

Distance, Gaze and the Intimacy Equilibrium Model

in Audio/Video-Mediated and Face-to-Face Dyads

Paul D. Guild

Emeritus Professor

Department of Management Sciences

University of Waterloo, Canada

Abstract

This experiment, from 1976 but until now unpublished, focused on the Argyle-Dean Intimacy Equilibrium Model, to consider gaze and social distance in face-to-face and audio/video-mediated dyads. It was found that, during audio/video-mediated interaction, communicators did not experience the anticipated degree of interpersonal remoteness or separation. What was expected to act as a technological barrier appeared to affect social influence but not interpersonal or informational communication. Under audio/video-mediated (teleconference) conditions, potential negative consequences of excessive intimacy (especially interpersonal assertiveness or dominance) appeared less salient, while certain positive effects remained unchanged. Consequently, subjects in the audio/video-mediated conditions liked each other to a greater degree, enjoyed the experiment to a greater extent, and perceived greater "closeness" than did subjects in face-to-face conditions. The levels of intra-dyadic gaze, which were significantly higher in the audio/video-mediated dyads, may have led to increased perceived intimacy between communicators.

Introduction

This study was undertaken in the Department of Experimental Psychology at the University of Oxford in 1976 and was submitted as part of a doctoral thesis with the title: “*Mediated Person-to-Person Communication: A Social Psychological Perspective*”. While the thesis was successfully defended in 1978, not all experiments have been previously published. During current practices made necessary by the COVID-19 pandemic, there may be useful relevance toward such new practices as: professionals consulting via teleconferences; students learning via distance education; industry teams collaborating online to advance shared projects; and family members sharing private time during separation necessitated by quarantine against viral transmission.

The experiment as reported here reflects the original mid-70s state-of-knowledge in the literature review and research methods. Further it depicts participant viewpoints prior to contemporary experience with such teleconferencing applications as Zoom, Skype, and FaceTime. Our gradual learning and adjustment over recent decades make it difficult today – if not impossible – to probe without a bias to similar conditions and expectations. Yet the study may advance our understanding of why teleconferencing applications often enable efficient, effective, and even enjoyable interactions – by creating “paradoxical closeness” while overcoming physical separation and social distancing.

Past investigation of group interactions occurring in some form of technological medium attracted attention from some social psychologists (e.g., Champness, 1973; Chapanis, 1975; Christie, 1975; Morley & Stephenson, 1969; Reid, 1973; Short, Williams & Christie, 1976; Turnbull, Strickland & Shaver, 1976). Apart from the studies concerned with media effects, closed-circuit television systems established some worth in social psychological research as a means of simulating interactions, as a powerful feedback technique, and as a method of recording behaviour for later analysis (e.g., Enzle & Hansen, 1976; Putz, 1975; Scherwitz & Helmreich, 1973; Shea & Rosenfeld, 1976; Storms, 1973; Wickman, 1970).

Group interaction occurring via a two-way audio-video link, is often referred to as a “teleconference” (e.g., Coll, George, Strickland, Guild & Paterson, 1975; Duncanson & Williams, 1973; McManamon, 1975). Applications of man-machine communication systems encouraged teleconference feasibility studies, and some of these may have generated hasty conclusions concerning the essential characteristics of mediated social processes. Social scientists investigating communication questions might promote the understanding of technologically mediated group process through employment of certain enduring theoretical frameworks established in face-to-face situations. For example, the Intimacy Equilibrium Model (Argyle & Dean, 1965) has been widely used in experimental investigations to generate predictions related to the interaction of such variables as amount of gaze, physical proximity, and intimacy experienced in the small group situation. Argyle and Cook (1976) have summarized the extensive literature on gaze-related variables which might be studied in settings of mediated communication. Kaplan and Greenberg (1976) have provided a theoretical outline of how the Intimacy Equilibrium Model may further studies in telecommunications.

In face-to-face dyadic interaction, gaze serves both interpersonal or social functions, and informational or task functions. It may act as a signal of attention, as a source of feedback, as a cue to facilitate smooth interaction during discourse, and as an indicator of liking or approval (e.g., Argyle & Cook, 1976; Efran, 1968; Ellsworth & Ludwig, 1972; Exline & Messick, 1967; Kendon, 1967; Pellegrini, Hicks & Gordon, 1970). Reduced levels of gaze may raise attributes of dislike, distrust or disapproval, whereas too much gaze may raise attributes of assertiveness, potency or excessive intimacy (Breed, 1972; Kleinke, Bustos, Meeker & Staneski, 1973; Strongman & Champness, 1968; Thayer, 1969). These counterinfluences, created by the desire to produce positive outcomes while avoiding the negative consequences, were recognized as the central processes underlying the affiliative conflict theory (Argyle & Dean, 1965).

Intimacy of mediated interaction. In any face-to-face dyadic interaction, there is an optimal distance at which the level of intimacy experienced is neither too high nor too low (Argyle & Dean, 1965; Goldberg, Kiesler & Collins, 1969; Mehrabian, 1968; Patterson & Sechrest, 1970; Scherer & Schiff, 1973). The optimal distance will vary depending on such things as degree of familiarity between communicators, and the type of experimental task. In mediated interaction, where physical distance is only one dimension of separation to be experienced, "immediacy" (Wiener & Mehrabian, 1968) may be a more useful concept to employ than distance. Predictions about changes in immediacy associated with different media of interaction have been outlined by Mehrabian (1971):

“The concept of immediacy can describe best the effects of a given space on the people who meet and/or interact there. Immediacy refers to the extent of mutual sensory stimulation between two persons and is measured in terms of spatio-temporal proximity or the number of "communication channels" that are available. Communication channels are the means by which one conveys his thought and feelings to another...the closer two people are to one another, the more immediate their interaction...

The greater immediacy associated with more channels for communication is illustrated as follows: telegrams and letters are two of the least immediate ways of communicating, permitting the verbal channel alone. These are followed in order by telephone conversations (verbal and vocal channels), conversation on a picturephone (verbal, vocal and facial), and face-to-face meetings.” (pp. 76-77)

Immediacy should be reduced when the capacity of communication channels is diminished qualitatively or quantitatively. As a function of increased immediacy of the communication medium, Ochsman and Chapanis (1974) seem to have shown increased efficiency in problem-solving tasks, and Wichman and Libby (1974) have observed greater cooperation during a Prisoner's Dilemma game. Similarly, Williams (1975) observed that more coalitions were formed in more immediate interaction circumstances. Putz (1975) found that performance on a vigilance task was related to immediacy as manipulated by the type of mediated supervision which the experimenter exercised over subjects. In a study comparing audio, audio plus video, and face-to-face modalities in a dyadic negotiation task, Turnbull, Strickland and Shaver (1976) observed that bargaining success was greatest when the medium was more immediate. Milgram (1974)

reported greatest obedience to the experimenter when the immediacy was lowest between the teacher-subject and the learner-subject.

There seems to be a similarity between Mehrabian's notion of immediacy and "formality" which is defined by Morley and Stephenson (1969) in terms of "the number of social cues available". The latter parameter was manipulated by varying the channel of communication, and the results were consistent with the immediacy studies.

