STUDIES OF TELECONFERENCING BEHAVIOUR WITH A MODEL OF COMMUNICATION ASSESSMENT

by

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To My Parents ....

As the book of verses indicates

'That person who patiently awaits
a sign from the clouds for many years
and fails to notice
the earthquake at his feet,
is devoid of intellect.'

- from 'The Golden Hours of Kai Lung'

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ABSTRACT

'Teleconferencing' which is an interactive conferencing process using audio or audio-video media, is a product of novel communication technologies to enhance interaction between two or more groups of people in separate locations.

There are social, psychological and operational differences and constraints between teleconferencing and face-to-face meetings. Loudspeaker voices and television images are not 'people' but may have some quality of 'things'. The mutual relationships, attitudes and moods within any one group may differ from those between groups. The traditions and rituals of face-to-face interaction may be inappropriate and may need to be modified to contain those particular distinctions.

The emphases of this thesis are on the conduct of experimental studies of some psychological factors of such a teleconferencing system; also to seek further possible refinement for a communication assessment model, in accordance with the experimental results.

The first part of the thesis presents some precautions against seeing teleconferencing as a possible substitute for conventional meetings.

The second part concerns the development of three types of methodology to measure the teleconferencing process. Four pairs of Interaction-Variables have been derived from comparisons of teleconferencing Performance Profiles. These performance profiles indicate unconventional interaction rituals and styles during substantial experimental teleconferencing sessions.

The third part of this thesis suggests major prerequisites to the design of training strategies and resources (human and corporate), allocations and planning.

A refined three dimentional assessment model is identified in the fourth part of this thesis, to suggest criteria for evaluating novel communication technologies which involve users interacting via technological system.

This thesis concludes with the awareness of needs for protection of private rights and system security; especially if 'telemediated' communications should develop across political and cultural boundaries. Telecommunications technologies involve enormous expenses; it is crucial to resolve a number of psychological questions in order to insure their value and success.

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Chapter 1 INTRODUCTION : Teleconferencing is not basically equivalent to Face-to-Face Conferences

Telecommunication being part of the very fabric of our industrial society, takes place at various levels; (between people and institutions, from government to people and vice versa, etc., through many channels both interpersonal and mediated. These widespread information systems have offered the possibility of developing various conferencing styles. A great deal is heard today about the possibility of holding conferences, via audio/video networks, and of their possible values as 'substitutes' for conventional conferences, or to reduce the need to travel, etc.. There are a number of systems now installed, in the U.K. and in other countries (Appendix 1); they go under such names as Video-Conference Systems, Confravision, Picturephone Conference, and the like.

'Teleconferencing' is one of these interactive communication styles. It was designed to use either audio or audio/video media, to enchance interaction between two or more groups of people in separate locations; to enable them to confer together in the same conference, at the same time, sharing values and exchanging ideas and views on subjects of common interests. The nature and style of the discussions are decided entirely by the participants and organizations involved.

Present practical areas of application (e.g. education, medical, government, social, industrial and financial organizations) suggest that a number of well developed teleconference networks have already been in active operation. However, there are social, psychological and operational differences and constraints in modes of communication between teleconferencing and face-to-face meetings. Loudspeaker voices and television images are not 'people' but may have some qualities of 'things'. Relationships, attitudes and moods are vital

factors in the conduct of meetings. Detailed studies and experiments are required to elucidate these before we invest in the expensive technology.

The nature of any social group-activity is defined by its peculiar rituals. The rituals of teleconferencing refer to such matters as the role of a chairman; there are also rituals indicating the relationship of one speaker and a television image. The mutual relationships, attitudes and moods within any one group may differ from those between groups; (e.g. hostility, trust rivalry, confidence; etc.). The traditions and rituals of face-to-face interaction may be inappropriate (to some extent) and may need to be modified to contain those particular distinctions with telemediated communications.

The development of such systems are not entirely matters of engineering but raise many questions within social psychology. Sophisticated studies have been done leading towards designs of teleconferencing equipment and organization. This thesis emphasizes on the experimental studies of some psychological factors of such a system; then to seek further possible refinement for a communication assessment model, in accordance with the experimental results.

Findings from both intensive and extensive teleconferencing studies will provide principles/guidelines for:

1) Understanding possible consequences when people are conversing with TV 'images' as sight and sound -
i.e. TV images are not real 'people' but 'objects', having some characteristics of 'things'. Attitudes to TV images may not be the same as those to a person in every detail.

2) Indicating specific group performance and behavioural characteristics of teleconferencing -
i.e. These are partly influenced by physical arrangements of conferencing environments and system-design-variations. They

also highlight the criteria for developing a model of 'natural' and 'bilateral' communication.

3) Being able to identify training-needs and to devise appropriate training strategies -
i.e. Users and potential users should been seen to cope with the observed changes of an interaction pattern caused by the use of telemediated aids. Teleconference designers and their multi - disciplinary organizers should then be well informed about the details of these specific interaction patterns and the conditions under which 'difficulties' (operation) and 'distaste' (attitudes) of participation may occur.

4) Designing equipment, modifying systems and assessing any com - munication system that concerns 'the human factor' in utilizing technology -
i.e. These provide detailed information for people who wish to introduce teleconferencing. Market promotors should know about the participants' response and attitudes, so that they can make their training and marketing thoroughly relevant to 'fit the user to the system and fit the system to the user' (FUS-FSU). The task is to design systems that enable the teleconference participants to utilize the facilities with a minium of difficulties and distastes and a maximum satisfaction.

5) Deciding appropriate methodologies/standardization of 'techno- logical assessment' -
i.e. Technological assessments should develop with time and require constant attention and adaptation to the social and economic changes. These will then indicate the degree of competitiveness of a particular technology with other types and also the degrees of satisfaction & efficiency of the technological systems compared to existing/conventional systems.

This thesis is organized into four parts with nine chapters. The first part (chapters 1 & 2) presents a discussion of the precautions against seeing teleconferencing as a possible substitute for face-to-face communication. The purpose of this discussion is to present the orientation of this work against background of social and psychological concerns and concepts necessary

for conducting the numerous sessions of teleconferencing experiments.

The second part of this thesis consists of three chapters (Chapters 3, 4, 5). Major efforts have been devoted to designing three types of methodologies, including a method of 'Vector Analysis' to measure the teleconferencing process. Observations of recorded interactions and latent intents of communications (within group and between groups) are conducted. Various phases of laboratory studies with four system-variations are analyzed in our own teleconference studios. A total of more than 100 participants of cross-cultural value background are involved in over 40 teleconferencing sessions.

Since individuals are conversing via a television medium, a number of unconventional interaction rituals and styles are observed and have formulated Group Performance Profiles (Chapter 4). Practice and effects of learning of participants are involved with and without their awareness. Four pairs of Interaction Variables are derived from comparing these teleconferencing Performance Profiles and analyzing seven sets of questionnaire completed by the participants (Chapter 5).

It is believed that the major prerequisites when designing training-needs are to recognize and study the capacities and inclinations, or ability and personality, or aptitudes and interests, or skills and attitudes of individuals. Suggestions of training strategies and resources (human and corporate) allocation and planning make up the third part of this thesis (Chapter 6).

The fourth part of this thesis (Chapter 7) devotes to a description of the structure of a three dimensional technological assessment model. It presents the temporal integration processes and development of two subsystems. This model is designed and refined (based on experimental results of telecon - ferencing) as a basic infrastructure of any bilateral communication system

which involves participant users interacting with telecommunication systems. The function of this model is not only to provide basic assumptions for the teleconferencing experiments, but also to suggest criteria for evaluating other novel communication technologies which involve users interacting via technological systems.

This thesis concludes in two chapters (Chapters 8 & 9). Protection of private rights and system security claim our attention when a wide range of information is stored in vast data-banks. It involves ethical, social-cultural and economical considerations; especially if 'telemediated' communications should develop across political and cultural boundaries. A certain criterion-framework is suggested to identify fundamental conceptual problems of long-range communication strategic-planning and to highlight possible reconciliation-alternatives.

Novel communication systems create fresh needs and grow in accordance with the needs of the people and the development of communication technologies. New means of communication may replace the old or establish parallel alternatives; market forces may determine the place of various media; and governments may have to resolve conflicts when new technologies threaten vested interests or dislocate established networks. There is increasing recognition of the need for a global view and coherent planning at the levels of policy formulation, strategy planning, operational implementation, human resources training, etc.. Teleconferencing, like other novel communication technologies, is one of the 'human-oriented'/'sensitive' telecommunication developments during the last decade. In addition to laboratories experiments, real life implementation of such systems are necessary in order to arouse and satisfy the actual needs in both local and international markets. Telecommunication technologies involve enormous expenses; it is crucial to resolve a number of psychological questions in order to ensure their value and success.

Chapter 2 SOCIAL IMPLICATIONS OF TELECONFERENCING

Summary

It is considered that teleconferencing is a man-machine interphasing process, so that the implementations of this 'Fitting the Users to the System and Fitting the System to the Users' (FUS-FSU) are of major importance. Without understanding of the influence of the teleconference mode upon conferencing behaviour, cost-control or cost-effectiveness cannot be effectively considered.

Attention of this chapter is devoted to extracting the fundamental principles of teleconferencing. These principles can be traced from the social foundation of communication; and are basically inter-personal behaviour of 'exchange'[1]. The totality of such 'exchange-behaviour' formulates patterns of social interaction; and the 'aggregate' of people participating in such patterns of exchange becomes a 'group'.[2] The behavioural pattern of each 'group' is then a system of communication. However, to what extent teleconferencing as a style of interaction with technical means differs from the conventional communication mode?

2.1 THE SOCIAL FOUNDATION OF COMMUNICATION

The historical origins of communication research are diffuse and diverse. 'Communication' can be treated as the development of socio-cultural phenomena; as well as the development of the self and its 'internalization'[3] of social norms to achieve an accepted identity among a 'group'. Theorists like Durkheim[4], Cooley[5], Mead[6] were deeply concerned with the problems of social control of behaviour which was seen as the phenomenon of individual interaction with others in groups.

The simpliest form of interaction can be described as one person (initiator) perceiving another person (recipient), who becomes aware of the existence of the initiator and then starts to react in reciprocal ways. Both initiator and recipient should mutually share a common frame of reference; i.e. similarity and equality in ideas, rituals, symbols, norms, values, etc.; normally referred to as 'culture'. It is only through a common culture that the two people (initiator and recipient) assign 'meaning' to their perceptions and thereby come to an understanding of the expectations of each in relation to the other. This is the phenomenon of interaction.

The 'product' of interaction which can be cumulative with time, is referred to as 'relationships'. Relationships developed between an initiator and a recipient are 'inter-personal'. When a person takes part in many relationships with the same or different people, they form an interwoven pattern, each person becomes initiator and recipient of interactions and follows different rituals, habits, norms on various occasions; on a large scale this can be interpreted as the social foundation of communications.

Indeed, society is no more than 'people in cummunication'[7]. However, the social foundation of communication seems to have expanded from 'personal' relationships to 'impersonal' relationship. Theoretically speaking, due to the fact of geographical distance and the consequences of population diffusion, the development and opportunities for inter-personal interaction should have been affected and reduced; however, in reality, by means of communication technologies, the rate of communications and the quantity of international data traffics via e.g. telephone, cable, satellite, computer networks etc., have been comprehensively developed and increasingly in demand. People are not only communicating through technological media and information exchange, but also establishing fresh communicating rituals and habits for interaction through machines.

As these communication technologies recognize no cultural and political frontiers, people who take part in those communicating activities are cultural strangers to each other. They may interact with differing cultures (or subculture of a common culture) with which they are not familiar and in turn do not understand the 'right' way to respond. Numerous communication failure occur because of such misinterpretation or ignorance. These problems arise due to the development of communication technologies with or without the awareness of ourselves.

2.2 SOCIAL INTERACTIONS AS EXCHANGE

2.2.1 The behaviour of Teleconferencing

In teleconference, two kinds of inter-personal relationship are of particular distinction. 1) The Person-To-Person relationship in a real sense of direct personal encounter; this has some similarity with a concept of 'primary group'.[8]. 2) The relationship between a person and the image of a face on a television screen or a voice over a telephone line, with which the person is conversing. The former relation (person-to-person) is one which we have ritualized in various ways, (e.g. to give admission of approach, indication of approach, indication of termination, etc.). The second relationship is far from being understood; it is neither the relation between a person and a person and a thing nor a person to a person. Questions of personal attitudes, responsibility, feelings, etc. arise. The holding of conferences by such technical means will exaggerate the characteristics of personal relationships that may have serious consequences.

Users or potential users may display a natural reluctance to attend tele - conferences, perhaps some individual members may resist unexpected risk which is implicit in attending such a conference. People may also be unwilling to experience a learning phase through practical experience. A learning phase implies that the conference participants may also have to change other related activities in conferences, such as their degree of preparation required. These involve particular styles of interaction that lead to development of specific relationships with which people are not familiar. If a teleconference is viewed as an alternative to the conventional style of interaction (and strictly speaking, it may not be a direct alternative), a different personal mode of communication and preparation is involved. Some psychological factors involved in interacting behaviours have certain influence in the meeting procedures. They may determine whether some features of the teleconference system are particularly useful for specific kinds of social interaction; i.e. information seeking, opinion exchange, etc.. A person's desire or style of communicating with another is conditioned by the nature of the interaction patterns and the physical atmosphere (for example, the importance of informality, flexibility, distraction, communication responses, etc.). These are all based on the relationship of 'Exchange'.

2.2.2 Primary vs. Secondary Relationships

Conventional face-to-face conferences and teleconferences are two different styles of group discussion. Group-discussion is a pragmatic style of communication and is the most common or unavoidable mode of interaction in industrial societies at present and very likely in the future. Although both discussion groups in face-to-face and teleconferencing situations are entities of communication, yet they represent various types of relation between individuals. A distinction based on the conducts (norms, rituals, etc.) of their members can then be drawn.

By 'Primary Groups'[1], Charles Cooley means 'those characterized by intimate face-to-face associations and cooperation'[9]. They are 'primary' in several senses. Chiefly in the result of intimate associations with group members; psychologically the group is in a state of fusion of individualities in a common 'whole'. The relationship involves sympathy and mutual identification for which 'we' is the natural identity. However, it should not be supposed that the unity of a primary group is one of mere harmony. It is always a differentiated and usually a competitive unity, but the major objective will be achieving a common 'recognition' of the unity. In brief, 'Primary Relationships' have the nature of communication expressed in those simple, face-to-face contacts.

The strength of social interaction lies in the immediacy of demands of individual members and the requirement for one's participation as a complete 'person'. For this reason, the primary relationship is fundatmental in framing an individual's attitudes and ideas toward his recipient(s). Proximity therefore is the key factor in establishing primary relationships; their norms demand conformity to one's own 'group'. Human relationships were seen in psychical wholes, rather than in artificial separation; that is until the introduction of communication media.

Personal contact is often impractical and may even be unnecessary when members of a group interact through which face-to-face communication is the basis of social interaction. The relationships of teleconferencing participants established through such communication channels, become 'Secondary'[2]. These

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[1] examples of Primary Groups : family, workgroups, community, neighbourhood, playgroups

[2] examples of Secondary Groups : professional societies, political parties, national labour unions, etc.

are characterized by impersonal relations whose objectives are limited and specific; participation involves only 'part' of the individual, such as his specialized training (or his leisure-time interests). As far as secondary groups are concerned, the membership is often large and widely dispersed and their norms are not constrained by distance.

Face-to-face communications and teleconferencing may exhibit striking differences with regard to the participants' relationships of this balance - Primary vs. Secondary. In a teleconferencing situation, participants are gathering various 'groups' from diverse areas to a number of predecided locations (e.g. TV conference studios) conversing for specific purposes. 'Physically Separate' small groups are attending the 'same' conference, at the 'same' time, for the 'same' purpose of interchanging ideas and views on subjects of common interest. The style of face-to-face relationships can only be developed within teleconferencing studios; likewise, the opportunity for 'personal face-to-face contact' is reduced and can only be benefited by the members within the same studio. The between group relationships are established on the 'impersonal' basis. Impersonal relationships are caused by physical separation of interacting groups and the effects of physical and psychological distance between members.

