy Signal	x	—	x	—
13	Access People[b]	x	need someone	need people	need someone
14	Others System[b]	x	answer system	x	—
15	Time Prompt[c]	x	—	—	—
16	Group Distrib.	x	—	x	—
17	Relationship	useful x	company x	—	useful x

Table 1 (continued)

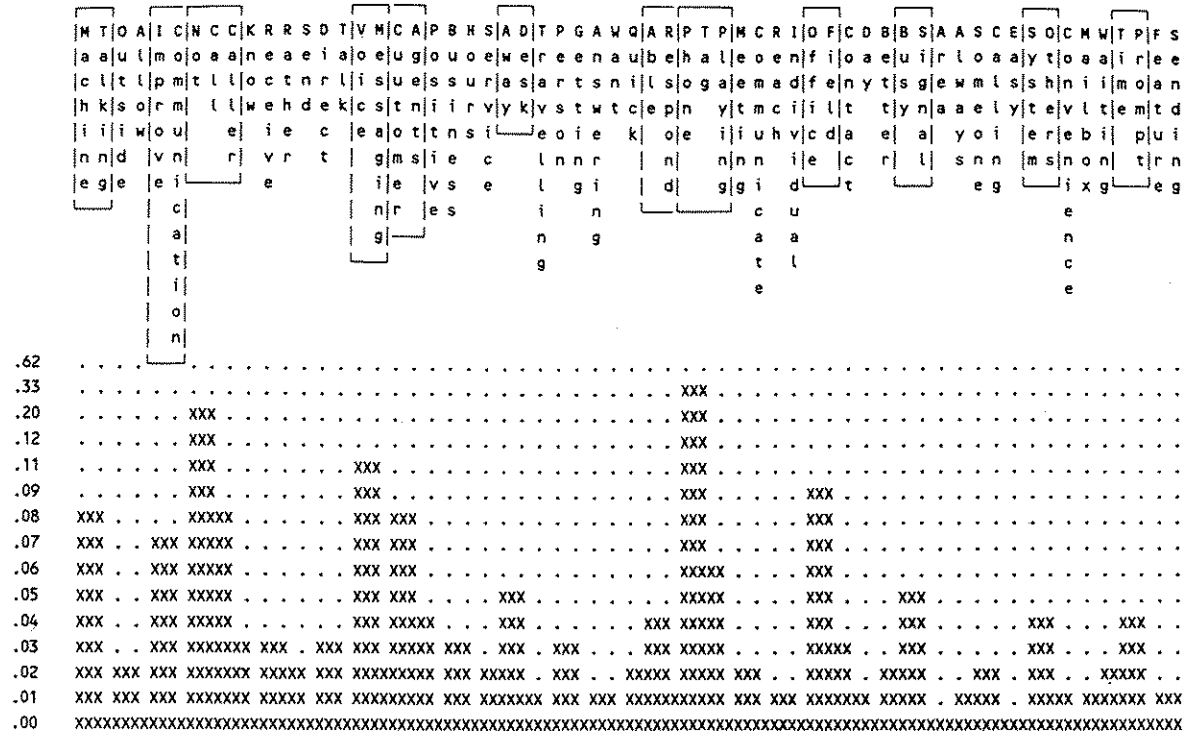
	MAIN CONCEPT	SYSTEM-MONITORED USAGE		SELF-REPORTED USAGE	
		High Sender	Low Sender	Messagers	Answerers
18	People Number[a]	—	(problem)	—	people number
			mailbox		
			number		
			(impersonal)		
			people hang		
			[up]		
19	Other	without long	know caller	detailed	able respond
				playing	want talk

Note: Entries in the table indicate clusters of words that occurred five or more times in each set of text files. For example the cluster 'Leave Message' occurred for all four types of users; for three types of users the word 'detailed' also appeared in the cluster (high senders) or at a subsequent clustering level (low senders, answerers). Table entries are symbolized as follows: X or CAPITALS = words of main concept are included in primary clusters; x or lower case = words of main concept are included in secondary clusters; (parentheses) = word clustered with main cluster at a greater distance; — = did not appear in cluster.