Typically manipulated as an independent variable, immediacy seems to imply a physical property of a medium that can be objectively quantified in terms of variables like communication channels, modalities, nonverbal cues and spacio-temporal proximity. Intimacy, on the other hand, may be thought of as a subjective experience of communicators. As a psychological phenomenon, intimacy may be inferred from such dependent variables as reports of interpersonal attraction, and perceived psychological or social distance.

Short, Williams and Christie (1976) have discussed the concept of "social presence" as a characteristic of a medium that concerns the user's subjective attitude towards a communication experience. Their concept has been empirically defined by four items in a semantic differential. These are: "unsociable-sociable, insensitive-sensitive, cold-warm, impersonal-personal" (p. 66). They suggested that:

“...the use of television rather than audio-only communication makes for greater intimacy, other things being equal... In some cases, immediacy and Social Presence may vary together. For example, if a person has both a voice telephone and a picture telephone available, both immediacy and Social Presence will be greater if he chooses the latter.” (pp. 72-73)

A similar semantic differential component which is termed "social distance" and is defined by 13 bipolar adjectives was described by Guild (1974).

On the basis of the Intimacy Equilibrium Model, it was predicted that the influences of the physical medium properties, hence immediacy, would operate on intimacy in a manner consistent with other studies which have employed this model. Just as physical separation is a salient aspect of face-to-face immediacy (and thus a critical determinant of intimacy experienced), so the image size of the communicators in the mediated conditions was manipulated as a salient aspect of immediacy. It was predicted that mediated dyads would report less intimacy and greater social separation than those in the more immediate face-to-face conditions (Mehrabian, 1971). Moreover, a mediated 3 metre separation between communicators was expected to be interpersonally more remote than a mediated 2 metre separation; in the same way, a 3 metre face-to-face condition was expected to be experienced as more remote than a 2 metre face-to-face condition. These were straightforward predictions derived from the Intimacy Equilibrium Model, with the added assumption that communicators would find any form of mediated interaction less personal than face-to-face interaction (Mehrabian, 1971).

Intra-dyadic gaze. Sanctions like smiles and frowns, which are thought to accompany gaze when face-to-face, may not be effectively communicated in mediated interaction. Even when the

teleconference system provides a close semblance of eye contact (i.e., adjusting the camera and monitor angles so that mutual gaze appears natural), concern about excessive intimacy, assertiveness and potency may lose salience due to reduced immediacy through technological intervention. It was predicted that mediated communicators would exhibit a higher frequency and duration of gaze than their face-to-face counterparts. This assumes carry-over effects from passive television viewing (McLuhan, 1964). Furthermore, with reduced image size, it was expected that levels of gaze at a mediated 3 metre distance would exceed those at a mediated 2 metre distance.

In the face-to-face conditions, the reliable predictions of intimacy equilibrium theory were expected. Dyads separated by $\frac{3}{4}$ metre were expected to demonstrate the lowest levels of gaze followed by increased levels at a comfortable 2 metre distance, and still higher levels of gaze at the extreme 3 metre distance (Argyle & Ingham, 1972; Hall, 1966; Mehrabian, 1972; Patterson & Sechrest, 1970; Rosenfeld, 1965; Scherer & Schiff, 1973).

There has been some evidence that during a teleconference, communicators can experience their conversations and the other person more positively than in similar face-to-face situations (Williams, 1972). These findings, while provocative, require further investigation. If communicators in mediated conditions engaged in higher than normal levels of gaze, then theoretical support for Williams's results may be found in studies similar to that of Cook and Smith (1975). This study suggests a linear relationship between the amount of gaze in a dyad and the favourability of impressions formed by subjects of each other. Similar relationships between the amount of eye contact in face-to-face conditions and affective responses (Ellsworth & Carlsmith, 1968; Exline & Winters, 1965; Goldberg, 1968; Kendon & Cook, 1969; Kleck & Nuessle, 1968; Mehrabian, 1969; Stass & Willis, 1967; Thayer & Schiff, 1974), and between eye contact and physiological arousal (Kleinke & Pohlen, 1971; McBride, King & James, 1965; Nicholas & Champness, 1971) have also been found.

Audio/video-mediated interaction should afford an opportunity to combine two social influences in a unique way. These are (a) a high level of interpersonal gaze, and (b) a high level of interpersonal separation. Should predictions with respect to intimacy during mediated interaction be adjusted because of these counter influences? It has been shown that an increase in gaze can cause an increase in the intimacy experienced, whereas an increase in distance (or decrease in immediacy) can reduce intimacy.

Of these two opposing influences, the latter was expected to exert a stronger effect in the present experiment. That interaction over a teleconference system would create a less intimate experience than interaction face-to-face separated by three metres is partly an intuitive prediction. But the picturephone was thought to be a less immediate medium than face-to-face meetings (Mehrabian, 1971). Where decreased immediacy was created, one might expect reports of lower intimacy, less positive regard between communicators and, overall, a less positive assessment of the shared experience.

Hypotheses

It was expected that:

1. There would be greater frequency and duration of gaze in audio/video-mediated conditions than in face-to-face conditions.
2. Dyads interacting face-to-face at the $\frac{3}{4}$ metre distance would show the lowest levels of gaze, less than dyads at the 2 metre distance which, in turn, would be less than dyads interacting at the 3 metre distance.
3. Dyad members in the two audio/video-mediated conditions would report lower levels of intimacy, less liking for each other and the task than face-to-face dyad members at the corresponding 2 and 3 metre distances.
4. Dyad members interacting at the 2 metre distance would report a higher level of intimacy than dyad members interacting at the 3 metre distance; this was predicted for both face-to-face and audio/video-mediated groups.

Method

Participants

In 1976, forty members of the University of Oxford's Department of Experimental Psychology Subject Panel, about an equal number of nonstudents and undergraduates, were paid 50 pence per hour for participating in this experiment. Mixed sex dyads (20 males and 20 females) were unacquainted prior to the experiment, and had a mean age of approximately 20 years (range was 18 to 32 years).

Procedure

Identification numbers I to V were assigned to the groups in the experimental conditions as designated in Figure 1. An interactive audio-video link was established between three adjoining rooms such that the two extreme rooms were the communication nodes and the centre one was the control room. Subjects in the mediated conditions were seated in one of the two communication nodes separately so that they did not know the distance between two rooms but were aware that both were somewhere in the laboratory. Subjects in the face-to-face conditions sat in chairs located in a wide corridor.

Insert Figure 1 about here

The communication link. In the mediated conditions, each subject was seated in a chair securely placed 1.7 metres from a 19-inch monochrome video monitor. A video camera was mounted above the monitor and pre-adjusted to give a head-and-shoulders image of the communicator with a reasonable semblance of eye contact. The distance-between-subjects manipulation was accomplished by changing the 25 mm lens of the video camera in the mediated 2 metre condition to a wider angle 16 mm lens in the mediated 3 metre condition. Previous tests

established photographically which lenses would create a retinal image size equivalent to a 2 and 3 metre distance. An audio-speaker was located below each monitor and each subject wore a neck microphone during the experiment. The audio was provided by a two-channel stereo tape recorder, one channel per node, and levels were adjusted to give a clearly audible voice link between nodes. Unobtrusive wiring fed into the control room where the experimenters (one male and one female) could monitor and record the problem-solving sessions. The duration of the sessions was controlled by playing the audiotape briefing to the subjects and allowing four minutes of discussion. Four human relations problems which encouraged discussion were employed. None had a "correct" solution. The order of presentation was randomly determined and held constant across all groups. Subjects were instructed to discuss each of the problems in turn and attempt to reach a mutually acceptable solution.

