

# Multimethod Approaches for the Study of Computer-Mediated Communication, Equivocality, and Media Selection

John D'Ambra and Ronald E. Rice

**Abstract**— This paper presents a longitudinal case study of the introduction of voice mail, applying media richness theory to develop and assess a set of 16 tasks with varying levels of equivocality, and to compare different media. Through *t*-tests, reliability, factor, and multidimensional scaling analyses, evaluation of task equivocality and voice mail is discussed and potential shortcomings of current approaches are highlighted. Results show that equivocality does not seem to be unidimensional and includes aspects of authority across organizational boundaries. Across all tasks, telephone would be most likely selected by respondents, but face-to-face and telephone were more likely to be selected for more equivocal tasks. Unlike in prior studies, voice mail is perceived as similar to documents and face-to-face.

**T**HE use of computer-mediated communication (CMC) within organizations is growing [1]. While there are many theories and paradigmatic perspectives applied to the study of these new media [2], one evolving theory is frequently applied to the question of new media choice: media richness theory (MRT) [3], [4]. This theory (along with social presence theory [5], [6]) proposes that communication media differ in the extent they 1) can overcome various communication constraints of time, location, permanence, distribution, and distance, 2) transmit the social, symbolic, and nonverbal cues of human communication, and 3) convey equivocal information.

MRT proposes a five-step continuum of media and their level of richness. Communication media included in this continuum are face-to-face discussion, phone calls, letters, formal documentation, and numeric reports. The level of richness is highest with face-to-face and reduces to a minimum with numeric reports. Face-to-face is the richest form of information processing because it provides immediate feedback. With feedback, understanding can be checked and interpretations corrected. The face-to-face medium also allows the simultaneous observation of multiple cues, including body language, facial expression, and tone of voice, which convey information beyond the spoken message. Therefore, face-to-face is said to have a broad "bandwidth." For those media lower down the media richness continuum, the "bandwidth" is narrower and

the capacity to carry information lower. Information richness is an important characteristic in terms of CMC. Where CMC is placed in the media richness continuum is one question addressed by this paper.

MRT suggests that organizational communication is necessary to reduce two fundamental task demands: uncertainty and equivocality [7]. Daft and Macintosh propose that two task characteristics—analyzability and variety—generate two types of information requirements: equivocality and amount. Daft and Macintosh define information equivocality as the multiplicity of meaning conveyed by information about organizational activities. Information that is clear and specific and that generally leads to a single, uniform interpretation by users is considered unequivocal. Information that lends itself to different and perhaps conflicting interpretations about the work context is considered equivocal information. MRT proposes that use of any communication channel involves both costs and information-processing capacities, so a medium that is not well matched to task requirements will degrade communication performance [8]–[10].

As part of their theoretical development of MRT, Daft and his colleagues have discussed and developed a four-item scale of general task equivocality [11]. However, their initial empirical study [9] took a different approach to measuring the equivocality of tasks that managers would assess when choosing media. They first asked 11 managers to identify critical incidents in their ongoing work. This generated 220 incidents, though we do not know the distribution of incidents across managers. The researchers then categorized these incidents into 60 more generic tasks, but we do not have a measure of that coding reliability. The researchers then provided a written explanation of equivocality to a panel of 30 judges and asked them to rate each task's equivocality on a single item ranging from 1 to 5, though neither the unidimensionality or the reliability of these ratings has ever been assessed. Subsequent studies have taken similar approaches to either generating hypothetical tasks with varying amounts of equivocality, or rating the richness of different media [4], [12]–[14].

There are other questions about the reliability and validity of these assessments of task equivocality and media richness [15]. For example, managerial media awareness in a study by Daft, Lengel, and Trevino [3] explained only 10% of the variance in managerial performance, and that was due almost entirely to selections of rich media. Also, empirical support for media richness propositions is often mixed at best, especially

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J. D'Ambra is with the School of Information Systems, University of New South Wales, Sydney 2052, Australia.