[a] concerns about customers' disliking talking to machine

[b] critical mass necessary to make system more valuable

[c] dislike of long number sequences and command prompts to access one's mailbox



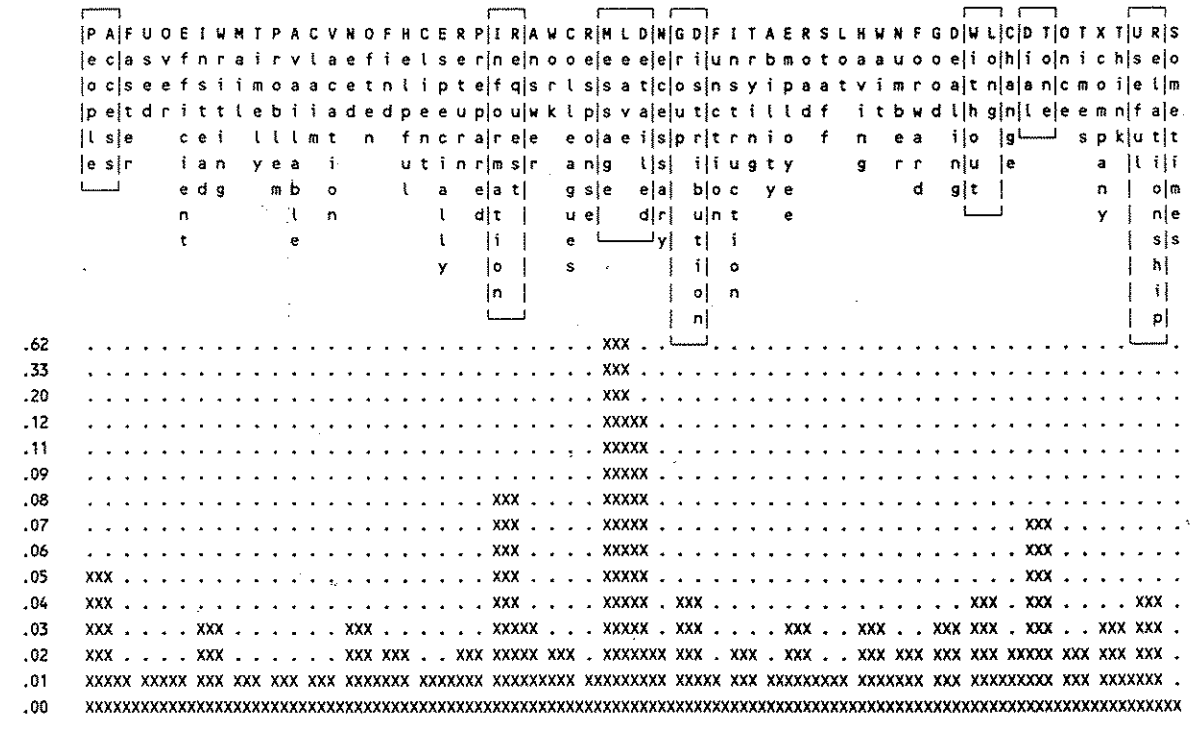


Figure 1. Clustering of words used at least five times by voice mail **high senders** (words cluster at given closeness if connected by Xs; primary clusters in boxes).