The same recording and briefing methods were used in the face-to-face conditions which were conducted in the corridor. Factors such as distance to the video camera, the wearing of neck microphones and the lighting levels were approximately the same as in the mediated conditions. The independent variable manipulation was produced by altering the seating distance between subjects. The chairs were fixed to the floor in all three conditions to ensure the desired inter-subject distances of $\frac{3}{4}$, 2 and 3 metres.

Post experiment questionnaire. Following the fourth problem-solving task, subjects adjourned to a central room and there completed a questionnaire. Assurance was given that the ratings would be confidential. The questionnaire provided the attitudinal indexes and subjective estimates of distancing between communicators during the experiment. In addition, a 35-item semantic differential containing a social distance component (see Figure 2) was employed.

Insert Figure 2 about here

Other items in the questionnaire asked subjects to estimate the perceived distance between themselves and the other person in the dyad. This was considered in terms of both physical distance and psychological distance (5-point scales anchored "near-far") and as estimates in feet of the actual distance separating the communicators. The first two items were intended to tap subjective dimensions of distance and the last item, a more objective dimension.

Data analysis. The five experimental conditions produced comparable videotape recordings that were analysed by two independent coders in order to determine frequency and cumulative duration of gaze in the direction of the other's face, both while talking and while not talking. As well, the frequency and cumulative duration of talking were measured. An intercoder correlation of agreement of .92 was obtained with such consistency, the mean of the two coders was used in the analyses. Previous research has found similar high agreement between coders (Exline, 1963). Where *a priori* pairwise multiple comparisons were appropriate, these were performed using the t-test procedure. Where *a posteriori* multiple comparisons were necessary, Scheffe's S method was employed for nonpairwise comparisons and Tukey's LSD for pairwise (Kirk, 1968).

Results

Behavioural indexes of gaze. A MANOVA shows that, considering all dependent variables at once, the five experimental groups differ multi- dimensionally (approximate F-statistic 1.99, $p < .01$). This test suggests that further univariate analyses are appropriate.

Insert Table 1 about here

Of the four univariate ANOVAs shown in Table 1, only in the case of "percentage of gaze while talking" is there a significant effect which differentiates the five conditions ($F=2.63$, $p < .05$). Multiple comparisons among group means for this dependent variable reveal that the mediated 2 metre condition, with gaze 65.6% of the time during discussion, is significantly different from the $\frac{3}{4}$ metre face-to-face condition which shows 38.6% gaze ($p < .05$) and differs significantly from the 2 metre face-to-face condition which again shows 38.6% gaze while talking ($p < .05$). The rather low amount of gaze in the latter condition (closer to 60% in previous studies) may be related to the addition of the video camera. This possibility will be discussed later.

Recall that mediated dyads were expected to show the highest levels of gaze, while face-to-face conditions were expected to show the usual Intimacy Equilibrium Model findings (i.e., least gaze at $\frac{3}{4}$ metre distance; most gaze at the 3 metre distance). Although the univariate ANOVAs for the four behavioural indexes do not indicate that all of the expected differences have emerged, further nonparametric analysis using Kendall's coefficient of concordance demonstrates that, as far as the predicted rank-ordering of the five groups is concerned. Hypotheses 1 and 2 are supported ($W = .58$, $p < .05$). Rank-ordering (lowest to highest) of the five groups, according to the four gaze measures, occurs as follows (a) $\frac{3}{4}$ metre face-to-face condition, (b) 2 metre face-to-face condition, (c) 3 metre face-to-face condition, (d) mediated 2 metre condition, and (e) mediated 3 metre condition. To summarize mediated dyads do exhibit the highest levels of gaze and, in the face-to-face conditions, the gaze index shows results consistent with the Intimacy Equilibrium Model.

Perceived separation of communicators. In the face-to-face conditions, the estimates (in feet) of the actual distance between pairs of communicators were reasonably accurate and consistent. This was not the case in the mediated conditions as the following variances for Groups I to V show: 35.23, 53.58, 0.74, 0.74 and 3.28 respectively. Clearly, Groups I and II (mediated 2 and 3 metre) have large intragroup differences in their manner of estimating the distance. When asked to explain their interpretation of the question, during debriefing, some subjects interpreted it as the 63-inch distance between themselves and the video monitor. Others calculated their estimates as twice the distance from the monitor, likely visualising the other subject's placement to be similar to their own. Still others seemed to estimate the distance based upon the image size shown on the monitor, implying a comparison with face-to-face distancing. Consequently, estimate of distance as a dependent variable is excluded from the overall MANOVA.

Insert Table 2 about here

Other sociometric questionnaire items related to interpersonal separation proved more useful in the overall analysis (see Table 2). Firstly, physical distance between the subjects is perceived to be "nearest" in the $\frac{3}{4}$ metre face-to-face condition (Mean_{Grp III} = 1.88 on the 5-point scale), followed, unexpectedly, by the mediated 2 and 3 metre conditions (Mean_{Grp I} = 2.00 and Mean_{Grp II} = 2.25). The 2 and 3 metre face-to-face conditions receive ratings slightly on the "far" side of the midpoint of 3 on the 5-point scale (Mean_{Grp IV} = 3.13 and Mean_{Grp V} = 3.63). *A priori* pairwise comparisons (t tests) show that Group III differs significantly from Group IV and V. In the face-to-face and mediated conditions, the relationship is as predicted (Mean_{Grp I} < Mean_{Grp II} and Mean_{Grp IV} < Mean_{Grp V}). However, the mediated groups (combined Mean_{Grp I and II} = 2.13) are seen as less physically separated than their face-to-face counterparts (combined Mean_{Grps IV and V} = 3.38); a significant difference ($p < .05$) suggesting that the medium separation effect does not operate as predicted in Hypothesis 3.

This evidence is reinforced by the results of the item concerning perceived psychological distance. The most psychologically distant conditions are found to be the 2 and 3 metre face-to-face conditions (Mean_{Grp IV} = 3.00 and Mean_{Grp V} = 3.75). In choosing the 2 metre distance, it was hoped to produce the optimum proximity for discussion; a distance perceived to be neither too close nor too far apart. The means of 3.13 (physical distance) and 3.00 (psychological distance) on 5-point scales suggest that this separation produced the desired effect. The 3 metre face-to-face condition is significantly different from the $\frac{3}{4}$ metre face-to-face condition (Mean_{Grp III} = 2.50) and the mediated 3 metre condition (Mean_{Grp II} = 2.13, $p < .05$). While the 2 metre face-to-face condition and the mediated 2 metre condition do not differ significantly (Mean_{Grp IV} = 3.00 and Mean_{Grp I} = 2.63), the direction of difference tends towards the latter being psychologically nearer. The overall mean for mediated conditions is 2.38; for the face-to-face conditions it is 3.38 (NSD, $p = .11$). Contrary to the prediction of Hypothesis 3, this too suggests that the audio/video medium intervention produced paradoxical closeness.