R. Rice is with the Department of Communication, Rutgers University, New Brunswick, NJ 08903 USA.

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TABLE I  
MEAN TASK EQUIVOCALITY RATINGS ( $N = 8$  JUDGES)

Task	Mean	Std. Dev.	Min.	Max.	Wording
C1	2.25	1.04	1.0	4.0	You need some important figures for a monthly report from another department.
C2	2.62	1.41	1.0	5.0	You need approval for allocation of resources in your branch.
C3	2.00	.76	1.0	3.0	You want to advise a superior on the progress of a project at your zone/branch.
C4	1.63	.92	1.0	3.0	You need to reply to a colleague's inquiry on your budget vs. actual expenses.
C5	3.62	.74	2.0	4.0	You wish to organize support of your colleagues for an idea that you have in the branch network.
C6	3.00	1.31	1.0	5.0	You need to discuss a problem in your zone/branch with your superior.
C7	1.38	.74	1.0	3.0	You want to schedule a zone meeting for two weeks from today.
C8	3.00	1.41	1.0	5.0	You wish to discuss a branch performance issue with a subordinate.
C9	2.63	1.3	1.0	4.0	You need to respond to a query by a superior concerning a variation in a budgeted-vs.-actual expenses report.
C10	3.50	1.07	2.0	5.0	You wish to organize a salary review with a subordinate.
C11	3.50	.93	2.0	5.0	You need to respond to a colleague's urgent request for advice on a problem.
C12	3.25	1.04	2.0	5.0	You need to respond to an urgent request by a superior for some performance statistics on your zone/branch.
C13	2.25	1.04	1.0	4.0	You need to respond to a formal memo from your superior.
C14	2.13	1.25	1.0	4.0	You wish to clarify a procedural matter with your subordinates.
C15	3.13	1.25	1.0	5.0	You wish to request funding for a nonroutine expense in your zone/branch.
C16	3.88	.99	2.0	5.0	You need clarification from a superior on a critical issue affecting your zone/branch.

when new media such as voice mail and e-mail are concerned [13], [16]–[18]. Other inconsistencies may be due to as-yet poorly understood individual, positional, and organizational differences in media choice [4], [15], [17], [18].

The issue of both the perceptions of CMC and reliability in the underlying concepts of task equivocality (that is, based on generated common incidents) and media richness stemming from the work of Daft and Lengel raises doubts about the findings of media richness work to date. As far as we know, no reliability or dimensionality tests for either have been reported. This paper explores methods for deriving reliable scales for measuring task equivocality and media richness.

Voice mail is an intriguing medium to study within the context of media richness for several reasons. First, it has only recently begun diffusing widely through organizations, so it is possible to conduct pre- and post-implementation analyses. Second, it blurs more of the lines between rich and lean media because, unlike other new CMC systems, it allows asynchronous communication, yet, like the traditional telephone or face-to-face conversation, it provides the richness of cues in the caller's actual voice [17]. Further, how voice mail is used affects users' assessments and represents different sets of characteristics [19]. Indeed, studies finding considerable differences between reasons for choosing, applications of, and problems with e-mail and voice mail seriously challenge the simple unidimensionality of "media richness" often used to place CMC at the lower end of media choice [16], [20], [22]. It must be noted that this is a preliminary study, with a very small sample of judges and respondents, and is intended mostly to raise some issues about these measures by conducting some initial analyses.

#### METHOD

Forty-four managers of branches or regional zones within one division of a multiregional insurance corporation were the primary respondents in this study. After the organization initially installed a voice-mail system, these managers were

brought to headquarters in December of that year to attend one of six voice-mail training sessions. The voice-mail account for each manager was activated after he or she completed the training session.

The primary researcher attended three of these training sessions, and before these training sessions asked the attending managers to participate in focus groups. Within these focus groups the critical success factor technique (CSF) [21] was used to help managers identify their key areas of responsibility and performance. These CSF's were then used as a reference point for managers to identify three factors: 1) critical tasks related to key areas of responsibility, 2) all media potentially used for these tasks, and 3) communication components of those critical tasks. These components constituted 192 managerial incidents of communication generated by the approximately 25 managers in these three focus groups.

These 192 incidents were inspected for similarity, then categorized into 16 types of common, critical tasks involving communication. Although, as with the prior studies that generated such incidents, no intercoder reliability was conducted, we have two bases for thinking this coding is relatively valid. First, the incidents were derived from organizational members within the same division who all occupied the same professional roles (zone or branch managers). Second, 10 managers were asked to comment on this final 16-task categorization, and they all felt that these well captured the nature of their critical tasks that required communication activities.

Then the equivocality of each of these 16 communication tasks was rated on a scale of 1 to 5 by a panel of eight judges, all faculty members of a university information-systems department. The concept of equivocality was explained, and Daft *et al.*'s definition of equivocality was provided in writing [9].