The interpretation of 'primary' and 'secondary' relationships are determined by the possible types of interaction (face-to-face vs. telemediated) that teleconference participants are able to establish. The unavoidable system constraint (e.g. physical distance between teleconference studios) and the effects it causes during conferencing processes limit the human choices of relationships that teleconference participants wish to develop. Primary vs. secondary relationships occur in a complementary manner. It is of course not correct to assume a mutual 'zero-sum' exclusiveness between them during teleconferencing situations. Between-groups and within-group relationships

are both having the quality of primary and secondary natures on many occasions.

2.2.3 Formal Meeting vs. Informal Group Discussion

A Conference (face-to-face, or teleconferencing) is a dynamic situation in which discussion, conflict, cooperation and creations of idea, etc. are normally presented by participants in many ways and with various degrees of emphasis. They are strongly affected by the styles of interaction arranged (formal meeting or informal small group discussion). The effect of such arrangements on the structure of teleconferences and their significance as a working environment are the major considerations.

The relation between 'conferencing styles' and 'teleconference systems' is indicated by 1) the frequency and duration of contacts among participants, 2) the tendency to initiate these contacts, 3) the direction of influence between participants and 4) the degree of cooperation. It also entails sentiments between and among groups such as feelings of attraction, respect and hostility. The differential distribution of social relations in groups finally defines the status structure of their members.

2.2.4 Group vs. Aggregate

The networks of social relation between a 'group' and an 'aggregate' of people differ. A 'group' is not a mere 'aggregate' of individuals, but includes more qualities. An 'aggregate' of individuals is a collectivity; but not the 'whole' of a 'group' which is more than the 'sum of parts' (individuals)[10]. A group is an interaction system of shared beliefs and orientations. These serve as standards for communication conduct of group members who normally meet in regular bases on time and localities. In the course of social interaction between 'groups', common notions arise as to how every member should act and interact and what objectives are worthy of

attainment. In the case of teleconferencing, there is no doubt that participants are organized in 'groups'. They are attending the conference via telemediated channels normally with specific purposes either in the sense of urgency or on regular bases. Participants are conversing with special norms and unconventional or unusual habits of interaction. These may be distinct from conventional meetings and may require typical operation-procedures.

In view of the rapid development of communication technologies, the organization of teleconferencing systems should not be limited to the structure of 'group'. It should be possible and be equally convenient to be used in a less organized or formal way, e.g. by an aggregate of people. Teleconference participants should be equipped to use the system on all occasions, for multi-purpose functions, and with their own choice of conferencing styles. The operation-procedures and the interaction patterns of teleconferencing are then being ritualized.

The manner of face-to-face meeting occurs in both styles of 'formal' vs. 'informal' discussion. However, the interaction patterns during conferences are strongly affected by the choice of these styles. Their characteristics have been defined within the general context of communication; (e.g. Blau and Scott[11], Bennis and Chin[12], etc.). The classification is tabulated in Table 1.

Teleconferencing should one day be sharing the characteristics of both formal meeting and informal discussion. At present, due to the high cost of telecommunication transmission, teleconferences are usually operated with certain features. They are with predetermined objectives in various areas of application. The number of participation or membership is inflexible and distributed over geographical distance. Since teleconferences have mostly

	FORMAL MEETING	INFORMAL DISCUSSION
OBJECTIVE	Predetermined objective is the prerequisite of setting a meeting	Group members are together with or without predetermined objectives
PURPOSE OF GATHERING	With functional or prelisted requirements e.g. problem-solving, annual conference	Sometimes for 'unofficial' or preparatory reasons & requirements
MEMBERSHIP	1)Arranged or fixed membership with a chairman 2)All of them are sharing determined roles, obligations & responsibilities to a specific organization 3)Certain particulars and constitutions must be followed	1)No fixed membership 2)No fixed chairman or no chairman 3)No specific responsibilities of each member
CONSTITUTION	1)Records of discussion & decisions of meetings must be kept, e.g. a secretary 2)Meeting procedures are strictly according to the constitutions	1)No official written record will be kept 2)No constitution should be followed by participants
AGENDA	Order of determination and discussion topics are according to the agreeable & prelisted agenda	No agenda will be arranged
INTERACTION PATTERN	1)Members are interacting in a highly ritualised, formal & constitutional style 2)Opinions & information can be given with the permission of the chairman	Members are interacting in an informal & casual way
ROLE OF CHAIRMAN	To control the progress of meetings & always be conscious of the goal-attainment, pattern-maintenance, members' integration & adaptation to the meetings	Only informal leader may arise to keep the small-group discussion on progress

Table 1 : Formal Meeting vs. Informal Discussion

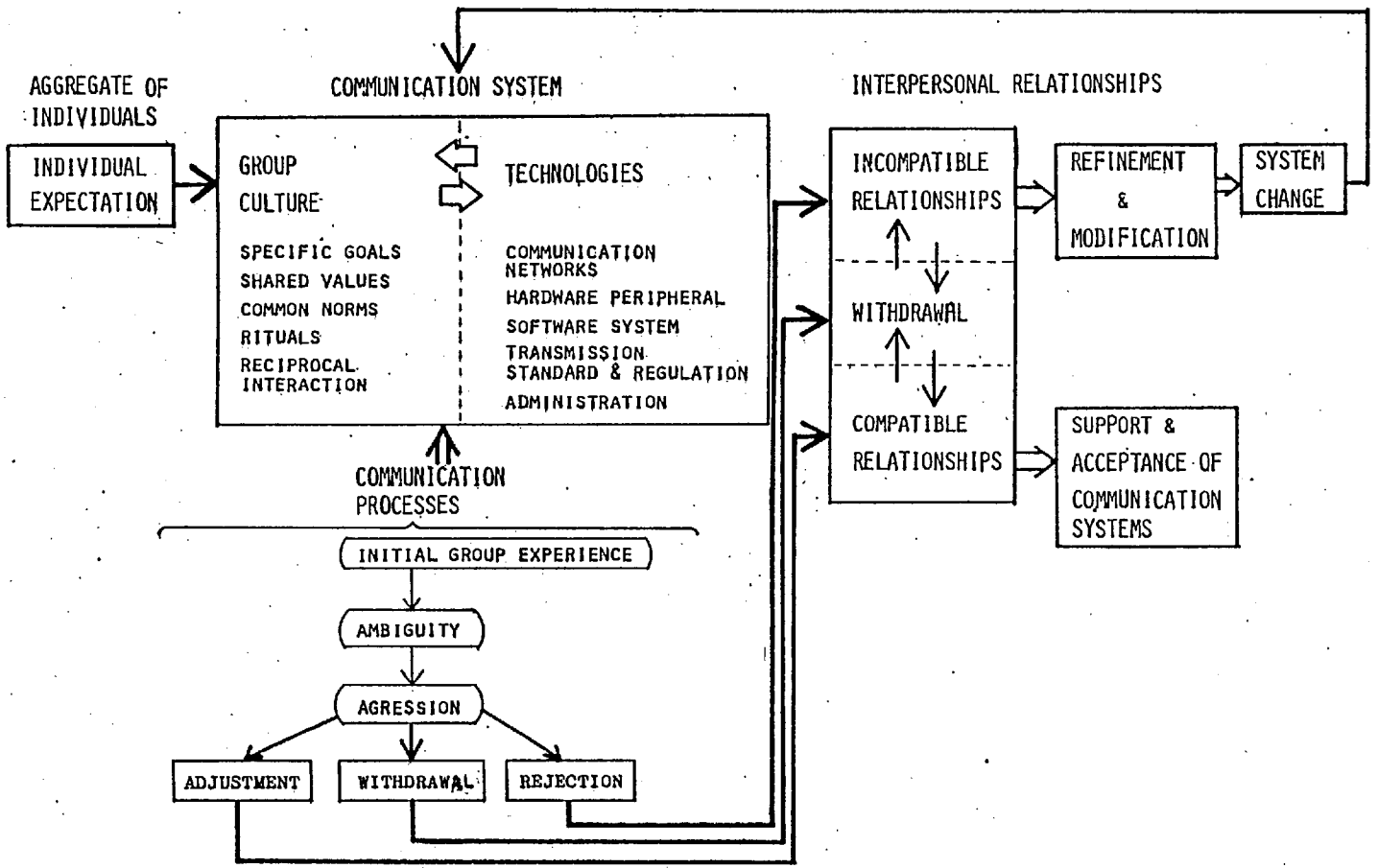

Fig. 1 : The Group Process of Communication Systems

been used (Appendix 1) at the organizational level of business or official purposes, participants are taking particular roles and sharing responsi - bilities to a specific extent. During the teleconferencing processes, there are ritualized or semi-ritualized operation procedures which must be followed in order to proceed such a men-images communication via machinery. This gives rise to unique interaction patterns of teleconferencing groups; especially the role of the chairman in controlling (or not) the meeting becomes arguable and dubious.

2.3 THE GROUP AS A SYSTEM OF SOCIAL COMMUNICATION

According to the preceeding section, the structure of small groups is formulated by aggregates of individuals (with specific goals and similar values & norms) facing a communication system. Their reciprocal relations, both between themselves and with the technologies, will grow within a total communication system (figure 1). The development of the system and its ultimate effect -- whether to become stable or changeable, is strongly determined by the members' attitudes toward the social and technological changes. This sequence of system development is also applicable to teleconferencing systems.

An individual may first see the group (in his own studio or that in the other studio) as a collection of different individuals, or may view the group as an undifferentiated entity. As interaction proceeds, there is mutual adjustment of individual attitudes and expectations toward a common culture of the group. The process of determining the communication network depends upon many situational factors; for example, the relations of the members in physical space, the size of the group, the available period of interaction, who can interact with whom, how often, and how

easily, etc.. These factors affect the direction and speed of the growth of 'common culture' in groups; particularly within sub-parts (within each teleconferencing group) and within the whole communication system (between all teleconferencing groups). Then, conversely, the nature and content of the common culture return to reinforce and maintain (or change) the original constriction in numerous ways.

Communications or interactions in real space and time are the necessary channels for building the common culture. However, the physical means are always suffering from economic scarcity of resource allocation, human coordination and balance between the development of individual parts (of the system) and time. Some parts (e.g. technologies) change before other parts (e.g. social attitudes) change. Time and resources (human and co - operate) taken for solution of one problem may result in lack of those for solution of some others. Many interesting characteristics of groups arise as more or less unforseen qualities and sometimes they are not even noticed.

2.4 THE MAINTENANCE OF A COMMUNICATION SYSTEM

Styles of social interaction will vary according to the extent of the technological involvement mediating those relations. At present the inter - action patterns of teleconferencing participants still remain uncertain, in general, except the symbolic interaction (i.e. the development of 'self' and 'commitment' to the conference) among the participants themselves. The former concerns the way social participants behave among themselves regardless of what material or technology they use, whereas the latter concerns the influence of material inventions upon the participants regardless of who originates or operates these inventions. The socially generated communication may be augmented by the physical or technological

inventions, but irrelevant balance of 'mutual exchange' (between people & people; and people & technologies) may cause tremendous problems.

2.4.1 Interaction and Equilibrium

A system of communication is not just a 'sum' of groups and technologies; but a system consists of groups operating technology compatible through learning, modification, ease of operation, etc. Such compatibility will vary between an ideal or perfection (when technologies fade away) and total incompatibility will lead to rejection of the system. The success depends on how well people can adapt to the technologies. Symbolically, in order to explain the relation between users and the technological system, 'G' can be assumed as groups or individual users; 'T' being technologies and 'S' being the total User-Technological system of which 'G' and 'T' are interacting parts. The consequences of 'G' and 'T' for 'S' may explain 'S', but they certainly cannot, by themselves explain 'G'[14]. The hypothesis being that 'S' responds to the influence of 'G' and 'T' by : 1) producing commensurate functions, 2) providing facilities 'T' for 'G'; and 3) reciprocating or repaying 'G'.

'S'	= 'G' ⊕ 'T'	User-Technologies System
'G'	= $(g_1 \oplus g_2 \oplus \ldots \oplus g_n)$	Group/Individual user(s)
'T'	= $(t_1 \oplus t_2 \oplus \ldots \oplus t_m)$	Technologies/Technical Subsystems

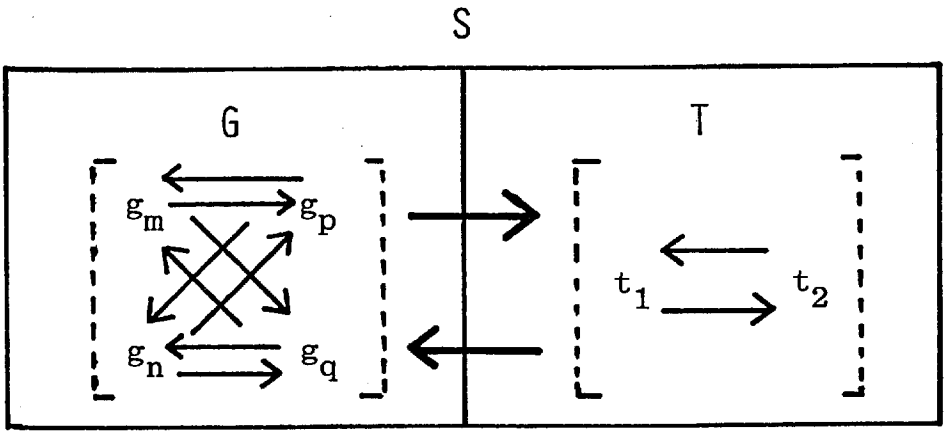

Figure 2 : The Exchange Relations of a User-Technological System

Thus, if 'G' and 'T' are compatible, 'S' will be sustained; communication then proceeds beneficially; otherwise not. There is a continuity from beneficial vlaue to total abandon of the system.

There are two characteristics of such systems of communication:

1) All communication involves the past, present and future. In the present instance, the degree of compatibility between 'G' and 'T' involves degrees of 'costs' which are accepted by 'G' , at present, in hope of reward in the future, which encourages to their maintaining the system to a similar degree.

2) The degree of compatibility between a group and the technology places general bounds on behaviour but, of course, does not determine precisely that behaviour; it may vary within those bounds. Thus if this compatibility can be measured or described, the results could be applied to many different practical tasks of the system.

2.4.2 Some Effects of Feedback on Communication Exchange

The transmission of information from group member(s) 'g_m' to another member(s) 'g_n' will influence and be influenced by the return of information from 'g_n' to 'g_m'. This is a matter of feedback. When 'g_m' seeks to transmit information to another group 'g_n', g_m's own sensory system is hardly an adequate source of information unless g_n takes some action which will help g_m to keep informed of g_m's own progress.

In addition to this assumption that contemporaneous feedback[15] should increase the accuracy of information transmission from 'g_m' to 'g_n'; the completion of the $g_m g_n$ circuit produces other effects on the $g_m g_n$ relationship. Feedback from both g_m and g_n can increase the certainty of g_n that he is getting the information, and the certainty of g_m that he is getting it across. This process of exchange increases the certainty of projecting the interpersonal relationship via a televised system, assuming that motivated participants should express some feelings of e.g. frustration, achievement, hostility, security, etc.. The usual 'free' feedback process of communication is an aid to accuracy in interpersonal communications. The process permits group members to learn and develop a mutual 'language' which, once being 'learned', may obviate the necessity for further feedback. The presence or absence of feedback affects the sender-receiver relationship; the former is normally accompanied by high confidence and amity while the latter is contrary -- i.e. communication is sharing[7].

Changes in group size and group composition may influence the relative amount of time the group must spend in completing tasks and solving social-emotional problems. The productivity of the group and the morale of group members are in turn related to the general physical and cultural setting of conferencing situations; i.e. teleconferencing or face-to-face meetings. In a tele - conferencing situation, the role of a chairman is a unique type of speciali - zation; it has been difficult to define what a teleconference chairman does or to construct a value theory of what he or she should behave differently, according to the condition of teleconferencing groups and their common culture as a men-technologies system.

The ability to specify some of these important differences of face-to-face and televised conferences has improved in the past five to ten years. However, these problems are mainly handled empirically using the techniques of e.g. factor analysis, consistency techniques in the specification of a number of very general factors, etc.. Some empirical and statistical results appear to deviate from those of the group behaviour in conventional meetings. An attempt is made in the next chapter to reconcile the apparent differences; for example, between modes of interaction within group vs. inter-group communication, with or without televised media. Several methodologies are developed and used in conducting and analyzing teleconferencing experiments, with the hope of broadening such perspectives.