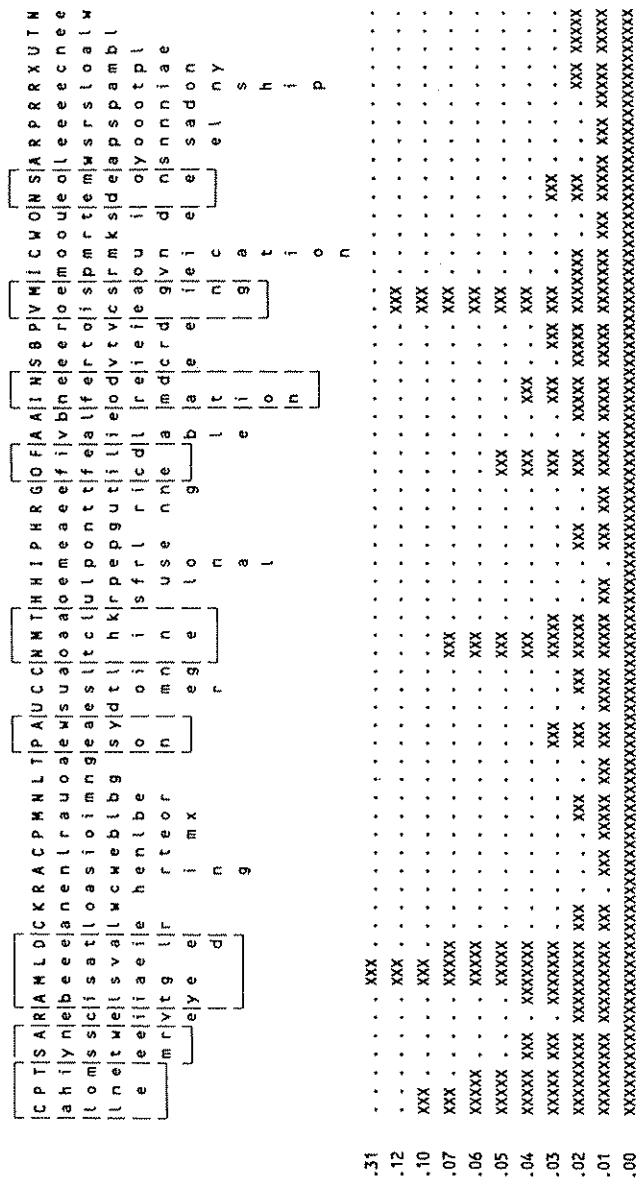


Figure 2. Clustering of words used at least five times by voice mail **low senders** (words cluster at given closeness if connected by Xs; primary clusters in boxes).

not be surprising that only high senders and messagers referred to the cluster "improve communication" (#9), implying they feel that such capabilities remove constraints and allow better communication.

Also, only these users seemed concerned with the "dial tone" (#10) (and, for high senders, the "time prompt" #15, which refers to the time it takes waiting for the voice mail system prompt), which refers to the cumbersome process of checking for messages and logging in to one's account. This would be more of