Semantic differential index of intimacy. Employment of the bipolar adjective checklist follows extensive use of the same semantic differential in similar communication settings. Figure 2 demonstrates the lawfulness of results using this semantic differential. While there were four component scales (social distance, activity, evaluative and communicative), only the results for the social distance component are reported in detail here (see Table 2). Compared with all other conditions, the mediated 2 metre condition is significantly lowest in social distance ($p < .05$), while the 3 metre face-to-face condition is greatest in social distance ($p < .05$). The overall ordering of conditions, from low to high social distance is (a) mediated 2 metre (Mean_{Grp I} = 4.07), (b) mediated 3 metre (Mean_{Grp II} = 3.41), (c) 2 metre face-to-face (Mean_{Grp IV} = 3.40), (d) $\frac{3}{4}$ metre face-to-face (Mean_{Grp III} = 3.35), and (e) 3 metre face-to-face (Mean_{Grp V} = 3.18). All groups give ratings that are on the side of low social distance on the 5-point scale. Consistent with the other distancing indexes but inconsistent with predictions of immediacy, the mediated interaction is perceived to have less social distance (more social presence) than face-to-face interaction. Moreover, these results offer support for Hypothesis 4 in that the 2 and 3 metre conditions in both face-to-face and mediated differed ($p < .05$).

When Kendall's coefficient of concordance is applied to the rank-ordering of all 35 semantic differential items, it demonstrates the consistent arrangement of the five groups. The average ratings were as follows: Mean_{Grp I} = 4.53, Mean_{Grp II} = 3.04, Mean_{Grp III} = 2.96, Mean_{Grp IV} =

2.59 and Mean_{Grp V} = 1.74 (Kendall's W = .46, $p < .01$). In general, the results from the semantic differential analysis suggests that the mediated conditions experienced high interpersonal intimacy and positive evaluation of the interaction.

Preference to work with the other person again. The questionnaire item regarding "preference to work with the other person again" produces a significant difference (Table 2, $F = 2.96$, $p < .05$). The mediated dyads are shown to be most compatible (Mean_{Grp I} = 4.88, Mean_{Grp II} = 4.50). Multiple comparisons show that the mediated 2 metre and 3 metre conditions differ significantly from the 2 metre (Mean_{Grp IV} = 3.63) and 3 metre (Mean_{Grp V} = 3.75) face-to-face conditions (Scheffe, $p < .05$). Subjects in the $\frac{3}{4}$ metre face-to-face condition expressed a preference to work with each other again (Mean_{Grp III} = 4.38).

Also of interest is the relationship between immediacy and the preference to work with the other person again. Rank-ordering the five groups according to the predicted levels of immediacy and then correlating this with rank-ordering of the groups using this attraction index produces a Spearman's rank correlation coefficient of -0.60. But, when the same attraction index is correlated with a perceived distancing index (actually, the combination of perceived physical and psychological distance), the resulting correlation is 0.58. The degree of negative agreement in the first correlation is about the same as the degree of positive agreement in the second. Both correlations are significant ($p < .05$).

Open-ended question. The general comments of the communicators, which were analysed in order to ascertain the frequency with which (a) the problem-solving task, (b) the experimental setting and/or apparatus, (c) both of these, and (d) neither of these were mentioned, do not suggest that their views of the experiment differed (i.e., the mediated conditions regarding it as a communications experiment, but the face-to-face conditions regarding it as a problem-solving task). The five conditions comment with approximately equal representation in all categories. This does not support the notion that different performance sets or experimental demands were operating across conditions.

The open-ended question does, however, provide the following two statements which seem compatible with the interpretation that is offered for these results. One comment: "(The mediated 3 metre condition) was probably more relaxed with the TV set-up than if we had both been in the same room" and, from the mediated 2 metre condition, this comment: "...you seem to be able to look more directly at the other person than when they are actually in the same room. By setting up one sort of barrier, the TV breaks down others." Both of these subjects state implicit comparisons between interaction held "in the same room" as opposed to some other form of mediated interaction, such as a telephone link. They did this while not knowing what comparisons were being made in this experiment.

Discussion

Levels of interpersonal gaze. The evidence supports the hypothesis that audio/video-mediated communicators gaze more at each other than do face-to-face communicators. In the mediated 2 metre condition, the level of gaze while talking is reliably higher than in the $\frac{3}{4}$ metre and 2 metre

face-to-face conditions. This follows from the assumption that people familiar with passive viewing of television maintain a higher-than-normal degree of gaze in order to gain as much information as possible via the video channel.

Why then is the effect not found in the "gaze while not talking" measure? Previous studies have used "gaze while listening" as a dependent variable (for review see Argyle & Cook, 1976). In the present study, it is difficult to judge the difference between gaze while listening and gaze while not talking, but relatively easy to differentiate gaze while talking from gaze while not talking. Employing this distinction, the present "not talking" measure includes a certain amount of time spent gazing in mutual silence.

Intimacy Equilibrium Model. As predicted, there is support for the Intimacy Equilibrium Model in the face-to-face conditions when all behavioural indexes of gaze are considered simultaneously. Where a high degree of interpersonal immediacy is expected ($\frac{3}{4}$ metre distance), this manipulation is effective. Communicators seated closely together report a high level of intimacy, which they see as stemming from their spacing. They offer moderately positive ratings on the semantic differential and show preferences to work with the other person again. It may be that participants -- experiencing awkward closeness -- make the necessary intimacy adjustments, but once separated to complete the questionnaire, they choose to emphasize positive aspects of their intimate encounters.

When seated at the more optimal distance for discussion of 2 metres, proximity does not seem to be of great concern. The task is viewed positively, even slightly enjoyably. At the extreme 3 metre spacing, judgments offered by communicators must be interpreted as confirmation that this condition is uncomfortably distant. Consequently, social interaction suffers and the task is rated more negatively. Rosenfeld (1965) found a similar distance to be "unfriendly" and Mehrabian (1969) found it to communicate "dislike".

Intimacy during teleconference. Perhaps the most interesting finding is one that was not expected. Contrary to predictions, audio/video-mediated dyads perceived themselves to be physically nearer to one another and more socially present than their face-to-face counterparts. They enjoyed working in the experiment to a greater degree (semantic differential) and showed greater preference to work with their partner again. They also tended to perceive less psychological distance than the face-to-face dyads, though this was not statistically significant. These sociometric indexes are what subjects reported as their experiences. Perhaps a form of psychological reactance (Brehm, 1966) operated when subjects thought that a potential barrier to communicative freedom had been transcended. Or it may be that subjects were implying that the experience was not as remote as they had expected it to be. That is, they may have rated the communication experience against a rather negative tacit expectation.

Other possible response biases might be considered. For example, if subjects had deduced or been informed that the basis of comparison was between mediated and face-to-face encounters, demand characteristics (Orne, 1962) and social desirability pressures (Crowne & Marlowe, 1964) might have elicited negative reactions from the mediated subjects toward the communication experiment. On the other hand, if subjects had made an implicit comparison between the telephone as a medium of communication and the audio-video link they may have viewed the

latter as an improvement. Statements in the "general comments" item of the questionnaire provide no evidence that the comparison had been teleconference versus telephone.