By the middle of December, after the first three training sessions but before the second three training sessions, the 44 managers were provided, through interdepartmental mail, an initial survey (Time 1) asking for their first three preferences

TABLE II  
 MEAN T1 MEDIA CHOICE RANKINGS, AVERAGED BY 16 TASKS AND BY 26 RESPONDENTS (TOP)  
 MEAN T2 MEDIA CHOICE RANKINGS, AVERAGED BY 16 TASKS AND BY 18 RESPONDENTS (BOTTOM)

Variable	Mean	Std Dev	Minimum	Maximum	Rank
Averaged across tasks:					
DOCU	.05	.12	.00	.56	7.5
EMAL	.04	.15	.00	.75	9
FACE	.78	.49	.00	2.38	3
FAXX	.67	.40	.00	1.69	4
LETT	.02	.07	.00	.31	10
MEMO	.92	.41	.13	1.69	2
NOTE	.06	.13	.00	.44	6
PHON	1.39	.59	.00	3.00	1
REPT	.14	.21	.00	.75	5
SECY	.05	.09	.00	.31	7.5
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Averaged across respondents:					
DOCU	.03	.08	.00	.35	8
EMAL	.03	.09	.00	.46	8
FACE	.48	.30	.00	1.46	3
FAXX	.41	.24	.00	1.04	4
LETT	.01	.04	.00	.19	10
MEMO	.57	.25	.00	1.04	2
NOTE	.04	.08	.00	.27	6
PHON	.86	.36	.00	1.85	1
REPT	.08	.13	.00	.46	5
SECY	.03	.06	.00	.19	8
-----					
Averaged across tasks:					
DOCU	.03	.10	.00	.38	10
EMAL	.06	.18	.00	.75	8
FACE	.76	.36	.38	1.50	2
FAXX	.57	.39	.00	1.50	5
LETT	.02	.05	.00	.19	11
MEMO	.59	.42	.00	1.50	4
NOTE	.03	.09	.00	.38	10
PHON	1.64	.58	.69	2.63	1
REPT	.14	.24	.00	.94	6
SECY	.10	.31	.00	1.31	7
VMAL	.67	.47	.00	1.50	3
-----					
Averaged across respondents:					
DOCU	.03	.09	.00	.33	9
EMAL	.05	.16	.00	.67	8
FACE	.68	.32	.33	1.33	2
FAXX	.51	.35	.00	1.33	5
LETT	.02	.05	.00	.17	10.5
MEMO	.53	.37	.00	1.33	4
NOTE	.02	.08	.00	.33	10.5
PHON	1.46	.52	.61	2.33	1
REPT	.13	.21	.00	.83	6
SECY	.09	.27	.00	1.17	7
VMAL	.60	.42	.00	1.33	3

for media choice for each of the tasks. (Thus managers in the first three groups may have had some slight exposure to voice mail before completing the first survey.) Media consisted of e-mail, face-to-face/meeting, telephone, voice mail, fax, formal memo, note, letter, single-purpose report, standard report, and secretary. For each task, for each medium, these rankings were converted into 0 = not chosen, 1 = chosen 3rd, 2 = chosen 2nd, and 3 = chosen 1st. A second survey (Time 2), this time including voice mail, was administered the following May.

## RESULTS

### Mean Task Ratings, Media Rankings, and Correlations

First, we approach the familiar problem: how is media choice associated with task equivocality? Table I shows the mean equivocality ratings of the 16 tasks. The task judged to be the *most* equivocal was C16 (clarification from a superior on a critical issue affecting your zone/branch), and the *least* equivocal task was C7 (schedule a zone meeting in two weeks).

TABLE III  
 CORRELATIONS OF MEAN TASK EQUIVOCALITY RATINGS ACROSS JUDGES WITH  
 MEAN MEDIA CHOICE RANKINGS ACROSS TASKS, T1 AND T2

Medium	T1	T2
Email	-.15	.31
Face	.32	.37
Telephone	.27	.25
Voice Mail	--	-.29
Facsimile	-.24	-.13
Forms	-.21	-.27
Note	-.17	-.43
Letter	-.56	-.10
Secretary	-.39	-.40
Single Purpose Report	-.39	.00
Standard Report	-.26	-.05

N=16 tasks.