Chapter 3 METHODOLOGIES AND EXPERIMENTAL CONSTRAINTS OF TELECONFERENCING STUDIES

Summary

The purpose of this chapter is to explain in detail the methodologies being used and the reasons why they are chosen for the experimental design of teleconference sessions, conducted in the two teleconference studios at Imperial College, London. The major purpose of the experiments is to investigate possible correlations between modes of interaction pattern (within and between groups) and to study four major variations of the teleconference system. The change (or lack of change) in the participants behaviour over a longitudinal observation and the role of a teleconference chairman are also considered. A method of 'Vector Analysis' with three variations of timing scale is developed to the analysis of group interaction. In addition to observing the organization of group dynamics, a data-base of individual participants is reviewed in order to compare the effect of learning and to develop novel communication rituals via televised media. Questionnaire answering is analysed as an auxiliary objective measurement of such teleconferencing data.

3.1 SOME CONCEPTUAL AND METHODOLOGICAL PITFALLS IN INTERPERSONAL PERCEPTION

Studies on teleconferencing interaction are mainly emphasizing the interpersonal perception of participants between and among group(s). Definitions of accuracy of perception and their interpretation give rise to many conceptual and methodological difficulties. Certain criteria have been adopted to ensure a better experimental design for the teleconferencing experiments.

3.1.1 A Clear Conceptualization of Interpersonal Perception :

It is often believed that accuracy in social perception constitutes a general trait. But accuracy has different operational definitions in different studies. Different degrees of accuracy are required depending on the situations, to measure interpersonal perception. Accuracy in predicting another's responses in one situation may or may not correlate with predicting another set of responses on another occasion; (e.g. accuracy in perceiving responses of neighbouring members and accuracy in perceiving images over audio or video channels may not be the same). It is very common to be content with a face-valid technique which relies on a simple 'operational definition' and to measure the adequacy with which one person understands another (people or images) without inquiring into its 'meaning'. The role of observers in a non-participant-observation teleconferencing experiment is bound to raise an additional problem of interpreting interpersonal perception between people and images. Observers are facing not only the risk of wrongly predicting the responses of both initiators and recipients; but also the uncertainty of interpreting the responses of audio or video images which can both be either initiators or recipients. Special interaction rituals and unique behavioural patterns occur when individuals are communicating via technological means.

On the other hand, the 'technique' by which one person (recipient) understands and responds to another person (initiator) should go through two stages:

1) The degree of their acquaintance over time that provides opportunities for them to gain experience of and become accustomed to each other.

2) The interpretation of information in order to arrive at predictive statements.

These two factors of a continuum are serving a complementary function. The more the initiator and recipient are acquainted, the less outward inference is required for them to obtain a more accurate interpersonal perception and vice versa.

3.1.2 A Reliable Prediction of Observers with Interpretable Score :

In measuring accuracy of interpersonal perception, observers should take account of the agreement between : 1) self-descriptions of an initiator 'I' and his or her recipient(s) 'R', and 2) the prediction by the initiator of the recipient(s)' response 'A'. An ideal situation will be 'I=R=A'. The degree of accuracy will be based on predicting :

1) How group members in general will behave
2) How the behaviour of a particular category of participants (i.e. a group of images on TV screens and sound channels) deviates from that of a face-to-face interacting group of participants in general
3) How an individual deviates from the typical behaviour of the group he belongs to
4) How an individual's behaviour in a particular situation (i.e. individual interacts with TV images) will deviate from his typical behaviour.

The accurate score may be divided in another manner, referring to 'stereotype accuracy' and 'differential accuracy'[16]. The former refers to the individual's ability to predict the pooled responses of a given category of people, whereas the latter refers to his ability to differentiate among individuals within the category. Whatever score is used should reflect accuracy in predicting a recipient's behaviour at the intended level of specificity (i.e. being seen and heard as images or people).

The value of teleconferences will be different according to the requirement and interests of different industries of groups. The purpose of designing a total of 28 teleconferencing sessions (in 4 phases) is to explore the

principle methodologies for analyzing teleconferencing behaviour. Therefore no generalization of such behaviour to all users and situations is intended. Due to this specific purpose of the experiments and the confinement of time and human resources, it is not necessary and practically impossible to obtain judgements from a sizeable team of experienced observers at this stage; (yet it is undoubtedly fruitful for any future exploration along this direction of analyzing teleconferencing behaviour). The present results are only relative to particular social environment. The studies would be regarded as studies of methodologies.

3.1.3 An Independent Criterion to Decide Interpersonal Effectiveness :

It is not correct to assume that accuracy of perception is directly correlated with effectiveness in interpersonal relation; and to use this to prove the effectiveness of a communication system. It is possible that accuracy in perceiving the behaviour of others improves one's effectiveness in dealing with them. However, initiators should know in which respects they can obtain the best and most satisfactory interrelationship with recipients. Beyond this, interpersonal perception and system effectiveness should be viewed as a global process rather than as one-to-one responses-to-cues received from the other. For instance, teleconference participants may formulate a disposition (with or without awareness) and impose it on the behaviour of others. The opinion is formed by experiences prior to their interaction with the other(s) and determines their general perceptions.

In view of these limitations of organizing experiments on interpersonal relationships on which teleconferencing is based, the following methodologies and experimental design are directed to minimize these pitfalls.

3.2 SAMPLING METHOD FOR TELECONFERENCING TECHNIQUE

3.2.1 The Criteria for Deciding a Sampling Technique

The degrees of heterogeneity of cultural and value background of the population and homogeneity of their education and age-range were the major considerations for choosing the most adequate sampling technique in 28 teleconference sessions which were in four phases. The reasons are :

1) The teleconference system is designed in a global sense with a possibility of covering wide distances and diverse applications. Technologies and communication channels recognize no political and cultural frontiers. However, the degree of acceptance and successful implementation of such a communication system are highly influenced by socio-cultural and economic factors. Users and potential users should have found such a communication alternative comfortable and convenient; and therefore only minimum adjustment of their interaction habits is required. With an aim of understanding and documenting teleconferencing rituals, maximum heterogeneous sampling must be obtained.

2) It is understood that teleconferencing is basically a special situation in which people interact via communication or technological channels. It should certainly contain most or all of the elements and precautions used when studies of interpersonal relationships are designed. It is very easy to over simplify the relation between technological changes and social changes. The former should be recognized as just a sufficient condition of the latter. Cultural values like individual attitudes, participant satisfaction, collective trust and responsibilities, decision making and control, etc. are the determining patterns in teleconference interaction. It is therefore essential to include cross-cultural sample units in all teleconferencing sessions.

They are chosen to prevent a biased orientation to teleconferencing patterns, due to particular cultural dominance.

3) The trend of teleconference development requires cumulative investment on capital and allocation of human expertise and technological resources. With the present economic climate, teleconference systems are likely to be operated in organizations and major urban or industrial areas. Hence, this indicates (and this has been the case) that users (and potential users) are most likely to come from business enterprises and functional institutions with relatively high educational background as well as expertise. Sampling units for teleconferencing studies should therefore be as close to the reality as possible because they are potential users in the near future.

4) Numerous behavioural and attitude studies have suggested the influence of 'age' variations on opinion formulation, agreement, learning and performance, etc.. The purpose of obtaining a sampling-frame of uniform age-range is to eliminate the fluctuation of opinions caused by the factor of age differences.

3.2.2 The Scope of Sampling-Frame

According to the above four criteria, a 'multi-stage cluster sampling'[1] [17] technique is then chosen. In addition to reducing the sampling cost, the main advantage of this technique is to enable the designer to know a calculated risk when no satisfactory sampling frame for the whole population (of the choice) is available or exists. A listing of some kind has to be made specially and it is obviously advantageous to confine the special listing to a few groups.

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[1] The process of sampling complete groups of units is called 'cluster' sampling; situations where there is any subsampling within the clusters chosen at the first stage are covered by the term 'multi-stage sampling'.

However, some general points about clustering should be noted. A particular aggregate of sample units (two consecutive years of 120 students reading M.Sc. courses) were selected as clusters to participate in 28 separate teleconference sessions in 4 phases. Individual members of these clusters were units of enquiry. The composition of clusters need not necessarily be natural aggregates (like schools, classes, etc.); artificial clusters can be used and do not necessarily contain equal sample units. For the reason of simplicity, the present experimental design is confined to the case of equal size clusters.

Several levels of cluster were used in this teleconference desgin. Within each chosen cluster, sample units were 'replaceable', repeatedly (not more than 3 times in each of the 4 phases of the teleconference) and randomly selected to participate in other session. Seating positions and locations (either in studio 1 or 2) of all participants were recorded in their individual data-form. Hence they could be arranged in <u>different</u> grouping combinations. Three additional sessions (in addition to the 18 sessions of phase I to III) were conducted in order to select '10' teleconferencing chairmen for the phase IV. The participants of the three sessions were the most 'active' initiators (according to their inidividual performance records) during the past 18 sessions. Detailed description of the four phases of experiment and the analyses of the role of a teleconference chairman will be discussed in the next section (3.3) and in chapter (4.5) respectively. Furthermore, in the final stage of analysis, instead of taking individual subjects as units of enquiry, each sample-unit-group of ten people (5 people randomly grouped in each teleconference studio) was considered to be a single 'unit-of-enquiry'. There were four phases or variations of total experimental designs of teleconferencing. Each phases consisted of five to ten teleconferencing sessions (depending upon the complication of each variations). Therefore, there were at least five

units of enquiry in each phase, and the total-average-unit of each phase became one fundamental basis of enquiry. The total four fundamental bases of enquiry were eventually foundations for final comparisons between the mutual influences between group performance profiles and technological alternations. This was the ultimate objective of comparing the similarities and differences of the average-teleconferencing-sessions of each variation. The possible correlations between particular natures of teleconferencing interaction and physical variations and arrangements of teleconference systems are the major concerns.

One design-effect of clustered sampling is having a high standard error as compared with simple random sampling techniques. The design of the clustering technique has made the subjects within a cluster more alike (in terms of age, special interest, ability, etc.) than those drawn from random sampling. In statistical language, there would have been a positive intra-class correlation. This increased 'riskiness' in the representativeness of the sample will be reflected in an increased sampling error. Hence, the more heterogeneous the clusters are within themselves, the less precision will be lost by clustering. The nature of multi-nationalities and cross-cultural backgrounds being one very significant heterogeneous factor in the present teleconference sample frame, is automatically solving the problem by serving as a demographic control of the design.

3.3 FOUR PHASES OF THE TELECONFERENCE SYSTEM

Investigations of teleconferencing were conducted in four phases. Detailed circuit diagrams and hardware arrangements of each phase were defined in Appendix 2. Four variations of system design : Single-Single, Dual-Split, Cross-Split and Single-Chairman are major variables to associate with any possible causual effect of interaction profiles of teleconferencing groups.

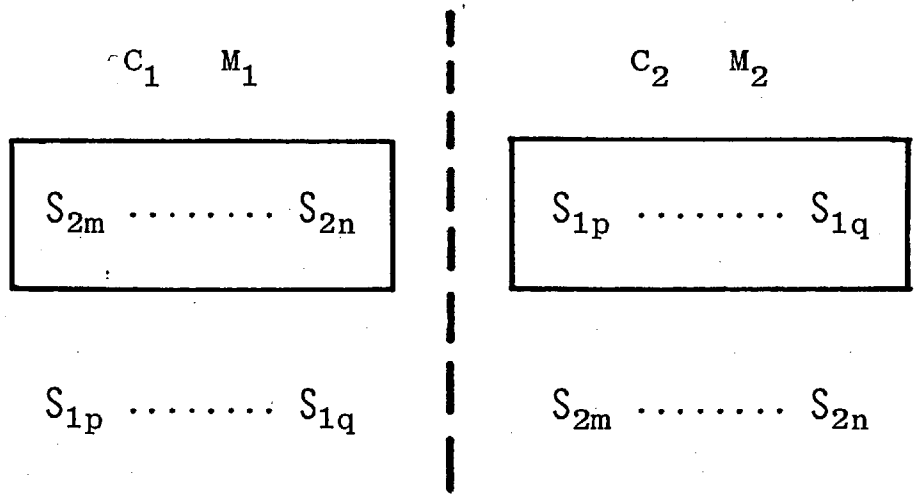
C : Camera(s)

M : Monitor(s)

S_1: Participants of Studio 1

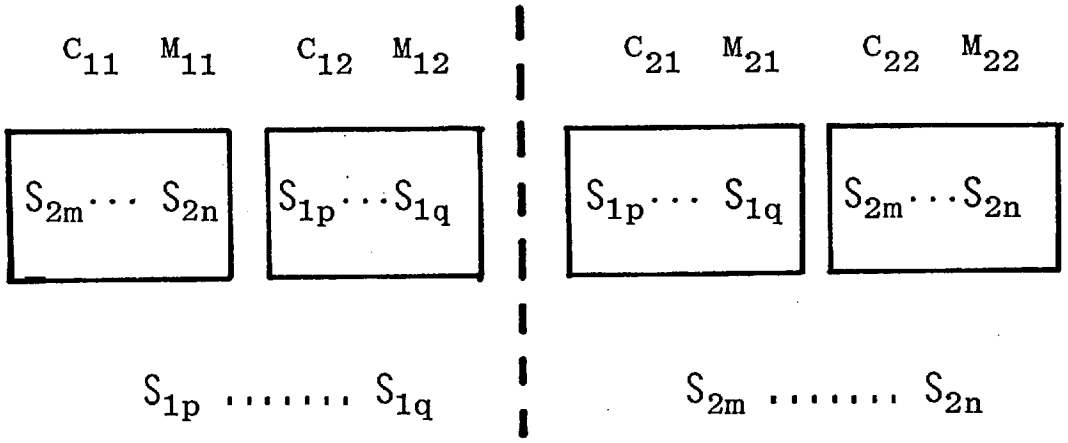
S_2: Participants of Studio 2

Phase I : Single-Single Arrangement (8 teleconferencing sessions)



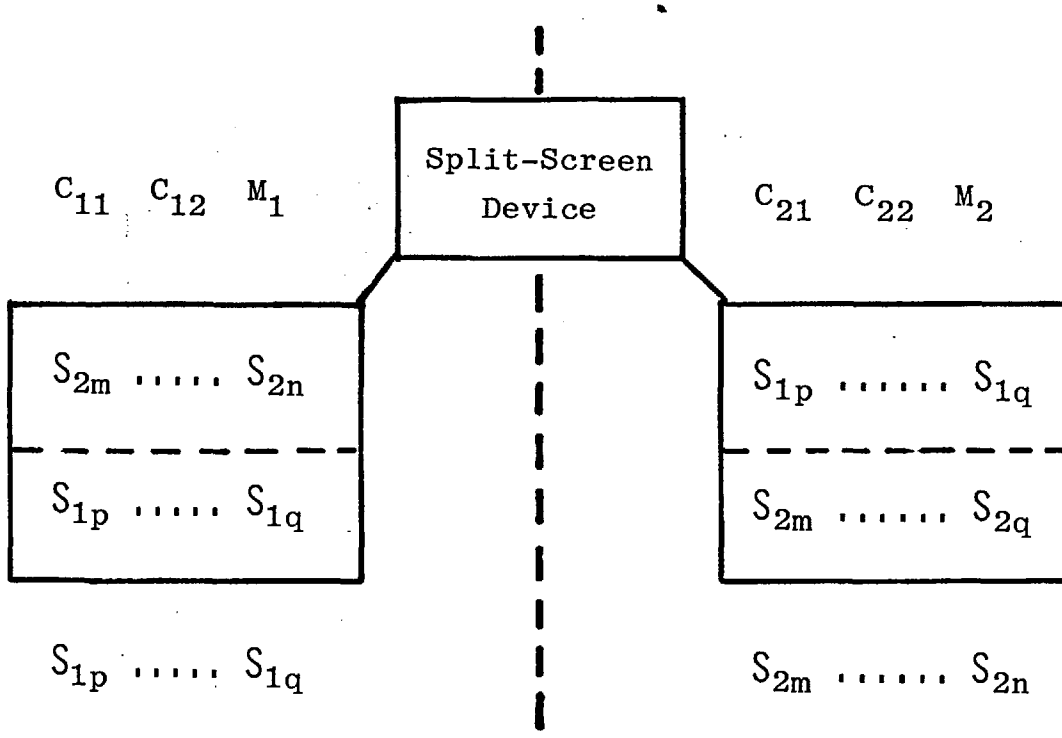
Eight sessions of teleconferencing which involved 43 individuals were conducted. Participants of each studio can only view their distant interacting group on the monitor in their own studio. These images on the screen are neither 'people' nor 'things'. The response of participants to images as well as their interaction patterns (within group and between groups) were the major concerns of this fundamental investigation of teleconferencing.