Any interpretations for this response set of the differences between the face-to-face and mediated conditions would seem to be rather weak as attempts to explain why the various distance indexes were influenced as they were, or why the two mediated conditions were differentially influenced.

Objective self-awareness during teleconference. Consider the possibility that the video cameras may have introduced a bias. Duval and Wickland (1972) have shown how a state of objective self-awareness can be created by the presence of a video camera. The consequences of this phenomenon for any video communication system should not be underestimated.

To assess the possible influence in the present communication context, a second experiment has been conducted to address the issue specifically. There may be a similar source of influence operating equivocally in the present study since communicators in the face-to-face and mediated conditions may have perceived the functions of the video cameras differently. The most obvious function of the cameras in the mediated conditions was to provide a communication link between the nodes. A secondary function, possibly less salient to subjects in these dyads, was to allow the experimenters to monitor and videotape the interaction. In the face-to-face conditions, there was no apparent function except to permit scientific eavesdropping. This may have created a nonspecific negative reaction or the specific perception of privacy invasion.

While this is a feature of audio/video-mediated communication that deserves further investigation, it is doubtful that the presence of the cameras produced the systematic influence underlying the results of this experiment. It should be remembered that it was the mediated subjects who produced the extreme reactions in terms of a marked closeness and positiveness of evaluation. Moreover, in face-to-face groups there was apparently no interference with the expected differentiation along distancing and intimacy dimensions. Cameras were rendered as unobtrusive as possible and subjects could readily gaze at their partner without looking directly into the camera. Communicators seemed to be fully engaged with the experimental task and rarely acknowledged the camera's presence by glances. None of the comments, written or verbal, made by the subjects would suggest that the cameras diminished the level of intimacy. This issue of "function" may have been more apparent to this investigator than it was to the subjects.

Interpretation of intimacy during teleconference. What plausible explanation may be offered to account for the paradoxical closeness experienced by the mediated dyads? The hypothesis that mediated communication creates an interpersonal barrier may be qualified in the light of the present results together with the extensive literature on the relationship between the amount of gaze and the favourableness of impressions formed. As anticipated with mediated dyads, the dependent measures of gaze duration were higher than with their face-to-face counterparts. We must stop short of stating that these higher measures of gaze were responsible for the feelings of closeness, but it has been shown that high amounts of gaze coincided with low estimates of social distance and positive ratings of both the other person and the experimental task.

One might further refine this notion of mediated social influence if one recalls the earlier statement that intimacy sanctions are not only difficult to impose, they may well be unnecessary.

A person's concern for the negative consequences of intimacy (especially assertiveness, dominance and potency) may be diminished by the video mediation. If the affiliative motive remains strong in this social setting, communicators may feel free to enjoy the positive aspects without reserve which is instrumental in the avoidance of negative consequences.

This reaction may be amplified by the experience of arousal stimulated by this novel situation of interaction. In spite of care which was taken to lessen the visual impact of the electronic hardware, mediated subjects may have been more excited by the experimental task. There exists strong evidence that excited people will, at times, make erroneous inferences from situational cues to label their arousal states (Schachter, 1964). In the process of causal attribution for heightened arousal, communicators may seize upon various situational cues that are social rather than technical. Subjects are likely aware of the higher than usual exchange of gaze, the focus upon facial nonverbal cues and the smooth nonthreatening nature of the discussion. It is plausible that subjects would complete the inferential process by concluding that they have enjoyed the social experience. Other studies have shown that subjects will produce links in inference between gaze patterns, arousal levels and feelings of liking (Cook & Smith, 1975; Ellsworth & Carlsmith, 1968; Exline & Winters, 1965; Goldberg, 1969; Kendon & Cook, 1969; Kleck & Nussle, 1968; Kleinke & Pohlen, 1971; McBride, King & James, 1965; Mehrabian, 1969; Nicholas & Champness, 1971; Stass & Willis, 1967; Thayer & Schiff, 1974).

In part, Williams (1972) found audio-video interactions rated more favourably than either face-to-face or audio conditions. Interpretations of this finding (Short, Williams & Christie, 1976; Williams, 1972) were made in terms of the Intimacy Equilibrium Model. A low-intimacy task (i.e., free discussion about the problems of modern life) did not yield the same positive evaluations from mediated dyads as those of the high-intimacy task (i.e., discussion on the same task but requiring a mutual decision). Their interpretation was that the increased intimacy of the second task was balanced by the level of social presence using closed-circuit television.

In the Williams (1972) study, both the level of acquaintanceship between subjects and the task intimacy were similar to that of the present study, and it may be of consequence that the evaluative ratings of both communication experiences were strikingly similar. The interpretation of the present study is assisted by the fact that mediated dyads reported specifically on the level of intimacy and social presence experienced. Moreover, the $\frac{3}{4}$ metre face-to-face dyads, while acknowledging the extreme closeness of their encounters, rated the experiment and their partner positively. In contrast, the 3 metre face-to-face condition was perceived to be distant. These results, together with the reactions of the mediated dyads, lead to the conclusion that mediated subjects experienced an increase in social presence.

Some mediated communication research seems to have equated or confused channel capacity and immediacy with intimacy and social presence. The distinction is an important one. Channel capacity refers to the quantitative and/or qualitative aspects of a communication medium. Systems engineers measure channel capacity by the number of "bits" of information that may be transmitted in a given unit of time; moreover, it is possible to define channel capacity in terms of the sensory modalities or types of information that may be transmitted (Kaplan & Greenberg, 1976). Any communication system, whether it involves conversations at a distance of a few feet or the transmitting of telegrams, may be analysed along a channel capacity dimension. Such

parameters as distance, transmission rate and type of information communicated, all objectively quantifiable factors, contribute to the delineation of channel capacity in a specific communication system or medium. The hypotheses of this experiment were stated in terms of expected differentiation along the channel capacity or immediacy dimension (i.e., from low to high, mediated 3 metre and 2 metre followed by 3 metre, 2 metre and $\frac{3}{4}$ metre face-to-face). However, these hypotheses were tested by measuring indexes which, while conceptually related, were not equivalent.

Sociometric indexes gave subjects an opportunity to describe their experience and to reflect their reactions to perceived interpersonal intimacy. Channel capacity would influence these perceptions, of course, but other psychological or experiential influences would be present as well. Familiarity with the medium, homeostatic social forces, application of social rules, communicators' acquaintanceship with each other and characteristics of the task, are typical factors which may interact with specific medium qualities to determine subjective reaction.

Some implications. If further investigations of mediated communication processes confirm that paradoxical closeness and low-threat intimacy are reliable and typical experiences, the results of this experiment may have implications for several spheres of concern. With regard to applied communications research, there is the suggestion that the subjective experience of intimacy must be assessed separately from a consideration of the channel capacity of a medium. Moreover, there may be the rudiments of an answer to the question of why certain man-machine combinations have failed to gain user approval. Sinaiko (1974), for example, has observed that it is often high-status users such as executives and military commanders who find teleconference systems inadequate as substitutes for face-to-face encounters. These users may sense an inability to influence, persuade, or dominate others. One can imagine other situations in which this low-threat intimacy between people may be used to advantage. For example, in social skills training it may be feasible to use interactive audio-video links in order to relieve a trainee of social anxieties. Together with the self-feedback capabilities of video replay, the trainee may be guided toward confident face-to-face encounters.