Table II shows each medium's mean aggregated choice across tasks and then across respondents for Time 1 (top) and Time 2 (bottom). For Time 1, telephone, face-to-face, and memo were, in order, the most preferred media. By Time 2, the telephone and face-to-face are still placed first and second, while voice mail, the new medium, is now ranked third. Note that voice mail combines the oral tones and cues

TABLE IV  
SYSTEM-MONITORED VOICE MESSAGE USAGE DATA

Month	Messages		Minimum	Maximum	Number Active Senders/Receivers
	Mean	S.D.			
January					
Sent	.27	.82	0	4	6
Received	1.23	1.12	0	5	36
February					
Sent	.45	2.30	0	15	4
Received	.41	.79	0	4	13
March					
Sent	4.82	21.43	0	138	12
Received	5.16	6.96	0	37	27
Sent	4.61	23.55	0	156	13
Received	3.61	5.90	0	18	20
May					
Sent	7.52	29.48	0	188	14
Received	10.30	18.19	0	93	27

N=44 managers.

of face-to-face and the telephone, but adds capabilities for asynchronicity and group message processing [18], [19]. The lowest ranked media at Time 1 were letter, e-mail, documents, and secretary; at Time 2 they were letter, note, document, and e-mail. These are primarily textual media and low in proposed media richness, so they should be less preferred for highly equivocal tasks. There were no significant *t*-test differences in each medium's mean choice ranking, aggregated across tasks, across time.

Table III shows the correlations of mean task equivocality ratings across judges with mean media choice rankings across tasks for both time periods. Given the small sample size, none of the coefficients is statistically significant; and, except for the media at both extremes (interpersonal and text), the correlations are weak. However, the direction of the correlations supports the proposition that for tasks with a high level of equivocality, telephone (approximately  $r = .25$ ) and face-to-face (approximately  $r = .35$ ) media were preferred. These findings also confirm the findings of other studies [23] that voice mail is not used for those tasks with a high level of equivocality ( $r = -.29$ ); note, however, that this proposition is rejected by Rice and Shook [18].

With respect to voice-mail usage, 84% of respondents indicated that they had ready access to voice mail. The mean reported number of voice messages received per week was 7.2 ( $sd = 5.1$ ), and all but one respondent reported receiving at least one voice message per week (with six reporting receiving 10 or more). The mean reported number of voice messages sent per week was 2.8 (1.6), with only two nonrespondents and all others reporting sending at least one voice message per week (but four reporting sending five or more). All but one respondent ranked voice mail for at least one task, and five respondents ranked voice mail for at least each task.

Monitored system usage data provides rather less evidence of general voice-mail usage, however. Table IV shows that, based upon the first five months' usage statistics aggregated across the 44 managers, at most only one-third of the managers actually sent any voice messages in any given month (with a mean rising from .27 to 7.52), though as many as three-quarters received voice messages in any given month (with a mean rising from .41 to 10.3). On the one hand, it is possible

that different managers could have been senders or receivers in different months, spreading experience with voice mail over the entire sample. On the other hand, we have no way to tell if managers actually ever listened to messages "received" in their voice-mail box. So the experiential basis of such assessments may still be in question.

Given these results, it may be tempting to draw conclusions on the usage of voice mail, its place within a medium richness continuum, and how it is perceived in terms of its characteristics by users. Here, we find that shortly after implementation, voice mail becomes the third-most chosen medium (after the telephone and face-to-face) across these 16 tasks, though respondents tend to rank it lower for highly equivocal tasks. Indeed, it was on findings similar to these that Daft and Lengel based their conclusions concerning the more traditional media. However, as will be demonstrated, more caution is required in drawing conclusions based on a media richness scale that as yet has unknown reliability and validity.

#### *Factor and Reliability Analyses of the Equivocality Scale*

To evaluate the dimensionality of the equivocality scale, the 16 equivocality scale measures were entered into a principal-components analysis with varimax rotation. Because the ratio of the sample size to the number of items is far below acceptable levels, these results must be regarded as only preliminary and evocative. Table V shows the loadings of the tasks, with loadings near .6 or above underlined, first based on five components and then on two.

From the first five-factor solution, six items loaded on the first factor, explaining 33% of the variance, and generally representing equivocality in upward-authority relations. The second dimension was indicated by five items explaining 20% variance; these seem to indicate equivocality in communicating about critical tasks or ideas. The third dimension was indicated by three items explaining 17% variance, representing vertical communication about performance/resources.