Phase II : Dual-Split Arrangement (5 teleconferencing sessions)



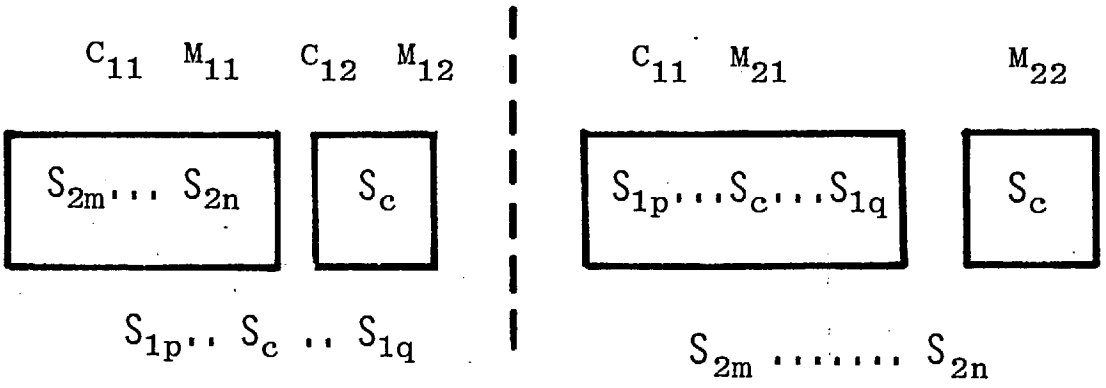
The response of participants to images of the other group was observed in Phase I. However, the interaction and reaction of participants to their own group members (face-to-face neighbours); their attitudes toward themselves also being seen as 'images' on the screen of another separate monitor; the difference of relationships established between a speaker to another speaker (people) and a speaker to an image; etc., were the emphases of this stage. These relationships may affect the course of argument, of decision making in a certain way, with regard to attitudes, confidence, responsibility, etc..

Phase III : Cross-Split Arrangement (5 teleconferencing sessions)



This phase was designed to observe specifically any possible change (or no change) of interaction natures; when both teleconferencing groups appeared on the same screen of their own monitor in each studio. The relationship between images to images claimed the attention. Elimination of the physical distance of two groups of images indicated the inescapable circumstances of seeing their own selves as images on the screen as well as other physically distant participants. The degree of adjustment and the sense of unfamiliarity with such interaction styles gave rise to further considerations of documenting teleconferencing rituals.

Phase IV : Single-Chairman Arrangement (10 teleconferencing sessions)



In view of the characteristics of interaction patterns gathered from the previous three phases of the teleconferencing experiment, the present design variation is focused on the role of a teleconference chairman. The distribution of participants was identical to the previous designs; but one of them (in either studio) was taking the role of a chairman. Dimensions of observation were emphasized on highlighting both the novel rituals of interacting and the initiation and responses of the two particular roles (chairman and members).

3.4 'OBSERVATIONS' OF TELECONFERENCING PROCEDURES

3.4.1 The Problem of 'Objectivity' in 'Observations'

The 'observation' methodology has the merit of providing a means to study a whole system with its many interrelationships in great detail. Although observation may be a relatively dependable way of collecting data in the form of measurements of time and attitudes, it has the advantages of obtaining information from participants who may give 'inexact' answers or be unable to comprehend and express themselves. Furthermore, observation of present behaviour is no doubt a helpful guide to predicting future behaviour during the exploratory stage of discovery. This is even more benefitual if future conditions can be simulated on a sample basis; the behaviour of the sample

may provide a good indicator for future behaviour. It is of course necessary as a preliminary to train investigators to observe 'accurately'. The arguement of 'accuracy' or 'objectivity' in observation remains to be defined. Hardware arrangements, particularly audio and video channels and equipment (i.e. tape recorders, cameras, monitors, etc.) are not only inevitable in the case of teleconferencing but also useful to observation of such behaviour. This equipment enables much detailed information to be collected at the time of observation and subsequently to be analyzed in depth. Observers can repeatedly reproduce the analysis to reduce individual biases. The use of other equipment like a one-way mirror will prevent observer-interference during the period of experiment. However, there are cultural and ethic problems to be faced when apparatus is used in teleconference systems for dual purposes.

A 'systematic' observation framework for recording information based on facts and a 'value-free' orientation to the data are two fundamental principles of the design. A tailor-made model is then designed to eliminate the aforementioned drawbacks. Observation can then be a major tool for the teleconferencing experiments.

Twenty eight teleconference sessions were held in four phases with four or five person groups at each end, communicating via audio and video links. Group interaction during teleconferencing were both audio and video recorded. Participants, divided into two teleconference studios, held discussion on general topics assigned.(Detailed discussion topics and observation sheets are shown in Appendices 3 & 4). No leader was appointed in the discussion during the first three phases of the experiment. Every participant was provided equal authority and influential opportunities to involve in the conversation. Topics of discussion adopted were of value-free nature; specifically, no indication of competition or cooperation between groups

was suggested to the participants. During the sessions, the discussion increased in intensity and difficulty was experienced due to the increasing participation of group members. The duration of each session was forty minutes. The observers in the control room were not themselves participating in the work of either teleconference studio.

3.4.2 The Teleconferencing Sequence

Each stage of the teleconferencing sequences and action can be reviewed as follow :

1) Identifying Problems of a Discussion Topic :

Separate 'workable' discussion topics are defined for the teleconference participants. Techniques for setting goals and ways to thing about current situations are suggested. Two major activities at this stage are :

a) To generate multiple problem statements -
e.g. to describe a number of problems as concretely as possible, to mention actual people, places and resources, etc.

b) To refine the problem statements

2) Analyzing the Problems of the Discussion Topic :

a) To produce lists of information, opinions, suggestions which are considered as 'forces' of the discussion; to avoid arguing over the forces at this stage. To suspend critical judgements and let every participant's mind expand by understanding the view of others.

b) To rank the restraining forces. To agree on those being considered as most important. Rate the important forces for their solvability.

3) Generating Multiple Solutions :

To take each restraining force in turn and reduce its strength; brainstorm ideas for eliminating each restraint.

4) Planning for Action :

Once the possible solutions have been generated, the group should use critical judgment and build concrete plans for acting; for instance :

a) To choose the brainstormed ideas
b) To list the material and other resources which are needed
c) To put the ideas and actions into a time sequence
d) To plan and estimate specific dates for the actions to occur
e) Make plans to evaluate periodically the effectiveness of the actions as they are implemented
f) Be prepared to revise the plans as the sequence unfolds

5) Forcasting Consequences of Intended Action :

a) To weigh the probabilities for success against the labour required for implementation
b) To simulate the actions in order to receive feedback before the implementation
c) To involve the people who will be affected in criticizing the plans
d) To anticipate barriers from environmental sources

6) Taking Action :

Have the courage to be imperfect

7) Evaluating Actions :

Criteria should be established for the effectiveness of the actions; progress has to be reviewed as each action step occurs. Criteria may include costs, time, undesirable side effects, valuable by-products, risks, support and acceptability.

8) Summarizing and Concluding the Discussion :

In addition, look for changes in the focal problems.

[1]The three vectors of interactions : Nature, Style and Value are related to the four classes of meaning of an utterance (I.A.Richards) :
Nature may relate to 'Sense' (semantics, designation) and 'Intention' (purpose in speaking, e.g. to explain, to greet, etc.)
Style may relate to 'Tone' (expressions of attitudes towards one's partner) and Value may relate to 'Feeling' (expressions of feelings towards designations)

3.5 Observation Described by 'Vector Analysis'

Three vectors which indicate the Nature ($\vec{N}$), Style ($\vec{S}$) and Value ($\vec{V}$) of each interaction, can be conceptualized into 12 attributes (called 'interaction categories' on the Bales Model[18]; (Table 2) together with 2 additional categories which are defined below :

	BALES' CATEGORIES OF INTERACTION
s	1 SHOWS SOLIDARITY raises other's status, gives help, reward
s	2 SHOWS TENSION RELEASE jokes, laughs, shows satisfaction
s	3 AGREES shows passive acceptance, understands, concurs
g	4 GIVES SUGGESTION direction, implying autonomy for other
g	5 GIVES OPINION evaluation, analysis, expresses feeling, wish
g	6 GIVES ORIENTATION information, repetition, confirmation
q	7 ASKS FOR ORIENTATION information, repetition, confirmation
q	8 ASKS FOR OPINION evaluation, analysis, expression of feeling
q	9 ASKS FOR SUGGESTION direction, possible ways of action
a	10 DISAGREES shows passive rejection, withholds help
a	11 SHOWS TENSION asks for help, withdraws 'out of field'
a	12 SHOWS ANTAGONISM deflates other's status, defends, asserts
	(Additional Categories :)
d	13 SHOWS DOMINANCE orders, abuses, threatens
o	14 SHOWS OBEDIENCE aplogises, submits, gives in

Table 2 :

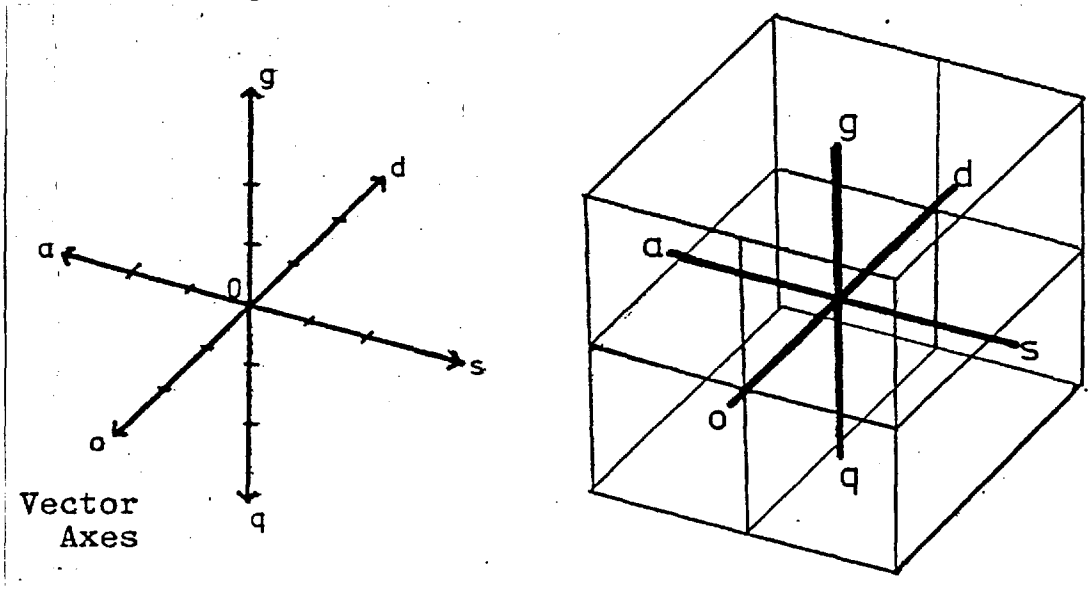
Categories of Interaction at Teleconferencing

For the present experiments, these have been classified into 6 attributes, as shown : asking for (q) as opposed to giving (g) (suggestions, opinions, information, orientation, confirmation direction, evaluation, analysis, express the feeling and wish, etc..); showing solidarity (s) and tension release (such as making jokes, laughs, showing agreement, giving rewards) as opposed to showing antagonism (a) (e.g. tension, withdrawal, defence, rejection, disagreement, etc..). Showing dominant (d) as opposed to obedient (o); which may further be regarded as the extreme points of the 3 axes : Nature (N), Value (V) and Style (S):

Vectors of Interaction		Vector Components
Style (S)	=	(d/o , q/g , s/a)
Nature (N)	=	(d/o , q/g , s/a)
Value (V)	=	(d/o , s/a , q/g)
∅	=	Non-Response & Non-Verbal Communication

Note : The components q/g are assumed to be 'Zero' for the Vector (V) and s/a to be 'Zero' for the Vector (N).

A method of 'Vector Analysis' was used[19] to describe the group performance of teleconferencing, as described below :



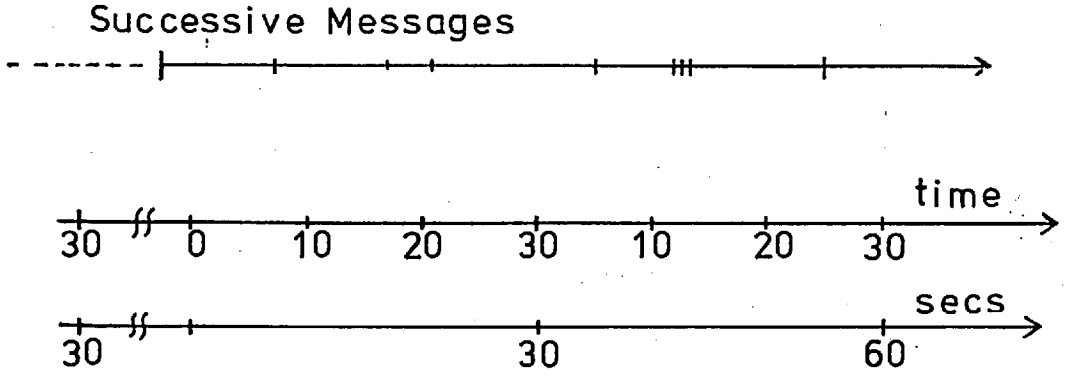
Note : Any one 'Message' corresponds a Vector in this Space

Fig. 3 : A Vector Model of Teleconferencing Interaction

This diagram represents the 'message' space. Each axis is divided by a 5-point scale (including 'zero') Three axes are used to represent the components listed above and vectors in this space represent the Style (S) Nature (N) and Value (V) of each message. The totality of these vectors then describes the atmosphere of a particular teleconferencing session. Clearly some statistical measures of this 'atmosphere' will be required.

A 'message' is defined as a complete continuous utterance of one person. A conference then consists of a sequence of 'messages' (of various durations) as will be discussed below. This quantity proved to be too great to handle for certain later analysis that 'messages' are then defined in three different ways, depending upon time intervals : a) continuous observation, b) 10 seconds or c) 30 seconds.

For subsequent analysis, time was quantized into intervals of 10 seconds and 30 seconds; and only those messages occurring at these points in time were selected from the whole data. For later analyses, only every third one of those was chosen.



The purpose of this simplified analysis was to reduce an overwhelmingly large quantity of data for describing the Group Performance Profiles satistically. (Chapter 4)

3.6 GROUP PERFORMANCE PROFILE

The purpose of this analysis is to set up 'Group Performance Profiles' description of teleconferencing. The 3 vectors over each teleconference period depict a Group Profile. In actual operation, all or any of the vector components are possible at any given time within the total span of conferencing.

There are unique Group Performance Profiles in teleconferencing which are influenced by external conditions : users' personalities and preferrence for the teleconference system, characteristics of conferrring groups, nature of discussion and technical design of the system. Different degrees of their combination will mould the teleconferencing performance into various unique features, at different moments -- orientation, evaluation, control, decision, tension management and integration, are existing in cumulative effects during the continuous group process. (Fig.4)

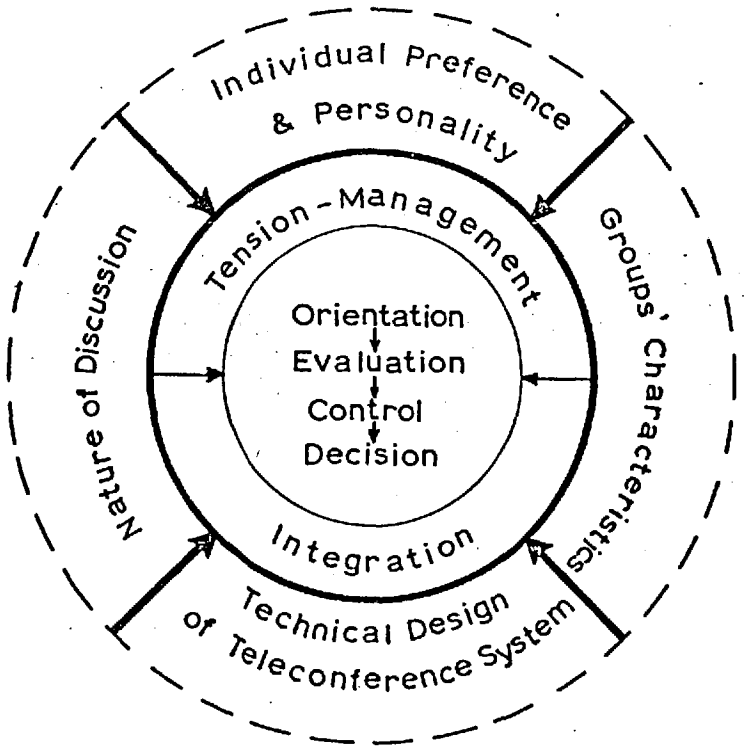


Fig. 4 : Group Performance Profile of Teleconferencing

We shall next consider an appropriate way of measuring Group Profiles. In order to do this, it is necessary to distinguish 'Cross-Talk' and 'Side-Talk' (i.e. conversation between the two groups and within each group).