an issue to those who wanted to use the system more frequently, and use the system more for processing communications, because they would understand the process and possibilities of voice mail more.

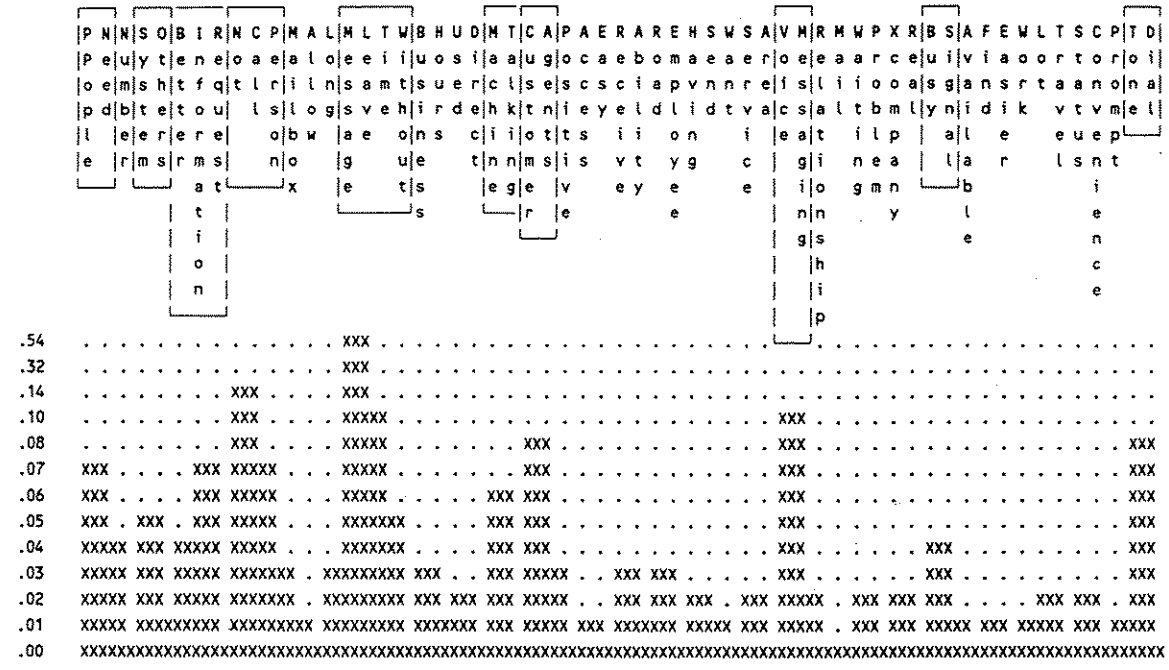
Although all four groups of users refer to the general issues of "access (to) people" (#13), high senders and messagers refer to "people," implying groups of other communicators, while low senders and answerers refer to "someone," implying only one specific individual. In light of this possible inference, note that only high senders and messagers refer to "others [on the] system" (#14), referring to the need to access sufficient others on the system: that is, a critical mass.