The failure of 11 out of 16 tasks to load highly on the first dimension raises doubts as to the unidimensionality, and therefore the suitability, of the overall 16-item equivocality scale. These preliminary results led us to try a two-factor solution. Here a different six items load highly on the rotated first dimension, explaining 33% of the variance (organize

TABLE V  
PRINCIPAL COMPONENTS ANALYSIS (ROTATED FACTORS) OF TASK EQUIVOCALITY RATINGS

Five factor solution:					
C1	-.73	-.13	.55	-.24	.04
C2	.53	.22	.53	-.43	.03
C3	.03	.45	.85	.07	.19
C4	.11	.07	.09	-.01	.86
C5	.43	.83	-.04	-.02	.24
C6	.94	.09	.02	-.05	.18
C7	.27	.09	.01	.66	.62
C8	.04	-.10	-.08	.90	.14
C9	.88	.22	.15	.26	.18
C10	-.12	-.24	.70	.60	-.04
C11	-.03	.26	-.06	.19	.79
C12	-.74	-.35	.10	.46	.18
C13	.07	-.42	.84	-.19	-.06
C14	-.19	-.14	.54	.47	-.46
C15	.00	.87	-.04	-.40	.23
C16	.29	.93	-.04	.01	.07
Eigenvalue	5.4	3.1	2.7	2.1	1.2
Variance	33.6	19.5	16.9	12.9	7.6
-----					
Two factor solution:					
C1	.50	-.31			
C2	-.34	.37			
C3	.16	.62			
C4	-.07	.55			
C5	-.69	.61			
C6	-.47	.59			
C7	.18	.81			
C8	.48	.45			
C9	-.29	.81			
C10	.84	.36			
C11	-.07	.54			
C12	.81	-.15			
C13	.48	.08			
C14	.68	.03			
C15	-.73	.22			
C16	-.65	.50			
Eigenvalue	5.4	3.1			
Variance	33.6	19.5			

colleague support for a branch network idea [negatively], organize a salary review with a subordinate, respond to a superior's urgent request about zone/branch performance statistics, clarify procedural matters with subordinates, request funding for a nonroutine zone/branch expense [negatively], and clarify from a superior a critical zone/branch issue [negatively]). All of these but the first related to equivocality across upward lines of authority, and all but the second and fourth related to zone/branch issues.

Six items (advise superior on the progress of a zone/branch project, reply to colleague's inquiry on budget variance, schedule a zone meeting for two weeks from today, discuss branch performance issue with a subordinate, and respond to a superior's urgent request about performance statistics concerning zone/branch) loaded positively on the second dimension, explaining 20% of the variance and possibly representing equivocality of zone/branch management/evaluation. Further, no other items loaded highly on these two dimensions.

So we might say that the two primary dimensions of task equivocality derived from the initial 16 critical tasks (which emerged from the 192 incidents) concerned equivocality of communication tasks across lines of individual authority and equivocality of evaluation within and across lines of unit authority, respectively. Parsimoniously stated, central (to these tasks, anyway) is an underlying issue of equivocality induced by communicating across or about boundaries of authority and evaluation. This is not an aspect of equivocality discussed by prior analyses of media richness or equivocality.

Having identified the tasks that do load highly, the Cronbach alpha reliability for the full 16-task equivocality scale is .67. Based on the loadings of the two-factor solution, the reliability for the six items (with the first item and the last two items reversed) from the first dimension is .86, and for the six items from the second dimension it is .6. Given the apparent multidimensional nature of the 16 tasks, the overall scale alpha of .67 is fairly satisfactory. However, use of the full scale would both mask effects of different kinds of equivocality and possibly give preference to boundary equivocality. So a unidimensional scale with an acceptable reliability might consist of the six items loading on the first dimension of the two-factor solution.

Factor analysis can also be used to evaluate the dimensionality of the media based on the ranking choices, thereby identifying the perceptions of the media by users. Factor analysis is effective in the study of new media as it groups media with similar perceptions, allowing for interpretation of similarities between old and new media.

Table VI (top) shows that four dimensions emerged from the choice rankings of 10 media at Time 1. The first is represented by facsimile (positively) and secretary (negatively) (explaining 23% of the variance); this may be a "mediated/unmediated" factor, if the secretary is considered as an interpersonal communication participant, or a "distant/local" factor if the secretary is considered as a local support for document transfer compared to the facsimile. The second dimension (16%) opposes letters and memos with the tele-