3.6.1 Matrices to Define the Ranking of Side-Talk and Cross-Talk

This research is not concerned with the study of the efficiency of Teleconferencing and face-to-face interactions. A 'control group' has not been used at the present case because we are not comparing one group (system) with another. The results relate only to comparisons of the within-group and between-group behaviours.

'Side-Talk' is here defined as 'Within-Group' interaction and 'Cross-Talk' is defined as 'Inter-Group' interaction during teleconferencing. The two separate conferencing groups have a high likelihood of coming from different organizations, decided by geography and so might be partial strangers. The group loyalties and the separate groups cross-layalties and trusts might differ. Therefore the analysis of Side-Talk vs. Cross-Talk interaction is significant when formulating the group profiles. It is based on a two dimensional interaction matrix, which records the modes and rankings of individual participants in terms of 1) Frequency of Initiation and 2) Number of People being Addressed. (Table 3)

RECIPIENT / INITIATOR	Group 1 1 2 3		Group 2 a b c	Total Initiation	Rank
1 2 3	SIDE-TALK		CROSS-TALK		
Chairman					
a b c	CROSS-TALK	Chairman	SIDE-TALK		
Total Reception					

Table 3 : A Matrix of Group Interactions at Teleconferencing

The frequencies of initiating interaction by each participant (Initiator) and of receiving information by any particular participant (Recipient) were recorded in the rows and columns of the matrix of interaction. The total of each row indicates the frequency of each individual's initiation of interactions while the total of each column indicates the frequency of each individual's reception of information or being addressed. There is also a forbidden area of the matrix when both initiator and recipient are in the same cell. A specific column to record the chairman's behaviour is also included.

3.6.2 Applications and Bases of Measurement of Group Profiles

According to the special emphasis above on Cross-Talk vs. Side-Talk patterns of teleconferencing, there is a need for standardized methods of classifying, analyzing and comparing this particular interaction behaviour. The present phase of experiments was conducted with widely different groups under widely different conditions (for instance, diversity of cultures of group members and nature of discussion topics). The objective has been to aim at assessing the generalized applicability to teleconferencing systems. Some statistics, regarding the frequency of occurrence of elements among the three vectors (Nature, Value and Style), such as agreement and disagreement produced a similar pattern of interaction profiles.

Different bases of measurement of group interactions can be illustrated using different ratios :

1) Relative Side-Talk

$$\frac{(ST)_i}{\Sigma_i (ST)_i} \% = R_1$$

Relative Cross-Talk

$$\frac{(CT)_i}{\Sigma_i (CT)_i} \% = R_2$$

Note :

$(ST)_i$ = The Number of Side-Talks of the ith Category

$(CT)_i$ = The Number of Cross-Talks of the ith Category

2) Ratio of Side-Talk to Total Interactions

$$\frac{(ST)_i}{(ST)_i + (CT)_i} \% = r_1$$

Ratio of Cross-Talk to Total Interactions

$$\frac{(CT)_i}{(ST)_i + (CT)_i} \% = r_2$$

3) Side-Talk Ratio

$$\frac{(ST)_i}{\Sigma_i[(ST)_i + (CT)_i]} \% = r_s$$

Cross-Talk Ratio

$$\frac{(CT)_i}{\Sigma_i[(ST)_i + (CT)_i]} \% = r_c$$

4) Group Profile

$$\frac{(ST)_i + (CT)_i}{\Sigma_i[(ST)_i + (CT)_i]} \% = GP$$

3.6.3 Some Implications of Observations

Herbert Spencer[20] was the first social scientist to devote considerable attention to the intrinsic difficulties of impartial observations. Social phenomena, e.g. interaction (unlike the bulk of natural phenomena), are not directly perceptible, but have to be established by accumulating dispersed details in space and time. Spencer commented on the 'emotional entanglement' of the observer or investigator as an important barrier to objective analysis.

The problem of objectivity has several facets. First among them being that of 'selection'. Even after numerous replays of recorded data, it is difficult to observe and note every 'relevant' aspect of teleconferencing behaviour and environment. Observers may fail to note the obvious. The overall picture may be false. Observers are likely to fit their habitual 'preconceptions' of how participants 'should' behave into stereotypes.

There is a risk of placing teleconferencing messages into 'appropriate' categories in the vector model of interaction. Sense organs are inherently bad machines for making comparisons. It is extremely difficult to compare accurately similar messages on face-value without understanding their context. All perception is compounded of the immediate experience and of the stored experience. Observation and inference are inseparable.

The effects of interaction when participants are aware of being observed also claims serious attention. The fact is that observation itself modifies the situation being observed. This effect did not strike Herbert Spencer, Emile Durkheim or other nineteenth-century scientists, presumably because their methods seldom involved the open-intervention of the investegator in situations under study. When an investigator introduces experimental changes into the situation, he cannot avoid reactions to the intervention, but it is these reactions which he is actually seeking. There are thus two distinct dangers. One danger is that 'self consciousness' may be aroused among participants by the presence of equipment (camera, monitor, microphone, etc.). This will lead to 'interaction distortion'; however, this is inevitable in all tele - conferencing situations. The other is the introduction of changes of interaction pattern with people as well as with images on the screen - these styles of interaction may conflict with the participants' ideas of 'normality'.

Some attempts to overcome these difficulties have been made. One means of deriving knowledge from such interaction processes is by observing only 'overt' behaviour. The other school of thought accepts that interaction and teleconferencing situations are essentially dynamic and complex.

It is recognized that the subjective interpretation of observers is unavoidable. Although some statistical weighting may be applied to the intrepretation of these observations (which could be subjective), yet it must be noted that the results of the analysis only hold true statistically. It is not just a matter of adjusting certain figures, or of expunging certain forms of behaviour from the record. Furthermore, there are no means of telling what the overt behaviour could have been under natural and unobserved conditions. On the other hand, there is no reason for supposing that behaviour has been entirely transformed through the presence of experimental elements.

3.7 THE INTRODUCTION OF PARTICIPANT DATA-BASE

A sampling frame of approximately one hundred units was used in the present teleconference studies. Each unit was replaceable for randomly composing groups in each of the four experimental phases. A participant data-base was therefore introduced to serve two purposes. First of all, to keep a comprehensive factual record of every sample unit on : name, sex, cultural background, session of participation, task for discussion, number of questionnaire answered, total number of participants at the particular session, exact seating location, as well as two kinds of individual ranking record during each session : 1) frequency of initiating a conversation or message and 2) frequency of being addressed by other participants. The second objective of such a data-base is to be able to record the development and changes (or lack of changes) of every participant in a systematically predefined manner with regard to the increase of their frequency of participation in the sessions. Individual progress of participants is a valuable indication for understanding the dynamics of teleconferencing.

The concept of causality as a chain of events is the most useful but also risky model for empirical analysis of human interaction. The possible distortions due to human factors are included in the data-base. Factors like : degree of familiarity with the system, personal like of the discussion topic, physical and psychological conditions at the time of the experiments, composition of the teleconferencing group, etc. are affecting the result of individual performance; and they should therefore all be accounted for. However, human interaction is flexible, and so far no standardized or generalized norm of measurement has been derived. The consequences of practising and learning to communicate via technological systems and the emergent role of leadership (both formal and informal) during teleconferencing processes are creating a compound intervening effect, which makes every effort worthwhile to maintain an individual data base.

3.8 QUESTIONNAIRE DISTRIBUTION AS AN AUXILIARY DATA COLLECTION METHOD

The risks of the subjective interpretation and selective preception of observers can not be avoided. On the other hand, questionnaire (Appendix 5) can be designed as a complementary tool for understanding social phenomenon. The combination of both data collection techniques in one experimental design will reduce the risks of a biased analysis.

Each of the seven sets of questionnaire (with a total of 114 items) is distributed to participants at the end of every session as an auxiliary data collection tool. The questionnaire were designed with precoded five-point scale answers for participants to describe certain characteristics of the discussion which they had just completed. Items of the questionnaire were not designed to judge the desirability of interaction characteristics but rather to gather an 'objective'

description of the whole teleconferencing process.

The frame of reference for the present questionnaire is based on two reliable and widely applicable group dimension indices. The Hemphill's Index of Group Dimension[21], which ascertains thirteen dimension of group[1], is one of the most ambitious attempts to measure the structural properties of groups. The Seashore's Group Cohesiveness Index[2][22], provides a measure of the strength and ability of a group to maintain its identity and to persist in the development. The present teleconferencing questionnaires consist of two major areas -- Socio-Emotional and Task areas. The former contains the 'Value' components (Table 2 & Fig.3) of the Vector Model of interaction. These include the participants' feelings and attitudes toward teleconferencing, e.g. general evaluation, privacy, social contact, realism, etc.. The latter describes the 'Style' and 'Conduct' of teleconferences. These activities are taking place at the discussion. The combination of 'Value', 'Nature', 'Style' and 'Conduct' components formulate a general 'Atmosphere' of the performance of teleconferences. The content and wordings of all items have been phrased in simple, everyday language with 'natural value' to avoid vagueness and ambiguity. It is realized that leading questions should be avoided, but the uncertainty remains as to which words are 'leading' in the particular question.

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[1] The 13 dimensions of Hemphill's Group Index are as follows : control, stability, intimacy, stratification, hedonic tone, autonomy, potency, visicidity, permeability, participation, polarization, flexibility, and homogeneity.

[2] Three main elements in the Seashore's Group Cohesiveness Index are : 1) the feeling of a part of the group, 2) the possibility of leaving the group, and 3) comparing one's own group with other groups.

Pre-test and pilot studies were conducted by five judges. With reference to the reliability score of both aforementioned indices, split-half reliabilities of the present items ranged from 0.59 to 0.89. The relationship between an item and high-low categories[1] ranged from 0.03 to 0.78 with a median of 0.36 on the keyed items and from 0.01 to 0.36 with a median of 0.12 on the randomly selected items. Inter - correlation of dimension scores ranged from -0.54 to 0.81, with most within 0.29 (with 0.01 significance level). Agreement between judges ranged from 0.53 to 0.74. More than one item of the same nature were included in one dimension. All dimensions were designed with regard to the indicators on the Vector Model.

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[1] Observed highest scores for the expected high-score-items and observed lowest scores for the expected low-score-items.

Chapter 4 GROUP PERFORMANCE PROFILES OF TELECONFERENCING

Summary

'Teleconferencing' in any form, necessarily divides participants into two or more groups. The mutual relationships, attitudes and moods within any one group may differ from those between groups

Loudspeaker voices and television images are not 'people' but may have some qualities of 'things'. Relationships, attitudes and moods are vital factors in the conduct of meetings and more understanding in this area is needed before we should invest in the expensive technology required for teleconferencing.

The nature of any social group activity is defined by its peculiar rituals (e.g. schoolroom, church, office, committee, etc.). The rituals of conventional conferencing may need to be modified to contain the within-group and between-group distinctions (e.g. role of a chairman; also hostility, trust, rivalry, confidence, etc.).

Is vision essential? It serves mainly a controlling function rather than a communicative one in conversation. Ordinary telephony works well without it, when intonation serves similar functions. But the controlling function of eye-glances and facial gestures may be more important to (multiple) group meetings than 2-person conversation, both for ritual and strategy reasons.[1]

This chapter gives a presentation of unique Interaction Profiles of four phases of experiments being undertaken to investigate the above factors, with discussion of some criteria for the social and statistical

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[1] Dr.D.Dicks, Ph.D.Thesis(73), Imperial College

implications of teleconferencing. It includes analysis of the behaviour (e.g. antagonistic/cooperative) of participants, of within-group and inter-group attitudes, etc.. The chapter concludes with the 'Fitting the User to the System and Fitting the System to the User' framework, showing the influence of the teleconference mode upon conference behaviour.

4.1 INTRODUCTION : INTEGRATION OF USER-TELECONFERENCE SYSTEM

Teleconferencing, as a mode of communication, has emerged both from the demands of a changing environment and from the advancement of communication technology. Its aims are to enhance interactive communication between two or more groups of people in separate locations, with the intention of enabling them to confer together in the same conference, at the same time, sharing values and exhanging ideas on subjects of common interest. Therefore, it is essential to view the sequence of interactive processes as a dynamic part of an integrated man-machine system[23]. Teleconference systems are composed of :

1) people with different sets of values, attitudes, skills and degrees of familarity with the system used;
2) technologies with different characteristics;
3) organizational processes and structures which reflect various kinds of relationships between people or between people and their work. (Fig.5)

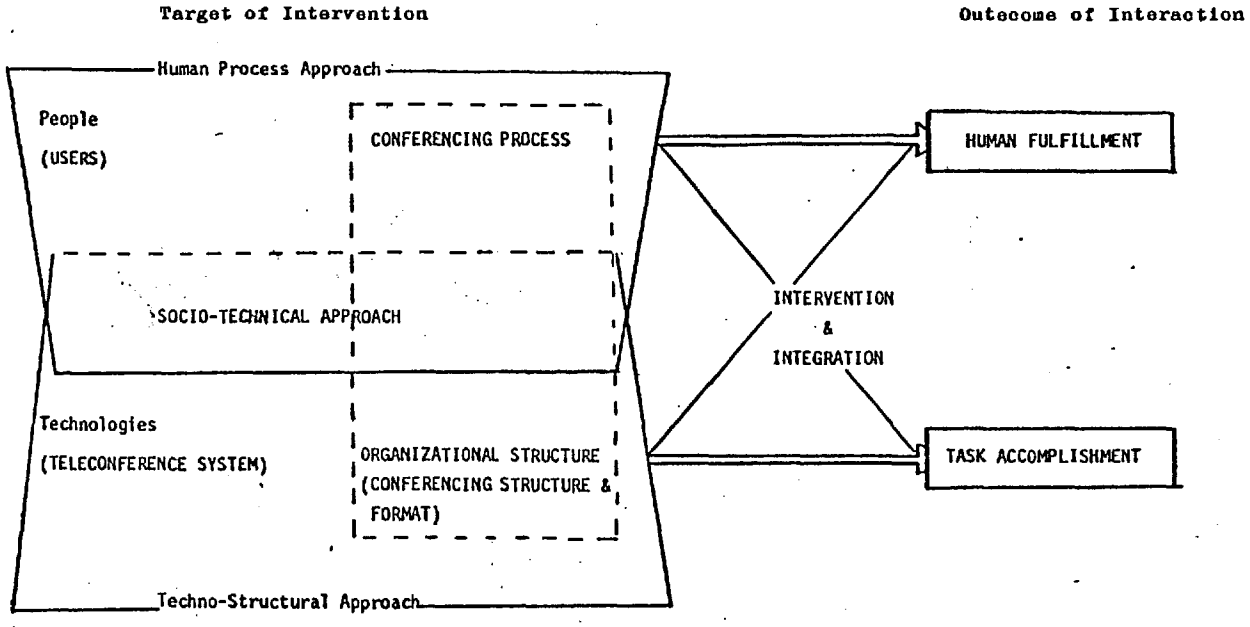

Fig. 5 : Integration of Teleconferencing Development

Teleconferencing systems form a prospective communication technology which is already being implemented in some organizations. Processes of human interaction within conferencing structures are the integrating mechanism for :

1) allocating human resources to conferencing processes for Task Accomplishment and
2) facilitating the utilization of the teleconferencing system for Human Fulfilment.

For these perspectives, it is necessary to understand the change that takes place in users, their interaction processes and development (e.g. style, values, skills) before technology can be applied to achieve their maximum compatibility.