Perhaps of theoretical consequence to social psychology, this study supports previous research which has concluded that gaze is an extremely powerful modality of communication. Regarding the Intimacy Equilibrium Model, there is some indication of what occurs with respect to the intimacy-balancing and affiliative-motive mechanisms when social influence is diluted. More empirical work is necessary to further explore the concepts of social distance, intimacy and immediacy during mediated interactions. Notwithstanding that persons in normal face-to-face interactions can feel experiences of "too close for comfort" if occurring at such distance as $\frac{3}{4}$ metre, persons at distance in technologically mediated interactions can feel experiences of "paradoxical closeness" because they can engage in gaze and/or mutual gaze without the sort of interruption that is normally triggered for the purpose of intimacy reduction. We see increasing use of technologies for mediated communication (such as Zoom, Skype, FaceTime) during times of viral pandemic. New interpersonal practices emerge, such as: professionals consulting via teleconferences; students learning via distance education; industry teams collaborating online to advance shared projects; and family members sharing private time during separation necessitated by quarantine against viral transmission. We observe further evidence of human resilience and social adaptation to changes in our living environment.

References

- Argyle, M., & Cook, M. Gaze and mutual gaze. Cambridge University Press, 1976
- Argyle, M., & Dean, J. Eye-contact, distance and affiliation. *Sociometry*, 1965, 28, 289-304.
- Argyle, M., & Ingham, R. Gaze, mutual gaze and proximity. *Semiotica*, 1972, 6, 32-49.
- Breed, G. The effect of intimacy: Reciprocity or retreat? *British Journal of Social and Clinical Psychology*, 1972, 11, 135-142.
- Brehm, J. W. A theory of psychological reactance. New York: Academic Press, 1966.
- Champness, B. G. Attitudes toward person-person communications media. *Human Factors*, 1973, 15, 437-447.
- Chapanis, A. Interactive human communication. *Scientific American*, March, 1975, 36-42.
- Christie, B. Perceived usefulness of person-person telecommunications media as a function of the intended application. *Environmental Journal of Social Psychology*, 1975, 4, 366-368.
- Coll, D. C., George, D. A., Strickland, L. H., Guild, P. D., & Paterson, S. A. Multidisciplinary applications of communication systems in teleconferencing and education. I. E. E. E. *Transactions on Communications*, 1975, v. COM-23, 10, 1104-1118.
- Cook, M., & Smith, J. M. C. The role of gaze in impression formation. *British Journal of Social and Clinical Psychology*, 1975, 14, 19-25.
- Crowne, D.P., & Marlowe, D. The approval motive. New York: Wiley, 1964.
- Duncanson, J. P., & Williams, A. D. Videoconferencing: Reactions of users. *Human Factors*, 1973, 15, 471-485.
- Duval, S., & Wicklund, R. A. A theory of objective self-awareness. New York: Academic Press, 1972.
- Efran, J. S. Looking for approval: Effects on visual behavior of approbation from persons differing in importance. *Journal of Personality and Social Psychology*, 1968, 10, 21-25.
- Ellsworth, P.C., & Carlsmith, J.M. Effects of eye-contact and verbal content on affective response to a dyadic interaction. *Journal of Personality and Social Psychology*, 1968, 10, 15-20.
- Ellsworth, P.C., & Ludwig, C.M. Visual behaviour in social interaction. *Journal of Communication*, 1972, 22, 375-403.

Enzle, M. E., & Hansen, R. D. Effects of video-mediated visual contact on observers' attributions of causality and reciprocal game behavior. *Simulation and Games*, 1976, 7, 281-294.

Exline, R. V. Explorations in the process of person perception: Visual interaction in relation to competition, sex and need for affiliation. *Journal of Personality and Social Psychology*, 1963, 31, 1-20.

Exline, R. V., & Messick, D. The effects of dependency and social reinforcement upon visual behavior during an interview. *British Journal of Social and Clinical Psychology*, 1967, 6, 256-266.

Exline, R.V., & Winters, L.C. Affective relations and mutual gaze in dyads. In S. S. Tomkins & C. Izard (Eds.), *Affect, cognition and personality*. New York: Springer, 1965.

Guild, P. D. Wired City Simulation Laboratory user impact assessment. Unpublished manuscript, Department of Systems Engineering and Computer Science, Carleton University, Ottawa, 1974.

Goldberg, G. N. Visual behavior in face-to-face interaction. Paper presented at the New England Psychological Association, Hanover, New Hampshire, 1968.

Goldberg, G. N., Kiesler, C. A., & Collins, B. E. Visual behavior and face-to-face distance during interaction. *Sociometry*, 1969, 32, 43-53,

Hall, E.T. *The hidden dimension*. Garden City, N.Y.: Doubleday, 1966.

Kaplan, K., & Greenberg, C. I. Regulation of interaction through architecture, travel and telecommunications: A distance-equilibrium approach to environmental planning. *Environmental Psychology and Nonverbal Behavior*, 1976, 1, 17-29.

Kendon, A. Some functions of gaze direction in social interaction. *Acta Psychologica*, 1967, 26, 22-63.

Kendon, A., & Cook, M. The consistency of gaze patterns in social interaction. *British Journal of Psychology*, 1969, 69, 481-494.

Kirk, R. E. *Experimental design: Procedures for the behavioural sciences*. Belmont, Ca.: Wadsworth, 1968.

Kleck, R. E., & Nuessle, W. Congruence between the indicative and communicative functions of eye contact in interpersonal relations. *British Journal of Social and Clinical Psychology*, 1968, 17, 308-313.

Klinke, C. L., Bustos, A. A., Meeker, F. D., & Staneski, R. A. Effects of self-attributed and other-attributed gaze on interpersonal evaluations between males and females. *Journal of Experimental and Social Psychology*, 1973, 9, 154-163.