TABLE VI  
ROTATED PRINCIPAL COMPONENTS OF MEDIA BASED ON CHOICE RANKINGS FOR MEAN TASK, TIME 1, TIME 2

Time 1					
DOCU	.03	.10	.24		-.57
EMAL	.14	-.03	-.74		.11
FACE	-.40	.14	.36		-.57
FAXX	.84	.00	.21		-.10
LETT	.09	.85	.00		-.02
MEMO	.11	-.56	.61		-.07
NOTE	.17	-.23	.53		.52
PHON	.45	-.65	-.00		.07
REPT	-.22	.13	.18		.74
SECY	-.77	.01	.29		-.00
Eigenvalue	2.3	1.6	1.5		1.1
Variance	23.2	15.9	14.6		11.4
Time 2					
DOCU	.04	.92	.08	.04	-.03
EMAL	-.07	-.08	-.17	.27	.81
FACE	.32	.34	.73	-.30	-.05
FAXX	-.54	-.03	-.23	.15	-.71
LETT	-.09	.91	.00	-.05	-.02
MEMO	-.37	.04	-.10	-.77	.05
NOTE	-.17	-.19	.93	.04	.05
PHON	-.13	.02	-.09	.79	.24
REPT	.95	.05	.00	.09	.04
SECY	.95	-.08	.02	.07	.03
VMAL	.16	.37	.61	.37	-.22
Eigenvalues	2.77	2.24	1.58	1.45	1.09
Variance	25.2	20.3	14.4	13.1	9.9

phone, indicating a written/oral mediated dimension. The third dimension (15%) opposes e-mail with notes and memos, indicating a dimension concerned with short communication by electronic or written text. The fourth dimension (11%) opposes documents and face-to-face with notes and reports, possibly representing real-time communication (presuming one "works with" documents) with ephemeral or archival communication.

Table VI (bottom) shows that five dimensions emerged from the choice rankings of 11 media (now including voice mail) at Time 2. The first can be called "formal media," represented by reports and secretaries (explaining 25% of the variance). Note that, in this instance, secretaries are not considered in their interpersonal role, but in their formal role of assisting in handling communications, such as preparation, storage, and retrieval. The second dimension can be called "written formal," represented by documents and letters (20%). These first two dimensions perhaps represent formal organizational memory media. The third can be called "informal," or perhaps "transitory," because communication by face-to-face, notes, and voice mail is not easily or usually stored (14%). The fourth can be called "oral" because of the negative loading for memo and positive for telephone (13%). This is similar to the third of three factors found by Rice and Case [24] in an analysis of media style factors involving e-mail and other media. The fifth dimension may be called "electronic text," represented by e-mail and fax (10%).

#### Multidimensional Scaling of Media Choice Rankings

One objective of research on new media is to place new and old media in a media-richness (or social-presence, or other) continuum. This was presented in traditional fashion by Table III's ranking of media choice with respect to the 16

tasks. However, as new media may include new capabilities, it is often difficult to compare them unidimensionally to more traditional media. In combination with factor analyses as summarized above, multidimensional scaling can contribute to identifying perceived similarities of old and new media [5], [25].

The MDS solution for the Time 2 choice rankings, shown in Fig. 1, fairly well portrays the factor-analysis solutions, except of course that the four dimensions are here forced into two dimensions. The overall stress was .16. The media that load highly on each factor dimension—particularly those on the first three dimensions (secretary and report; letter and document; and face-to-face, note, and voice mail)—are generally located in close dimensional space. Note again that after implementation of voice mail, it is considered similar to face-to-face and short notes, on the basis of media choice rankings across the 16 tasks. It is not seen as similar to either the telephone or e-mail, as some critiques of voice mail often presume.

## DISCUSSION

### *Dimensionality and Reliability*

The application of factor analysis to the equivocality scale enabled the determination of its dimensionality. In this study, only 6 of the 16 tasks loaded highly in the unconstrained factor analysis. This casts doubt on the unidimensionality of the scale, although the overall scale reliability of .67 is a reasonable initial result.

The issue of both dimensionality and reliability in the underlying concepts of task equivocality (that is, based on generated common incidents) and media richness stemming from the work of Daft and Lengel raises doubts about the