The rationale behind this is twofold :

1) the organizational structures and interaction processes are the major linkage between the human and technological inputs into the teleconference system;

2) strong resistance or failure is often encountered if efforts are spent to change only : a) the organization structure based on structural elements; b) the technology of the system; or c) the individuals. Processes and structure are so embedded in each other that it is almost impossible to create effective change in one aspect without modification of the others.

The implications of this 'Fitting the Users to the System' and 'Fitting the System to the Users' (FUS-FSU) are of major importance. This complementary FUS-FSU framework implies that our approach is problem and and system oriented. Teleconferencing problems (both users and systems) should be seen as linked, and studied in the context in which they arise. Our diagnostic criteria and activities should be considered in terms of 'to what extent' is it a human or user problem? Likewise, 'to what extent' is it a system or technology problem? Most of teleconferencing problems are mixed.

Both psychological and technological criteria claim our attention. Because of our social psychological emphasis on teleconferencing, our psychological criteria relate to conditions that determine the 'satisfactoriness'[24] (Task Accomplishment) of users in the system, and of conditions that determine their 'satisfaction' (Performance) with their teleconferencing participation. Our technological criteria are to promote both participation-satisfactoriness and user-satisfaction. A unique Group Performance Profile may then be extracted from the experiments on teleconferencing along these lines.

4.2 COMPARISON OF GROUP PROFILES IN THREE TIMING VARIATIONS

Phase I : 'Single - Single' Arrangement (see P.30)

Group Profiles of the groups during each teleconference could be presented in terms of a two dimensional diagram. Figure 6 depicted the frequency distributions of the Bales Categories of Interaction; together with my additional categories of 'dominance' and 'obedience'. Results were based on sampling at a) Continuous Observation b) 10 second and c) 30 second intervals. These are marker intervals ; spaced by 10 and 30 seconds.

The frequencies of occurrence (vertical axis) are plotted (in percentage) against each of the 14 interaction categories (horizontal axis) as in Table 2 from which the vectors Nature, Value and Style are derived. The existence of the categories were presented irrespective of the 5-point scale other than the value of '0'.

In Figure 6, it is the fifth category (opinion giving) that occurs most frequently in all three types of sampling interval (Continuous, 10 seconds and 30 seconds). But 'opinion giving' was a 'Task' area according to the Vector Model of teleconferencing (Fig.3). It implied :

1) More than 50% of the total messages were task oriented; that included giving and asking for opinions, suggestions and orientaion.
2) Out of the total percentage of 'task orientation', 60% - 70% of the messages were with the nature of opinion giving.
3) The relative 'socio-emotional orientation' which was related to the 'Value' of interaction. (shows solidarity, agrees, tension, etc.) in the present phase of teleconferencing was less emphasized; except in the following case
4) A different set of results was obtained when the same series of data was analyzed according to the 'Continuous Observation' sampling.

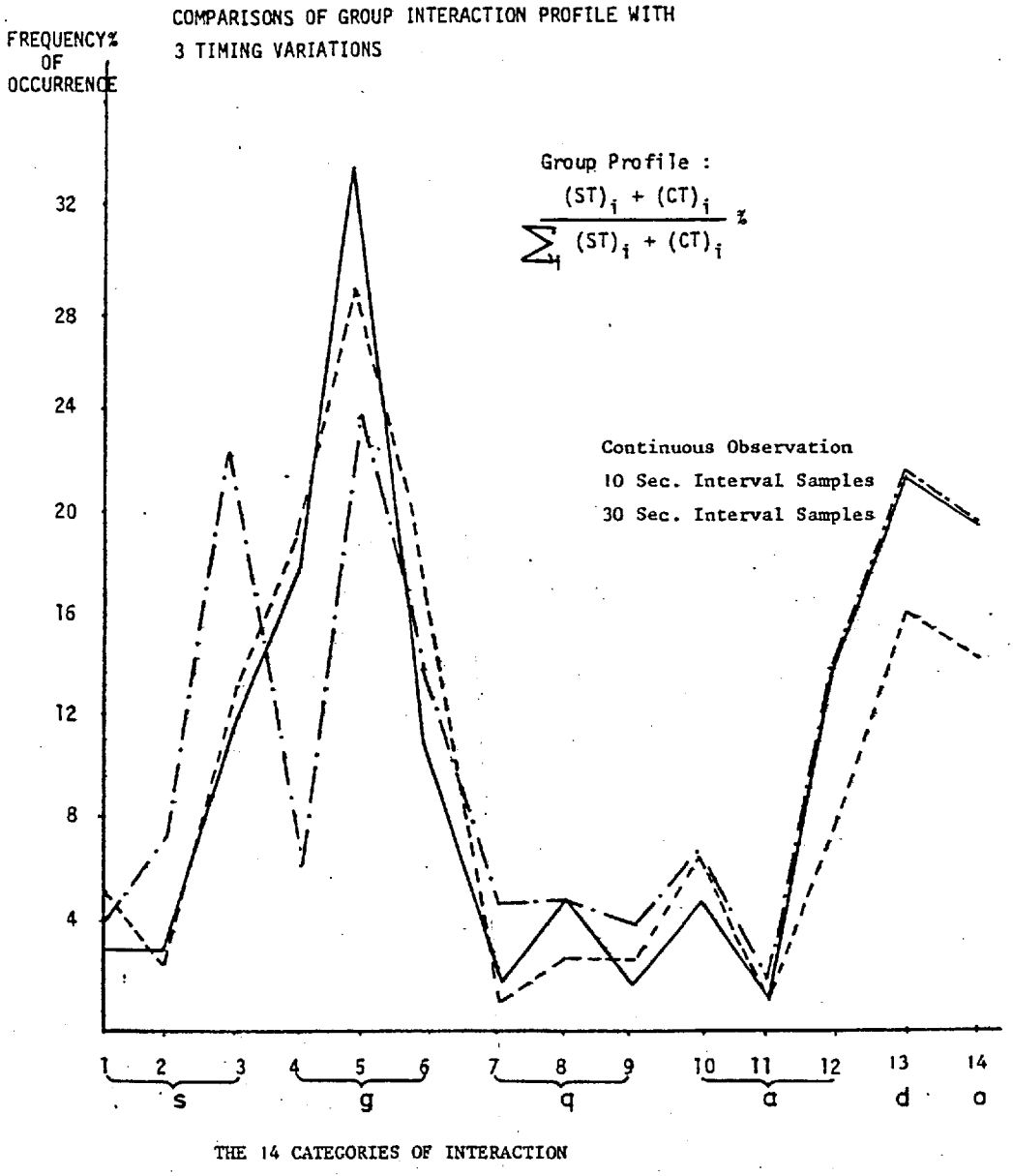

Fig.6 : Comparison of Group Interaction Profiles
(Average of 8 Teleconferences of Phase I)

5) The percentage of 'showing tension release' and 'agreement' increased to 22% of the total interaction. That was 11% and 10% difference to the 30 second and 10 second sampling intervals.

6) This indicated that the consensus and emotional expression of teleconferencing groups was not equally distributed over the total period within each session. This finding deviated from that of the usual face-to-face conferencing.[1] Socio-emotional reactions and responses were not necessary to follow the discussion or completion of any task-oriented interaction.[24]

7) A certain degree of showing tension and antagonism (16% of total interaction) was observed during teleconferencing. This indicated the possible competitiveness or disagreement during the sessions.

If we further analyze the Group Performance Profiles in terms of the 'Side-Talk' vs. 'Cross-Talk' parameters, their features are even more significant.

4.2.1 Comparison of Relative Side-Talk vs. Cross-Talk in Teleconferencing

Figure 6 has shown the frequency distribution of the 14 categories of interaction without distinguishing between 'Side-Talk' and 'Cross-Talk'. The frequency distributions of 'Side-Talk' (within-group interaction) and 'Cross-Talk' (between-group interaction) are separately presented in Fig.7. 35% of the total Side-Talk regressed in the Value category of 'agreement' while relatively, only 15% of the total Cross-Talk was in the same category. These indicated certain characteristics of relative Side-Talk vs. Cross-Talk. In terms of Value and Nature which represented Socio-Emotional and Task areas during teleconferencing, participants felt and showed more release and satisfaction with their own group rather than with the other group encountered only as audio or audio-video images. Frequent laughs, jokes, rewards, understanding, acceptance, complience, concurrance were recorded in Side-Talk matrices.

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[1] extensive studies have been conducted; e.g. Communication Studies Group, Open University (U.K.), Institute for the Future (U.S.A.), and Department of Communications, Canada, etc.

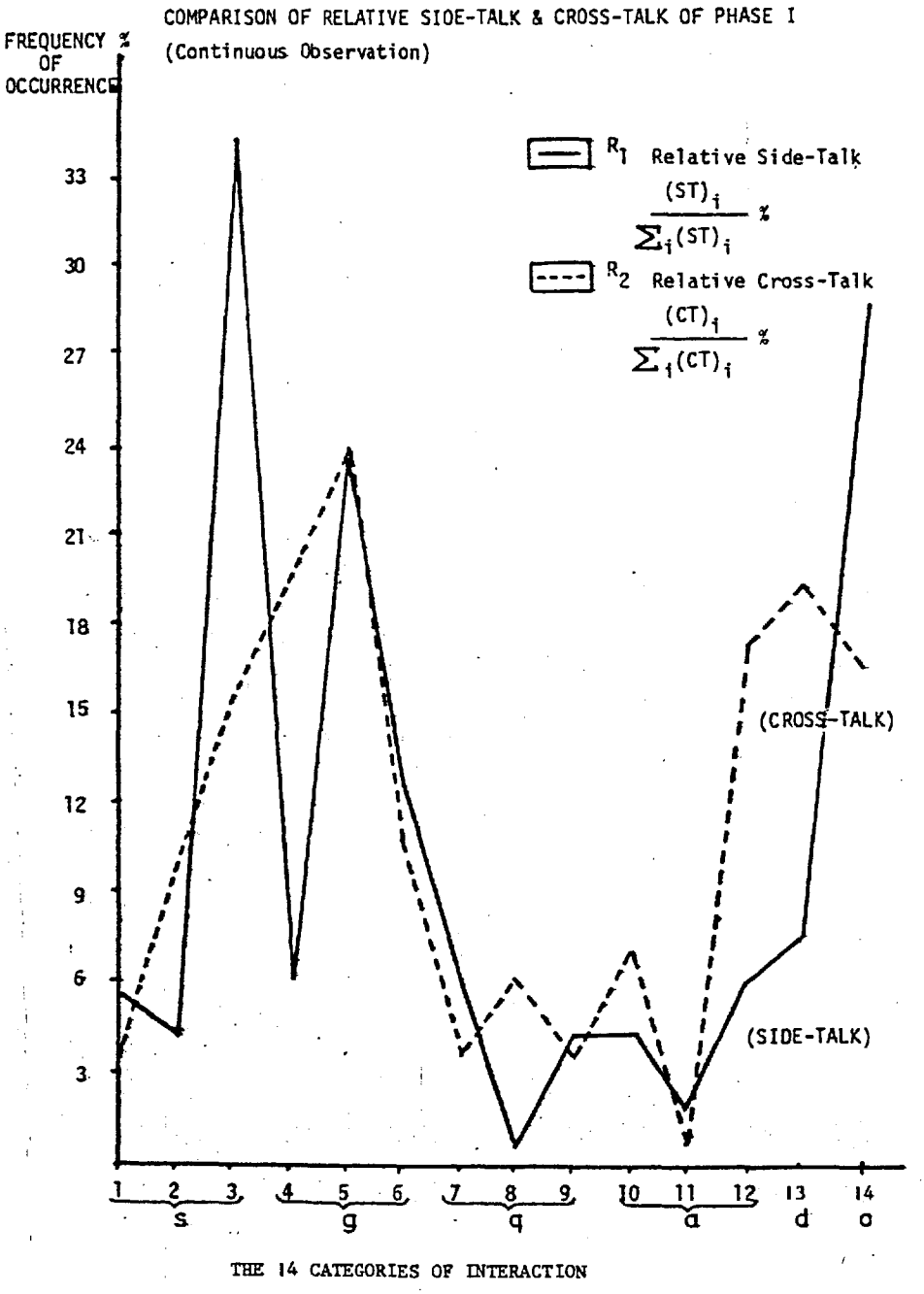

Fig.7 : Comparison of Relative Side-Talk & Cross-Talk

Consensus was much less observed in the Cross-Talk matrices; but, on the contrary, disagreement, rejection, withdrawal, aggression, defendence, etc., frequently occurred. That meant the socio-emotional aspect was mostly expressed within the teleconferencing group at the same location. Furthermore, it also suggested a tendency to compete and debate between the groups. This might be caused by :

1) the psychological uneasiness of participants who were not accustomed to communicate with audio or audio-video images rather than with physically present, real people;

2) this situation would create an atmosphere of competition if there was a lack of 'Mutual Trust'[25] between teleconferencing groups;

3) within-group communication (Side-Talk) developed toward a socio-emotional relationship because members had a 'Loyalty' to their own group which differed from that to the other group;

4) the sense of availability of remote-recipients and within-group neighbours, predictability of recipients' motives and intensions, and familiarity with teleconference 'exposure', etc. were the major variables which linked with the feeling of 'Nearness' during the interaction; and

5) vision served mainly a controlling function rather than a communicative one in conversation. The controlling functions of eye-glances and facial gestures were important to group meetings both for ritualistic and strategic reasons[26].

4.2.2 Comparison of Side-Talk with Cross-Talk for Each Category of Interaction

The frequency of occurrence of each category of Side-Talk was different from that of Cross-Talk; they are complementary, of course, because the sum of the two must always be 100% (Fig.8 & 9).

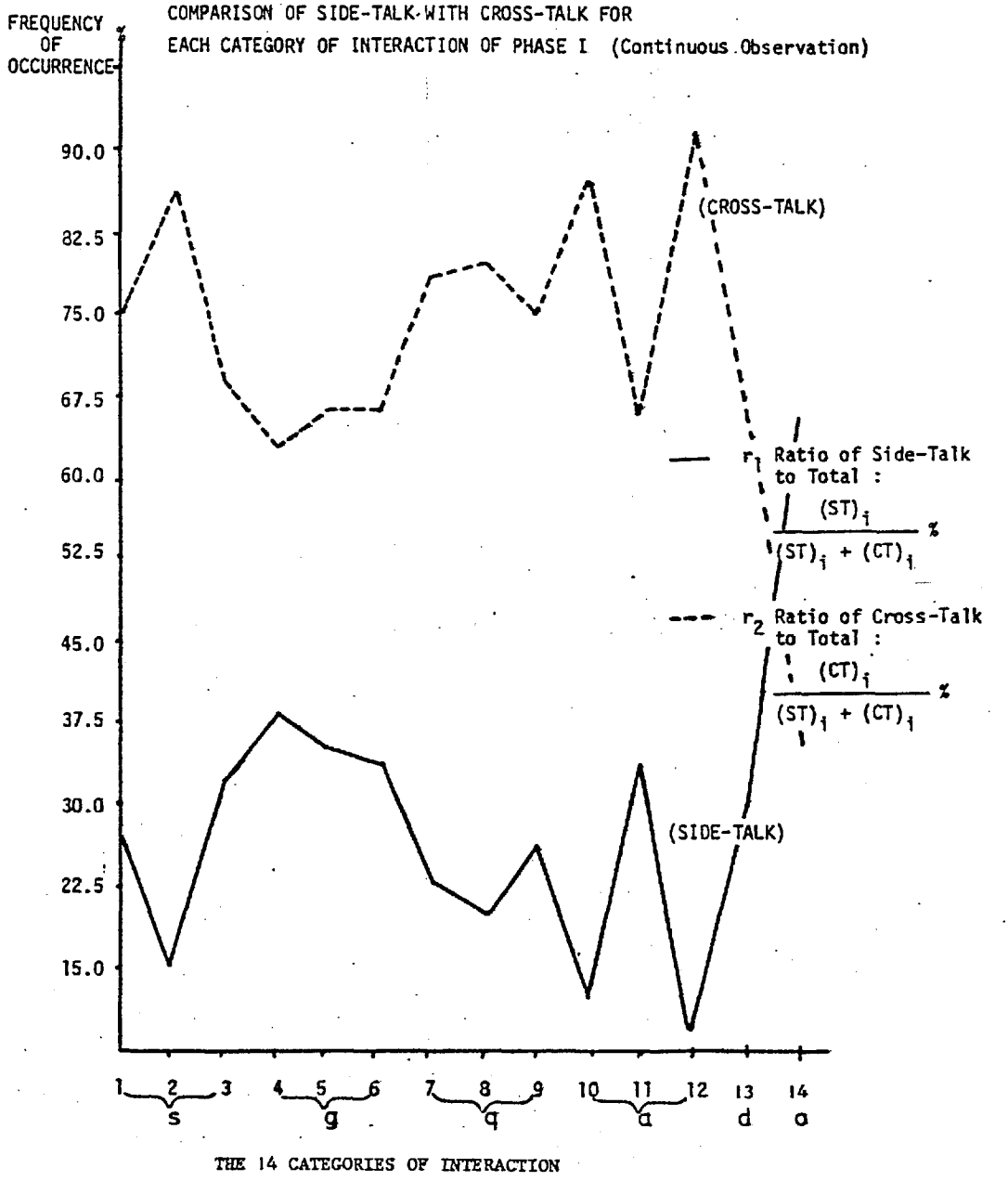

Fig.8 : Comparison of Side-Talk with Cross-Talk for Each Category of Interactions