- Kleinke, C.L., & Pohlen, P.D. Affective and emotional responses as a function of another person's gaze and cooperativeness in a two-person game. *Journal of Personality and Social Psychology*, 1971, 17, 308-313
- Libby, Jr., W. L. Technological and spatial immediacy: How the joint study of face-to-face and telecommunication may further our understanding of human co-presence. Conference of the Canadian Psychological Association, 1974.
- McBride, G., King, M. G., & James, J. W. Social proximity effects on galvanic skin responsiveness in adult humans. *Journal of Psychology*, 1965, 61, 153-157.
- McLuhan, M. *Understanding media: The extensions of man*. London: Routledge & Kegan Paul, 1964.
- McManamon, P. Technical implications of teleconference service. I. E. E. E. Transactions on Communications, 1975, v. COM-23, 30-38.
- Mehrabian, A. distance relationship of attitude to seated posture, orientation and *Journal of Personality and Social Psychology*, 1968, 10, 26-30.
- Mehrabian, A. Significance of posture and position in communication of attitude and status relationships. *Psychological Bulletin*, 1969, 71, 359-372.
- Mehrabian, A. *Silent messages*. Belmont, Ca.: Wadsworth, 1971.
- Mehrabian, A. *Nonverbal communication*. New York: Aldine-Atherton, 1972.
- Milgram, S. *Obedience to authority*. London: Tavistock, 1974.
- Morley, I. E., & Stephenson, G. M. Interpersonal and interparty exchange: A laboratory simulation of an industrial negotiation at the plant level. *British Journal of Psychology*, 1969, 60, 543-545.
- Nicholas, K. A., & Champness, B. G. Eye-gaze and the GSR. *Journal of Experimental and Social Psychology*, 1971, 7, 623-626.
- Ochsman, R. B. & Chapanis, A. The effect of 10 communication modes on the behavior of teams during cooperative problem-solving. *International Journal of Man-Machine Studies*, 1974, 6, 579-619.
- Orne, M. T. On the social psychology of the psychological experiment: With particular reference to demand characteristics and their implications. *American Psychologist*, 1962, 17, 776-783.
- Patterson, M. L., & Sechrest, L. B. Interpersonal distance and impression formation. *Journal of Personality*, 1970, 38, 161-166.

- Pellegrini, R. J., Hicks, R. A., & Gordon, L. The effect of an approval- seeking induction on eye-contact in dyads. *British Journal of Social and Clinical Psychology*, 1970, 9, 373-374.
- Putz, V. R. The effects of different modes of supervision on vigilance behaviour. *British Journal of Psychology*, 1975, 66, 157-160.
- Reid, A. A. L. Channel versus system innovations in person/person telecommunications. *Human Factors*, 1973, 15, 449-457.
- Rosenfeld, H. M. Effects of an approval-seeking induction on interpersonal proximity. *Psychological Reports*, 1965, 17, 120-122.
- Schachter, S. The interaction of cognitive and physiological determinants of emotional state. *Advances in Experimental Social Psychology*, 1964, 1, 49-80.
- Scherer, S. E., & Schiff, M. R. Perceived intimacy, physical distance and eye contact. *Perception and Motor Skills*, 1973, 36, 835-841.
- Scherwitz, L., & Helmreich, R. Interactive effects of eye contact and verbal content on interpersonal attraction in dyads. *Journal of Personality and Social Psychology*, 1973, 25, 6-14.
- Shea, M., & Rosenfeld, H. M. Functional employment of nonverbal social reinforcers in dyadic learning. *Journal of Personality and Social Psychology*, 1976, 34, 228-239.
- Short, J., Williams, E., & Christie, B. *The social psychology of telecommunications*. London: Wiley, 1976.
- Sinaiko, H. W. The universal garage principle: Designing for acceptance. Paper given at the National Telecommunications Conference, San Diego, December 1974.
- Stass, J. W., & Willis, F. N. Eye contact, pupil dilation and personal preference. *Psychonomic Science*, 1967, 7, 375-376.
- Storms, M. D. Videotape and attribution process: Reversing actors' and observers' points of view. *Journal of Personality and Social Psychology*, 1973, 21, 165-175.
- Strongman, K. T., & Champness, B. G. Dominance hierarchies and conflict in eye contact. *Acta Psychologica*, 1968, 28, 376-386.
- Thayer, S. The effect of interpersonal looking duration on dominance judgements. *Journal of Social Psychology*, 1969, 79, 285-286.
- Thayer, S., & Schiff, W. Observer judgement of social interaction: Eye contact and relationship inferences. *Journal of Personality and Social Psychology*, 1974, 30, 110-114.

Turnbull, A. A., Strickland, L. H., & Shaver, K. G. Medium of communication, differential power and phasing of concessions: Negotiating success and attributions to the opponent. *Human Communication Research*, 1976, 2, 262-270.

Wichman, H. Effects of isolation and communication on cooperation in a two-person game. *Journal of Personality and Social Psychology*, 1970, 16, 114-120.

Wiener, M., & Mehrabian, A. *Language within language: Immediacy, a channel in verbal communication*. New York: Appleton-Century-Crofts, 1968.

Williams, E. The effects of medium of communication on evaluation of a conversation and the conversational partner. *Communication Studies Group paper (mimeo)*, 1972, n. E/72131/WL.

Williams, E. Coalition formation over telecommunications media. *European Journal of Social Psychology*, 1975, 5, 503-507.

Acknowledgements

The author wishes to acknowledge the support and advice of the following:

- Michael Argyle (1925-2002) who supervised my doctoral research and provided wise guidance as this work was undertaken in the Department of Experimental Psychology at the University of Oxford.
- Lloyd Strickland (Emeritus Professor, Carleton University) for decades has been my mentor, friend, and inspiration in social psychology and mediated communication.
- Donald George and David Coll (both now deceased) who were prime movers and visionaries behind the Wired City Simulation Laboratory (WCSL) at Carleton University.
- The Canada Council and Department of Communication of the Government of Canada, who funded my graduate studies and the exploratory engineering facility of the WCSL.