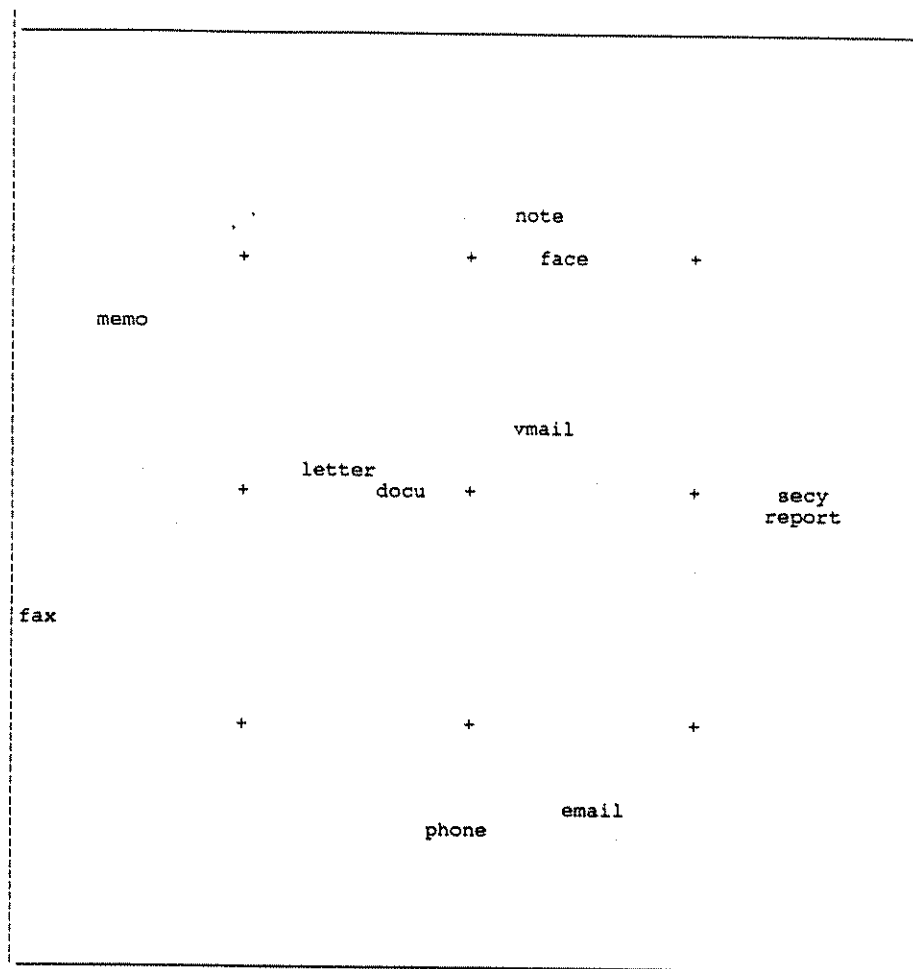


Fig. 1. Multidimensional scaling plot of 11 media based on ranking choices across 16 critical communication tasks, Time 2. Stress = .16.

findings of media richness work to date. As far as we know, no reliability or dimensionality tests for either have been reported. One suggestion would be to ask judges (or respondents) to rate a pool of hypothesized tasks (generated within the context of the organization, as done in the initial Daft *et al.* studies, as well as this one) according to the well-standardized four-item task equivocality scale developed and assessed by Withey, Daft, and Cooper [11]. We know that this scale is unidimensional and reliable. Media choices and comparisons would then be analyzed on the basis of a single, known dimension of equivocality, allowing comparisons across studies.

We have begun a follow-up study to help resolve these issues, based on the initial results of the current study. Among other components of the study, we are asking respondents to rate each of five organizational media (face-to-face, business memo, electronic mail, voice mail, and regular telephone) on the four specific aspects of media richness proposed by Daft *et al.*, but not, to our knowledge, actually measured or analyzed separately. We are also asking respondents to rate the equivocality of each of the 11 best-loading of the 16 situations, using the Withey *et al.* (1983) equivocality items. Finally, we are asking respondents to rank the top three media they would choose for communicating in the situation. The actual values were recoded to 3 if ranked first, 2 if second, 1 if third, and 0

if not chosen, so that the higher number means more likely to be selected. Table VII shows very preliminary results, based on just 16 managerial respondents (with responses concerning electronic mail and voice mail only for those who have ever used these media—14 and 10, respectively), for just the two most and two least equivocal of the 11 situations used.

Concerning equivocality of the 11 situations, the reliabilities ranged from .35 to .88, with most around .7 or above. Clearly, the second and tenth-ranked situations here are discriminated on the nature of the problem (unspecified or procedural) and authority (superior or subordinate). Concerning media richness, the reliabilities ranged from .46 for e-mail to above .7 for the other four media. This low reliability might be rather representative of the variable nature and use of e-mail, somewhat helping to explain the variable nature of media richness tests of e-mail usage. Overall, the media are ranked according to declining richness in this order: face-to-face, regular telephone, voice mail, e-mail, and business memo. All the media except face-to-face and e-mail (both for the first situation) are ranked in accordance with decreasing situation equivocality.