Summary

While there are considerable similarities in word clusters among the four types of users, the clusters also differentiate somewhat between types of users. High senders and messagers emphasize group communication, improved communication, the problems of frequently getting a dial tone or a busy signal with the regular telephone, some interface problems associated with high usage of VM, and the need for others to be on the system. Low senders and answerers emphasize the asynchronous aspects of leaving a message on another's telephone, access to individual others rather than to groups or general others, and the impersonal machine-like aspects of voice mail.

DISCUSSION

Initially, we asked the general research question, *Do differing conceptualizations of voice mail exist among different types of VM users*? While we conclude that there are reasonable indications that this is indeed the case, the process of studying this question and the results lead to some general comments concerning both the method of analysis as well as the implementation and use of voice mail.



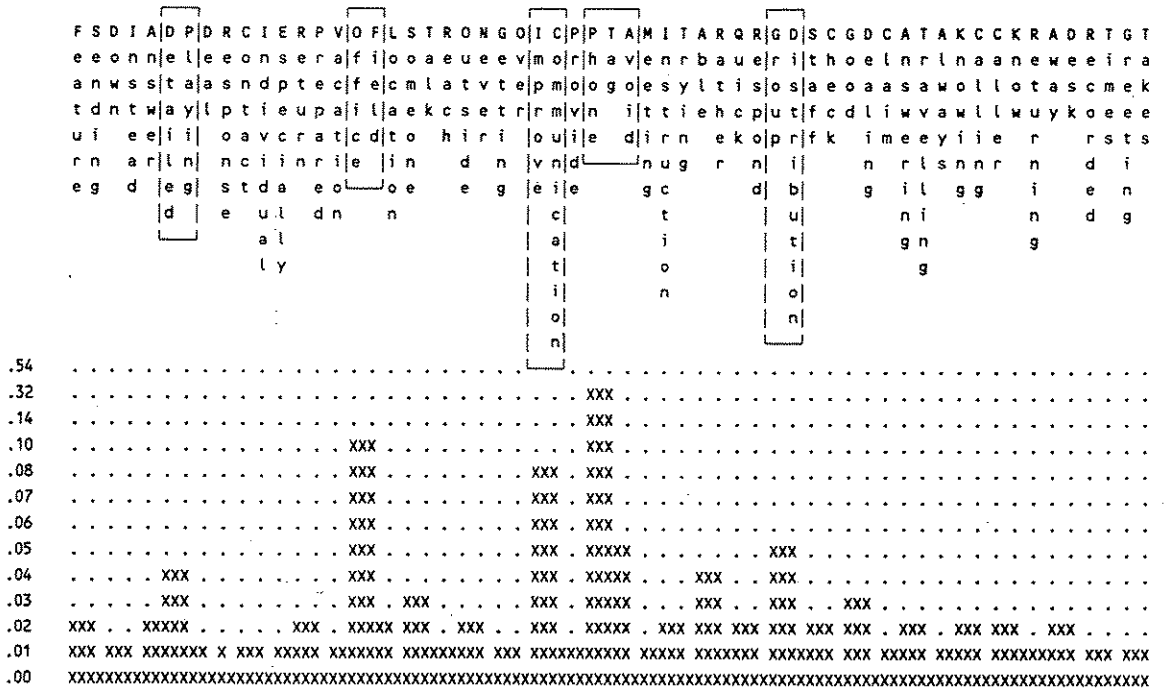
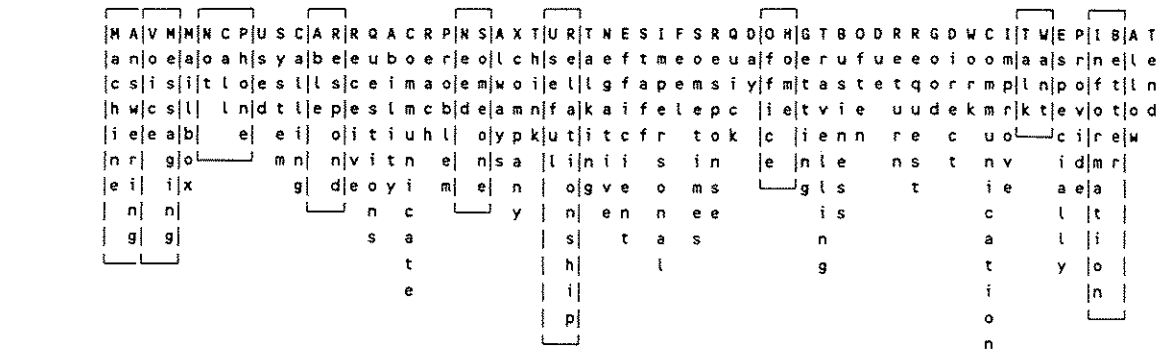


Figure 3. Clustering of words used at least five times by voice mail **messagers** (words cluster at given closeness if connected by Xs; primary clusters in boxes).