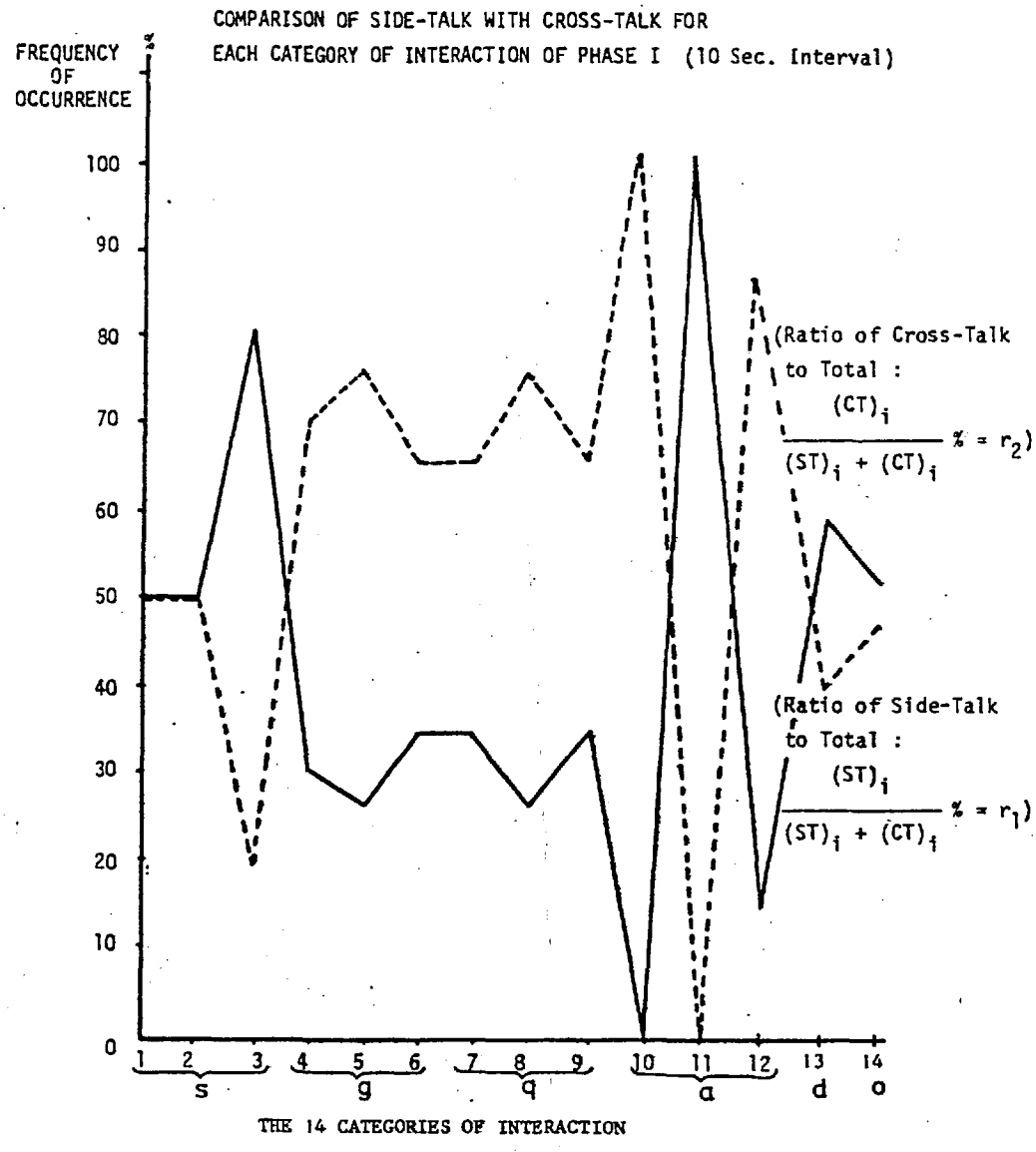

Fig.9 : Comparison of Side-Talk & Cross-Talk for Each Category of Interactions

Based on 'continuous observation', the Cross-Talk and Side-Talk ratio of each category was 71.62% to 28.38% (Fig.8). The frequency of Cross-Talk was preponderant for all categories. Specially, the divergence between Cross-Talk and Side Talk was greatest for the Value categories of 'disagreement', 'showing tension' and 'showing antagonism' (For instance, comparing Side-Talk, 12.5% vs. 87.5% in 'disagreement'; 33.33% vs. 66.67% in 'showing tension'; and 9.09% in 'showing antagonism'.). This further reinforces the hypothesis that participants tend to express more competing or hostile feelings to the remote audio or audio-video images, (at least during the style of teleconferencing employed).

'Continuous Observation' (Fig.8) most clearly distinguishes Side-Talk and Cross-Talk, out of the total interaction. However, the results of '10 second interval' observations (Fig.9) depicts a closer relation between the two. Again, with 10 second interval sampling, the ratio of total Side-Talk to total Cross-Talk of all categories combined is almost identical to that with 'continuous observation' (i.e. 29.42% to 70.59%). Although this ratio suggests that the general frequency of Side-Talk was almost 50% of that of Cross-Talk, the occurrence of categories showing positive emotional values in Side-Talk (i.e. tension release and agreement) was dominantly four times beyound that of Cross-Talk.(ratio 80% to 20%). However, the task natures of the profile (i.e. categories of opinion, suggestion and information) are symetrically distributed according to the Cross-Talk vs. Side-Talk frequencies.

In section 4.2 were listed implications of specific teleconferencing features (Nos.1-7 listed in text), derived general characteristics of Fig.6,7,8,9. Although these Figures give results from different bases of measurement (section 3.6.2), these implications are common to all. Incidently, a

comparison of these implications based upon individual conferences showed that in spite of the great variety of participants, subject matter, etc., they showed great similarity.

Figure 10 illustrates different bases of measurement of group interactions using histograms and group profiles. The histograms represent different ratios :

1) Relative Side-Talk (R_1) vs. Relative Cross-Talk (R_2) as used in Fig.7;
2) Ratio of Side-Talk to Total-Talk (r_1) vs. Ratio of Cross-Talk to Total-Talk (r_2) as used in Fig.8,9; and
3) The 'Group Profile', in Fig.10, is defined as a set of 14 points one for each category 'i',

$$\text{Group Profile} = \frac{(ST)_i + (CT)_i}{\sum_i [(ST)_i + (CT)_i]} \quad \%$$

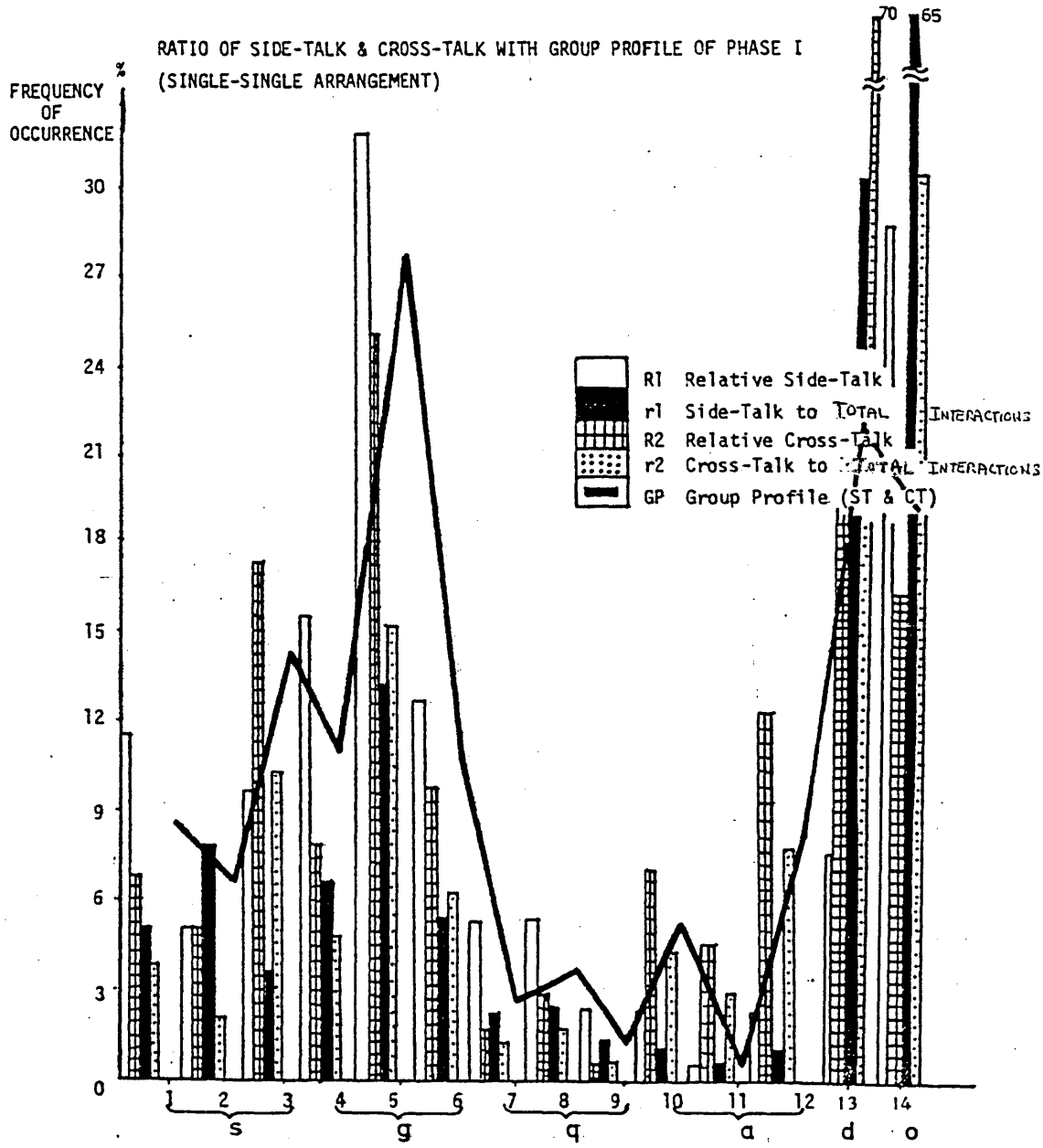

Fig.10 : Comparisons of Side-Talk with Cross-Talk for Each Category of Interactions (10 second interval)

4.3 COMPARISONS OF INDIVIDUAL ATTITUDES TOWARDS PARTICIPANT SATISFACTION

Phase II : 'Dual - Split' Arrangement

Phase I has indicated inverse differences (28.38% : 71.63% s.l.=.10) in the frequency between Side-Talk (within-group) and Cross-Talk (between-group). The participants' sense of unfamiliarity with teleconferencing arrangements was one of the major reasons for this result. Attention was mainly attracted to the interactions with images on the screen; while much less notice was taken of participants in one's own studio. Further studies of this characteristic of teleconferencing were conducted in Phase II ('Dual -Split' Arrangement). An additional monitor was provided in each studio; so that participants could see themselves with their own group as images on the second monitor in their studio as well. Certain features of the group profiles were found to be different from those of Phase I.

4.3.1 The Choice of 10-Second Interval Samples

The comparison of group profiles (as was done in Phase I) on three types of sampling standard indicated that the 10-second interval sample was most appropriate for the final analysis of this phase. The main reasons being that :

1) The task and socio-emotional expressions were distributing randomly during the total of five sessions being conducted (in Phase II).
2) According to the timing records, the number of speech-like messages and remarks reduced comparing with the frequency of those in Phase I. (Comparing Phase II to Phase I, only 6.47% : 17.58% of the total number of interactions were 'continuous-spoken-utterance' of one speaker for more than 30 seconds.)

A forty-minute session had a total number of 40 x 60/10 = 240 units of observation. This provides a uniform or constant unit for making comparisons and further implies stricter control of the timing-units of observation.

These can never be achieved in the case of 'continuous observation' (e.g. Phase I); which is based on the total number of messages exchanged in each session and this number of messages differs from session to session.

4.3.2 The General Group Performance Profiles

The mode of the average five group profiles at this phase was task oriented. 50.55% of the total interaction was giving directions and suggestions, making evaluation and analysis, seeking information and confirmation, etc. (Fig.11).

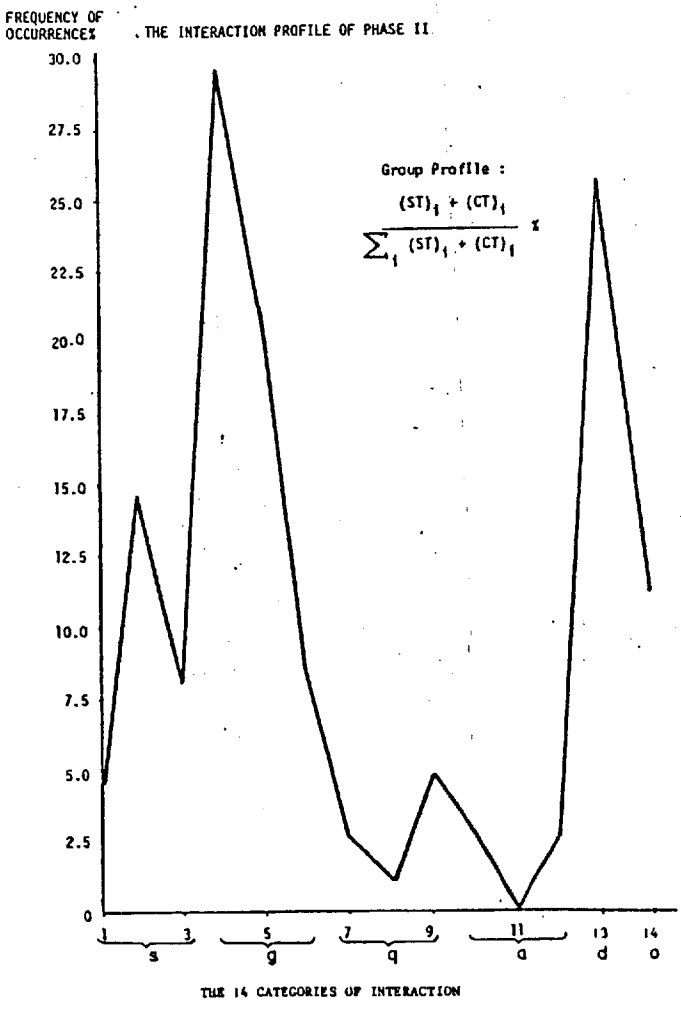

Fig.11: Nature Profile of Phase II (Average of 5 Teleconferences)

The style of interaction was positive-dominant that frequent laughs and jokes indicated tension release (14.67% of total interactions). There was a great difference in the frequencies of 'showing antagonism' between Phase I and II. The frequencies of this value category at Phase II (when participants could also see themselves and their neighbours on another monitor) reduced to 2.7% rather than 12.93% at the previous Phase I (when participants were often confronting with distant images of the other group). Further studies on within and between-group interactions (Side-Talk and Cross-Talk) may confirm these group characteristics more definitely.