Figure 1

Experimental Conditions

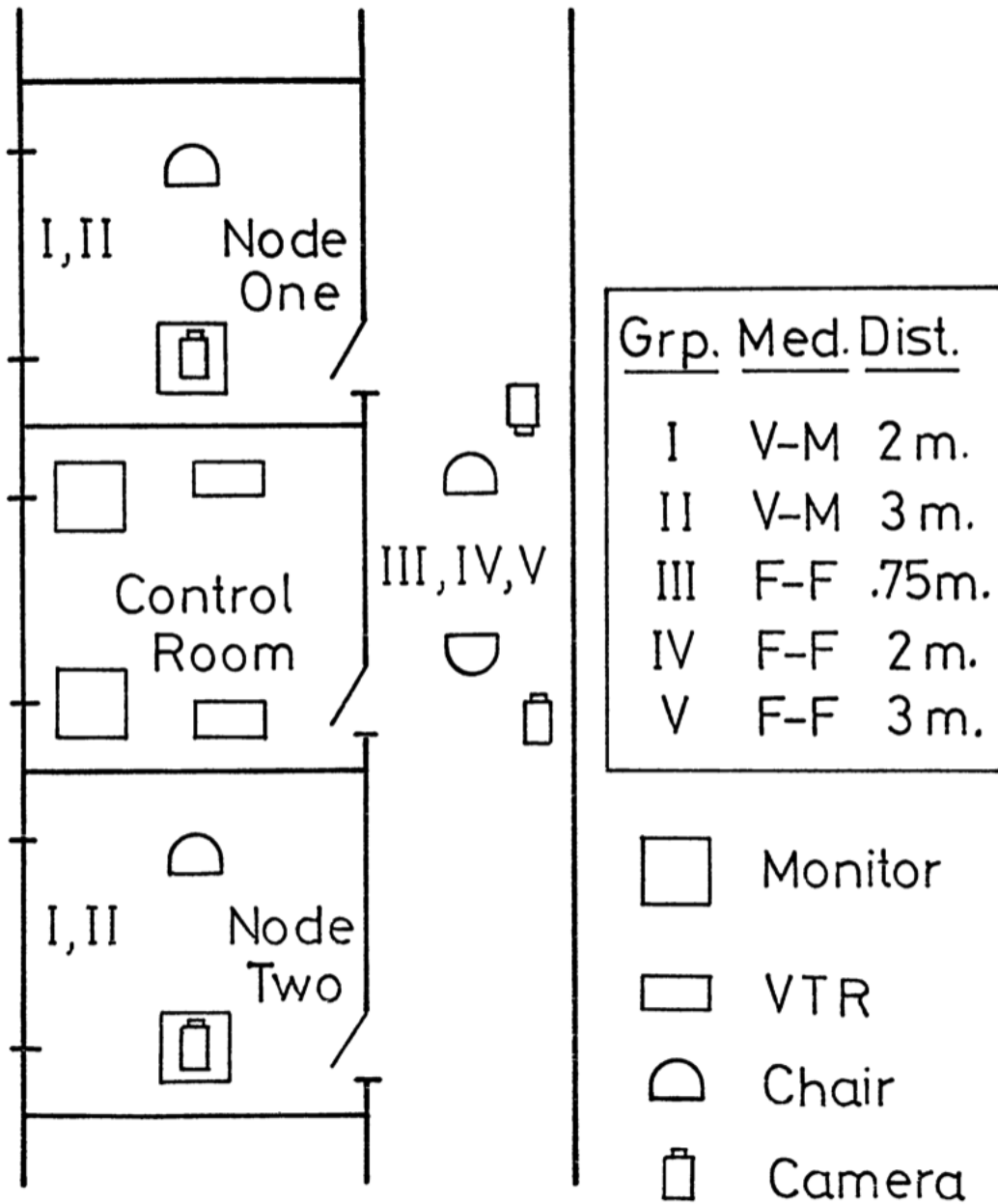
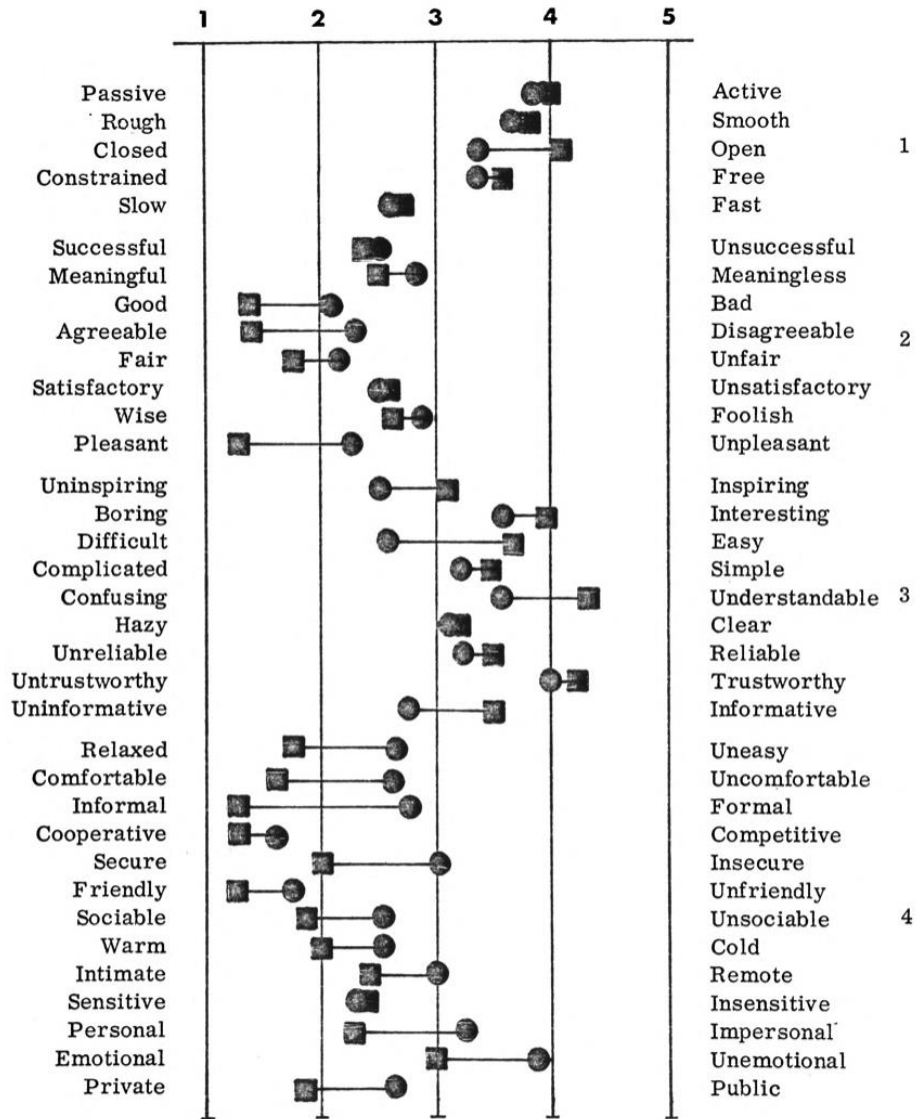


Figure 2

Ratings (on 5-point Scale) by Participants at
V-M at 2 metre (square) Versus F-F at 3/4 metre (circle)



Semantic differential components are:

1. Activity.
2. Evaluative.
3. Communicative.
4. Social Distance.

Table 1

Behavioural Indexes of Gaze

Dependent Variable of Gaze	Group Mean					F Ratio	$\hat{\omega}^2$
	I	II	III	IV	V		
Percentage Talking	65.6	50.5	38.6	38.6	55.4	2.63*	.14
Frequency Talking	88.3	89.4	58.8	95.6	77.3	1.52	.05
Percentage Not Talking	52.0	54.6	32.2	50.0	50.8	1.99	.09
Frequency Not Talking	80.4	92.1	63.0	69.9	90.4	1.24	.02

* $p < .05$.

The strength of association between I, V, and D. V. is indicated by $\hat{\omega}^2$.

Group I = mediated 2 metre.

Group II = mediated 3 metre.

Group III = $\frac{3}{4}$ metre face-to-face.

Group IV = 2 metre face-to-face.

Group V = 3 metre face-to-face.

Table 2

Sociometric Indexes of Intimacy

Dependent Variable of Intimacy	Group Mean					F Ratio	$\hat{\omega}^2$
	I	II	III	IV	V		
Social Distance Component of Semantic Differential	4.07	3.41	3.35	3.40	3.18	3.71*	.21
Perceived Physical Distance	2.00	2.25	1.88	3.13	3.63	5.60*	.32
Perceived Psychological Distance	2.63	2.13	2.50	3.00	3.75	2.93*	.16
Preference to Work with Other Again	4.88	4.50	4.38	3.63	3.75	2.96*	.16

* $p < .05$.

The strength of association between I. V. and D. V. is indicated by $\hat{\omega}^2$.

Response scales were anchored:

Social Distance Component of Semantic Differential: Low distance = 5;
High distance = 1.

Perceived Physical Distance: Near = 1; Far = 5.

Perceived Psychological Distance: Near = 1; Far = 5.

Preference to Work with Other Again: High preference = 5; Low preference = 1.