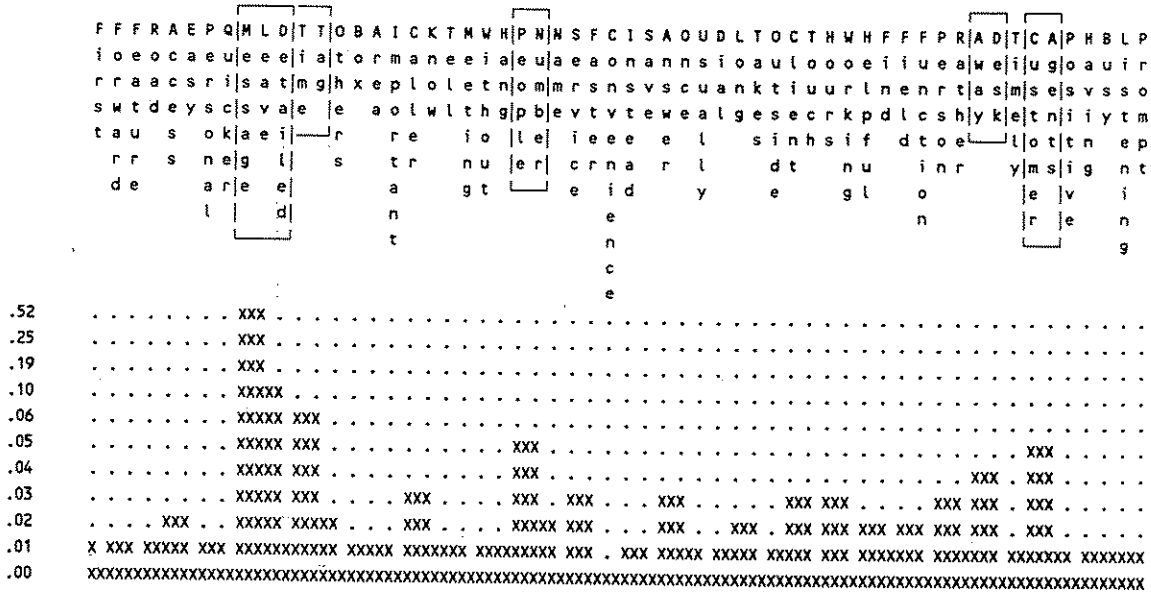


Figure 4. Clustering of words used at least five times by voice mail **answerers** (words cluster at given closeness if connected by Xs; primary clusters in boxes).

Concerning Method of Analysis

Semantic network analysis seemed useful in this exploratory stage, where the *a priori* meaning categories required for content analysis might not be easily identified or might stifle the emergence of some of the more subtle aspects of VM assessment. Thus both primary as well as more subtle clusters identified here might be useful for developing insights into the development of a possibly new genre of voice messaging, as opposed to the extension of a traditional genre of telephone answering.

Given that the method used here is unfamiliar to most organizational researchers, some qualifying comments may be in order. First, the analyses do not reveal overwhelmingly major differences between the groups. Yet, as noted above, major differences between two or more sets of respondents are not necessary to justify such an approach. Even a few unique meaning clusters across different categories of users may indicate consequential conceptualizations, applications and conventions of a medium such as voice mail. And that is what we found.

A second question, however, concerns the interpretation and implications of these distinctions. While messagers and senders do emphasize the group distribution and messaging handling aspects of voice mail, it may be that many still see these uses as impersonal. Indeed, Barrington and Baker's 1990 survey of 26 respondents from different companies found that voice mail was clearly seen as more advantageous to the organizational user than to outside callers. This textual analysis does not indicate whether messagers and senders actually overcome their concerns about impersonalness because they find ways to use VM to better understand customers' messages, or whether they just ignore the issue of impersonalness. However, based upon analyses of personal interviews and focus group transcripts, it seems that messagers and senders do come to appreciate how voice messaging can be used to provide better service to both internal and external clients, and they consciously reject the "impersonal" label of VM that is often associated with voice answering (Rice & Shook, 1990; Rice & Steinfield, 1993).

Semantic network analysis, of course, cannot reveal all distinctions, or all issues of concern to users, implementors, or researchers. It is just one additional approach that seems to reveal some subtle and useful distinctions, as generated from users' comments. Further, the results will be constrained by the questions or situations that generate the text to be analyzed. The five questions used here were moderately specific, so would not generate responses about other topics of greater interest to specific stakeholders. For instance, issues such as whether voice mail can support rich communication that is necessary to reduce equivocality (or maintain

it, when messages are forwarded to others) (Rice, 1987), did not emerge from the analysis of words used at least five times by each subsample. However, other approaches have shown that voice messaging does seem to support the management of equivocal information (Nicholson, 1985; Rice & Shook, 1990; Rice et al., 1992; although Barrington & Baker's 1990 results argue otherwise).

The integrated approach used here does allow for the structuring of responses to open-ended questions (or any other source of text) in precise ways, compared on the basis of different usage behaviors (or other categories of interest), yet it retains and perhaps enriches the qualitative information available from subjective accounts. That is, it takes a more ideographic approach to empirical studies of media use than do traditional surveys or content analysis, yet allows the emergent word clusters representing population-level meaning to be combined with more quantitative data and categorical differences, in the spirit of triangulation when studying new media (Williams, Rice, & Rogers, 1988).

Concerning Voice Mail

The study has provided some answers about whether users' comments about the VM system and its applications have semantic network structures that correspond to potentially different sub-genres of that VM system, and what those applications and evaluations might be. Users who actually send more messages on the VM system, and who report that they use the system more for messaging than for answering, describe their experiences with more semantic references to group-oriented and ongoing communication functions that can be facilitated by use of VM for *messaging*, with fewer references to asynchronous or store-and-forward activities that can be facilitated by use of VM simply as an *answering* machine, and with fewer concerns about the impersonal nature of VM, but with more concerns about the system's interface.