Closer inspection of the other tasks, and similar factor analyses and multidimensional scalings to those in the current study, will increase our understanding of the concepts of

TABLE VII  
 MEDIA RICHNESS AND SITUATION EQUIVOCALITY QUESTIONS, WITH SITUATION EQUIVOCALITY RANKINGS, MEANS AND  
 SCALE RELIABILITIES, AND MEDIA RANKING MEANS FOR EACH SITUATION AND SCALE RELIABILITIES

Questions about media richness:

...please indicate the extent to which you feel that (the particular medium) allows participants to do each of 4 communication processes (from 1 = a very great extent to 5 = a very little extent):

1. If communicators are unclear about something or do not understand it, (the medium) allows them to ask questions and obtain answers as they arise.
2. (the medium) allows communicators to add meaning to what they want to say by using as many cues (body language, voice, tone, etc.) as possible.
3. (the medium) allows communicators to be flexible with the way words are used in order to increase understanding.
4. If communicators feel very strongly about something (positively or negatively), (the medium) allows them to show their feelings.

Questions about equivocality of situations:

... for each of the following situations, to what extent do you agree with the 3 statements (from 1 = a very great extent to 5 = a very little extent):

1. There is more than one satisfactory solution for the problem.
2. The information can be interpreted in several ways and can lead to different but acceptable solutions.
3. The information used to make the decisions can mean different things to different people.

<u>Situations (rank, mean, reliability)</u>	<u>Mean Ranking for Each Medium</u>				
	<u>FACE</u>	<u>MEMO</u>	<u>MAIL</u>	<u>MAIL</u>	<u>TELEPHONE</u>
<u>Most Equivocal Situations</u>					
You wish to organize political support of your department colleagues for an idea that you have. (1, 4.06, .79)	2.75	.25	1.14	.30	1.69
You need to discuss a problem in your department with your superior. (2, 3.85, .87)	2.94	.25	1.14	.20	1.62
You wish to clarify a procedural matter with your subordinates. (10, 2.94, .88)	2.56	.56	1.50	.20	1.38
You want to schedule a department meeting for two weeks from today. (11, 2.63, .62)	.31	1.56	2.71	.60	.94
<u>Least Equivocal Situations</u>					
<u>Richness of Medium:</u>					
Mean across four items	4.64	2.28	2.48	2.50	3.75
Reliability of scale	.72	.80	.46	.78	.84

situational equivocality, media richness, and task-medium fit, with an enhanced sense of reliability and validity.

#### *Communication Across Authority*

The loading of the tasks dealing with cross-authority communication indicates that supervisor-subordinate relations and unit relations are a major factor in media choice. Zmud *et al.* [26] identified that for similar communication tasks, different communication media were chosen by senior management, depending upon the direction of the communication. Rice and Shook [17] suggested that as an individual moved from one job position to another, or across organizations, different patterns of media choice might be relevant, though promotion and relocation training rarely considers such issues. Further work must be done in examining the nature of the authority and boundary relationships and media choice.

#### *Qualifications*

Clearly, this is a preliminary and tentative set of results. Because of the nature of this exploratory study, the sample sizes are very small, and the ratio of cases to items is

insufficient. So the results from these multivariate analyses may well be unstable. Further, without an assessment of intercoder reliability of the correspondence between the 192 incidents and the 16 common critical tasks, we do not know the reliability of this categorization scheme. We note that similar problems plague almost all prior media-richness studies.

On the other hand, the tasks were generated within the context of the organizational respondents, in line with Daft *et al.*'s original methodology, and the categorizations were assessed by the managers themselves as well representing the nature of their critical communication activities. Further, the variety of analytical methods provides us with a triangulation perspective on media-choice measures.

#### *Voice Mail*

In the end, this study shows that media richness provides one way to better understand the implementation of voice mail. On the one hand, as media richness theory predicts, a new medium such as voice mail is less likely to be used for equivocal tasks. On the other hand, contrary to many critiques of mediated electronic communication (but as supported by Rice and Shook

[17] and Rice and Danowski [20]), voice mail quickly becomes a highly rated medium, following only the telephone and face-to-face as a likely choice across the spectrum of these 16 tasks. It seems clear from the choice rankings, factor analyses, and multidimensional scaling results that there are other aspects than simply media richness of media that play a role in organizational members' selection choices. As Rice [1] and Trevino, Lengel, and Daft [4] argue, other issues such as symbolic value (consider the issue of secretaries, in this study) or situational constraints (such as geographic or temporal boundaries caused by branch/zone communication) must be taken into account. Such issues are probably one of the main reasons that uses and evaluations of new media often do not follow strict media richness predictions as well as do traditional media such as face-to-face, meetings, telephone, memos, and numeric reports.

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**John D'Ambra** is a lecturer in the School of Information Systems, University of New South Wales, Sydney, Australia. His research interest lies in computer-mediated communication.

**Ronald E. Rice** is an Associate Professor in the Department of Communication, Rutgers University, New Brunswick, NJ. He has published extensively on computer-mediated communication and the new media.