The results show that voice mail in general can overcome some of the considerable constraints associated with traditional dyadic and group media in organizations (face-to-face communication and the regular telephone), even when used in a more traditional genre as a voice answering machine (Rice, 1987). For example, Reinsch and Beswick (1990) found that two of the three best predictors of scenarios where respondents would use voice mail were time shifts and distance between participants.

But even greater, though more subtle, value is added when voice mail is used for voice *messaging* capabilities within groups and other people — that is, for processing communications rather than just transmitting and storing them or thinking of it only as a way to reach someone else's

telephone. This use represents, we would argue, a rather different and consequential genre of telephone communication.

These results also imply that the *critical mass* of sufficient others is theoretically and empirically central to the success of interactive communication systems (Markus, 1990; Rice, Grant, Schmitz, & Torobin, 1990). Essentially, such systems require a critical mass of fellow users to make it worthwhile for additional users to adopt the innovation, because each additional user increases the possible number of connections exponentially. So, if only one or two members of a project team or committee use voice mail, a critical mass of users cannot be achieved, the present users will not obtain much value from using the system because they cannot reach many others through the system, and non-users with higher thresholds for adoption will be reluctant to adopt the system. The three most frequent complaints identified by Beswick and Reinsch's (1987) VM survey were all concerned with critical mass (necessary co-workers are not on system, people do not check their voiceboxes, and all members should be on the system). DiFiore (1986) also noted that the one site which implemented a voice system throughout the entire organization reported higher benefits than did two other sites which did not have complete vertical implementation. He also noted that local communities of users are necessary to influence top management to begin using the system as well. Trevino and Webster (1992) found that the only area in which VM usage was perceived as superior to email was in the area of overall communication effectiveness — such as size of communication network and ability to reach people, both aspects of critical mass. Both Finn (1986) and Ehrlich (1987) explicitly emphasized the importance of implementation policies that foster a general overall critical mass of users or several critical masses within relevant groupings. Thus, implementation should attempt to foster both general and local critical masses of users (Rice, 1990) in order to enhance the group distribution processes recognized by high senders and messagers. For example, members of currently existing project groups, memo distribution lists, committees, or "need to know" managers, should be identified, introduced to voice mail, and receive training that makes the two genres of voice mail explicit.

Another practical implication is that system designers and potential purchasers should take into consideration inherent obstacles to greater use of the system for messaging (such as long log-in procedures, or lack of a visible message-waiting indicator) that would decrease the less obvious but more pervasive benefits of this new organizational medium. Another implication of these findings is that implementors should distinguish between voice answering and voice messaging, and encourage

organizational members to integrate these potential voice mail capabilities into their activities (Rice & Shook, 1990). Further, awareness of these new messaging applications should be diffused throughout the organization, to foster more positive attitudes and applications.

Those organizational members who use VM for messaging seem aware of these important differences and their application to organizational collaboration and coordination, and are able to overcome some of the perceived impersonalness associated with use of a VM system as simply a "fancy answering machine." That is, conceptualizing, implementing, and using voice mail as a single genre similar to a telephone with recording capabilities stifles the emergence of the possibly new organizational genre of voice messaging.

NOTES

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1. Did the general fact of making an explicit emphasis on the conceptual distinction between voice answering and messaging influence ways in which the system was used? Yes — the mean level of self-reported use for voice messaging was significantly higher for this set of sites than for other sites that did not receive this emphasis in its training (31 percent for these sites compared to 10-15 percent for the other groups). Further, those who sent more messages or reported greater use of the system for voice messaging also reported greater benefits, measured in a variety of ways (see Rice & Shook, 1990). However, these results are outside the scope of this article.

2. Both answering and messaging were described on the questionnaire.

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