The average ratio (5 sessions at this phase) of Side-Talk and Cross-Talk to the total interaction was 34.78% : 65.22% (s.l.=.02). Although the frequency of Cross-Talk recorded was about two times of that to Side-Talk, yet there was a relative increase in occurrences of the latter (Side-Talk) in the value categories (e.g. shows tension release, agreement, etc.), and in the task and nature categories (e.g. gives and asks for orientation and information). (Fig.12)

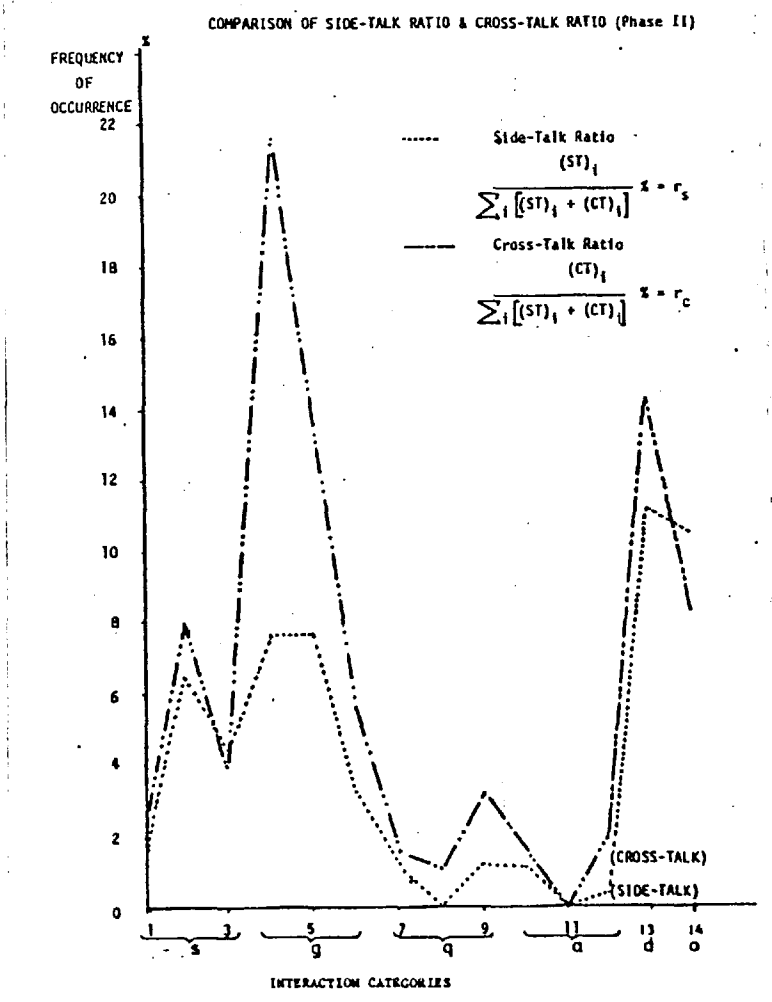

Fig.12 :

Comparison of Side-Talk Ratio (st/sum) & Cross-Talk Ratio (ct/sum) of Phase II

One possibility might be caused by the over involvement in the conversation with images. Participants at this stage tended to 'forget' the existence of their within-group members. They were so concentrated on and so attracted to the 'novel' style of interaction (two-way communication with images) that they gave minimum attention to and allowed very little opportunity for the 'conventional' face-to-face communication (within own-group members).

It might be assumed that if within-group members were having the properties of 'people' (as they always were) as well as 'images' on the video channel, the attitudes of participants to them (within-group 'people' and 'images') and to the between-group images were distinctive. This aspect will be emphasized and illustrated in Fig.13.

The comparison of Fig.7 and 13 suggested the different emphasis on their socio-emotional categories. The basis of measurement of both figures was on the distributions of either the total Side-Talk or the total Cross-Talk to the 14 categories. At this Phase II, the total Side-Talk compared to the total Cross-Talk along the major socio-emotional categories were :
18.75% : 12.50% in showing tension release (3.42% : 6.58% at Phase I);
12.50% : 5.83% in showing acceptance and agreement (15% : 34.78% at Phase I);
1.56% : 3.33% in showing antagonism and defense (5.87% : 16.95% at Phase I).
The frequencies increase in showing positive value (e.g. participant satisfactions, sense of attention,etc.) to within-group members. Friendliness was shown in each studio. This indicated a relaxed atmosphere of the whole conference.

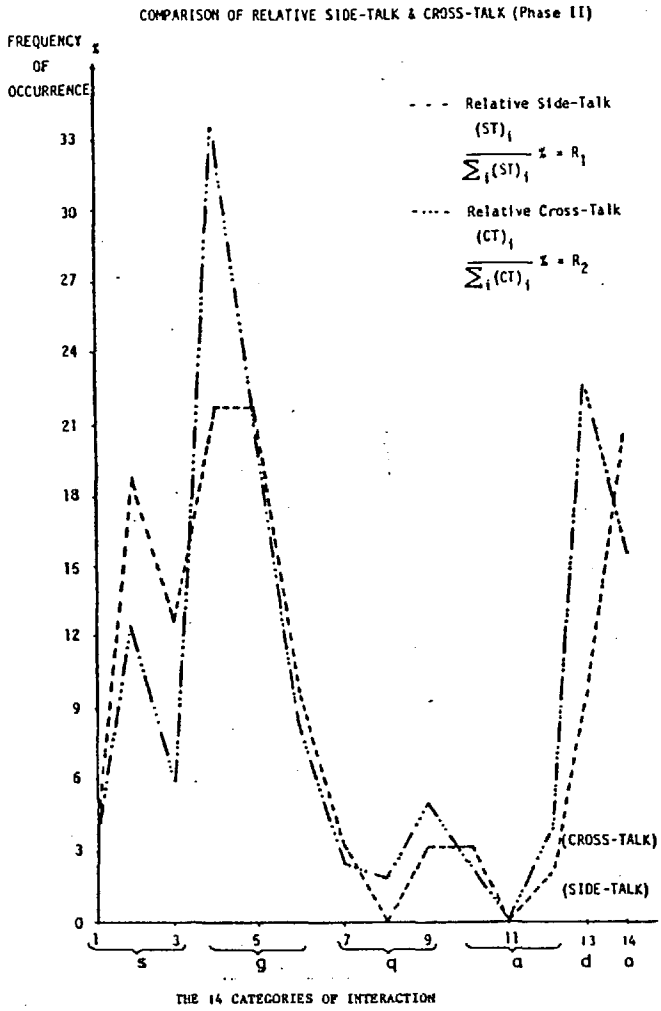

Fig.13 : Comparison of Relative Side-Talk $st_i/\Sigma_i(st)_i$ and Relative Cross-Talk $ct_i/\Sigma_i(ct)_i$ of Phase II

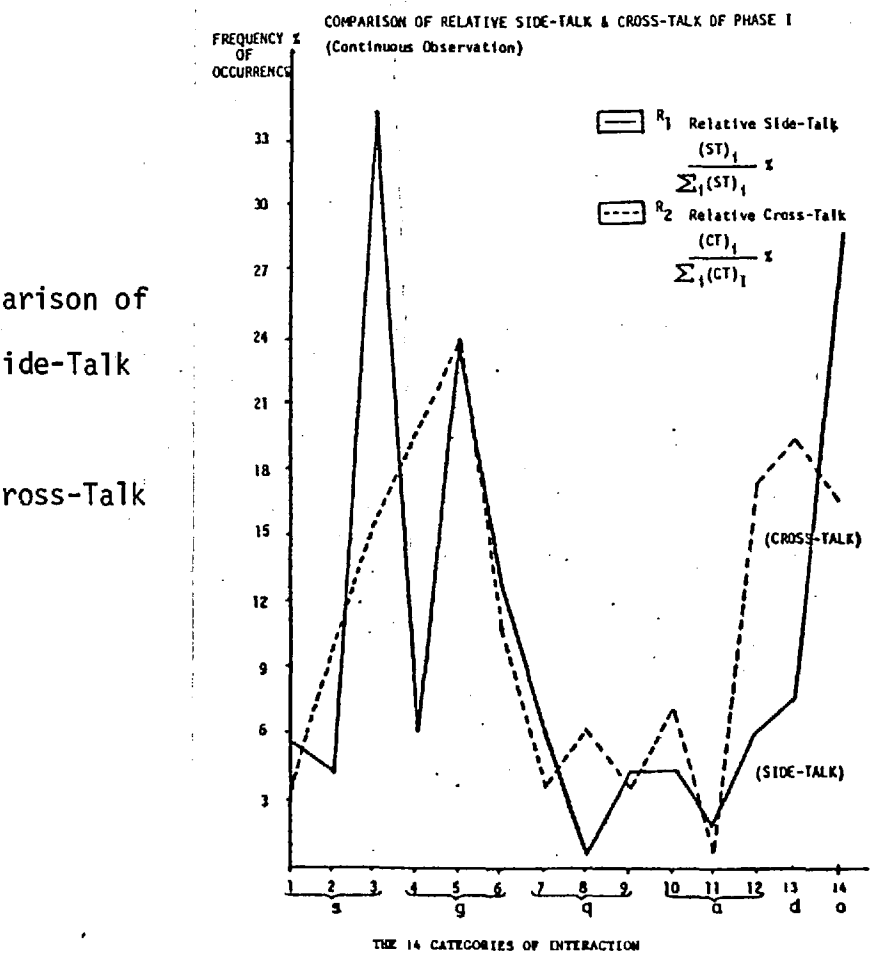

Fig.7 : Comparison of Relative Side-Talk and Relative Cross-Talk of Phase I

The results of interaction indicated several possibilities :

1) Since similar attention was given to both within-group and between-group images, the frequencies of Side-Talk and Cross-Talk to each interaction category were equally distributed.

2) The degree of friendliness could be expanded to the extent that participants were able to develop a cooperative relationship among themselves.

3) Participants might find such a relationship more rewarding than they had experienced with the between-group images (Phase I). The general atmosphere of teleconferencing sessions at Phase II was relaxed and satisfying within-groups but relatively less agreeable and there was more tension between groups. The results of providing participants with facilities to view themselves and their neighbours on the other video screen encouraged the within-group interaction in a positive socio-emotional direction. However, the emphasis on task orientation remained to be the dominant activities during teleconferencing at Phase II.

There were two categories of image during teleconferencing at the present Phase II. The communication patterns of participants to these two categories were different. The first category of images (between-group images) was unavoidable due to the physical distance between groups. These images were analyzed in Phase I. The second category (within-group images) accounted for an alternative with which the participants within one group might communicate among themselves. (They might also communicate via the second monitor as opposed to the face-to-face interaction in the same studio). Detailed analyses of this organized communication will be discussed in Phase III.

4.4 COMPARISONS OF THE STYLES OF ORGANIZED COMMUNICATION

Phase III : 'Cross - Split' Arrangement

Phase III was designed to analyze specifically the nature of interaction when both teleconferencing groups appeared on the same screen (via split-screen devices) of their own monitor in each studio. Given the option of communicating with members in the same studio via the second monitor, participants might not (or might) prefer to converse using this alternative in order to avoid seeing themselves. However, at the present Phase III, participants faced an inescapable circumstance. They were viewing the images of themselves as well as the images of their within-group and between-group members on the same monitor. This system design created one special situation. Participants had to communicate with either of the two categories of images (between- and within- group images). On such an occasion, apart from the communication with physically distant between-group image, they were interacting with the perception of both 'within-group people' and their 'images', unless the participants should decide to withdraw from the teleconference discussion. The sense of unfamiliarity with such interaction styles and the degree of adjustment to the change constitute particular teleconferencing rituals.

4.4.1 Images Interacting with Images

At this phase, there were considerable frequency reductions (compared to Phase II) in some positive value categories of the total interaction: showing tension release, making jokes and laughs (1.85% : 14.67%), showing acceptance and concurrence (11.11% : 8.15%). However, frequencies increased in some negative value categories at Phase III compared to Phase II : showing rejection and withdrawal (5.56% : 2.72%), showing antagonism and defense (7.41% : 2.72%) (Fig.14 & 11).

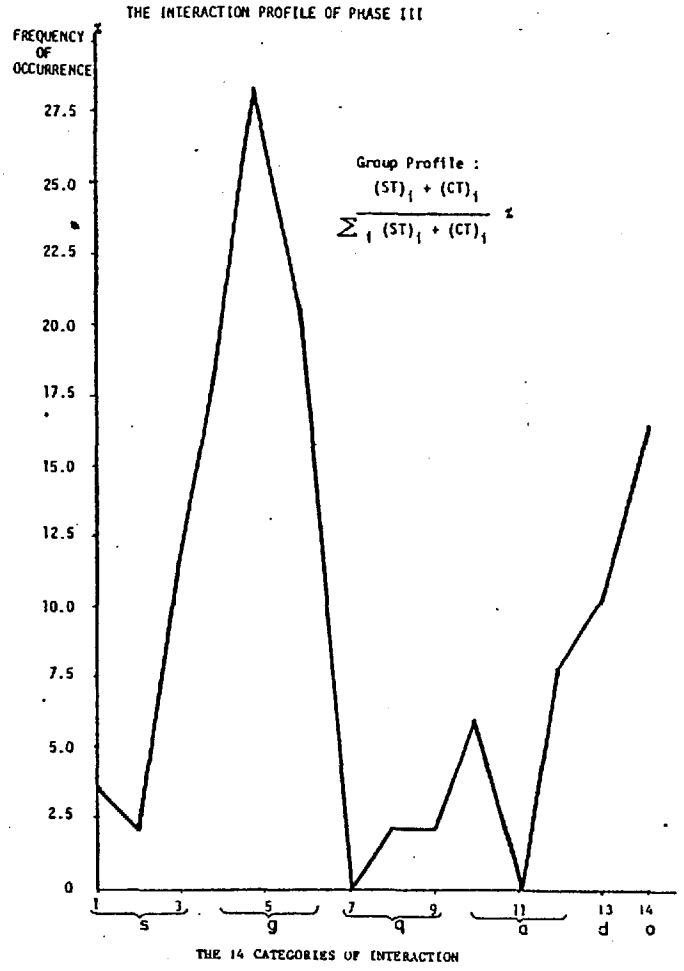

Fig.14 : Nature Profile of Phase III : 'Cross-Split' Arrangement

(Average of 5 Teleconferences)

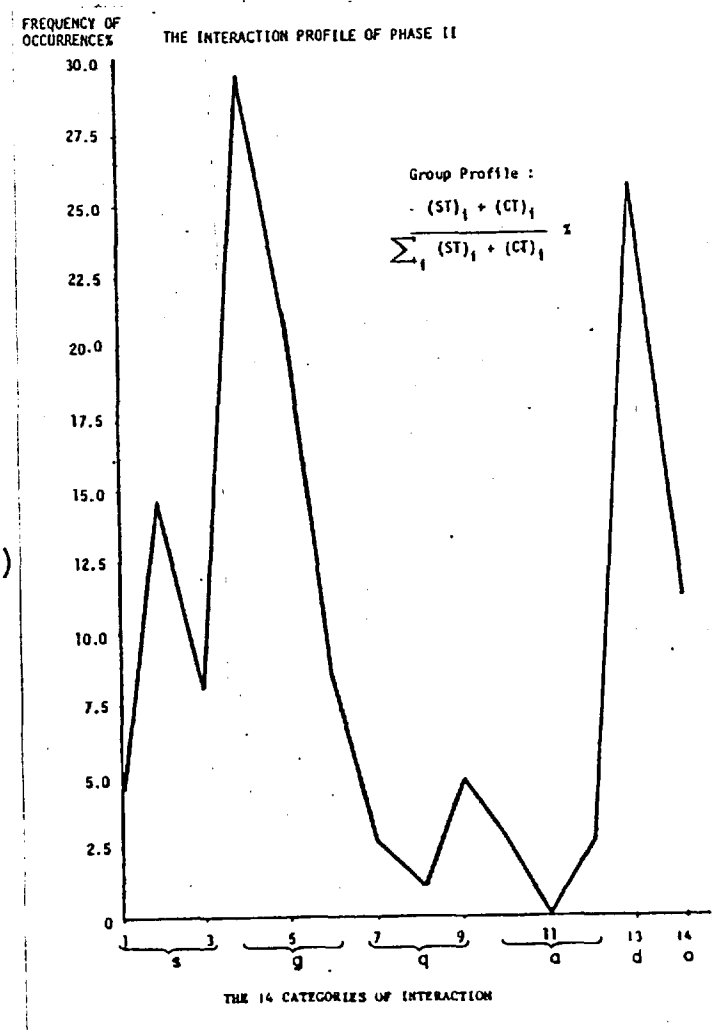

Fig.11 : Nature Profile of Phase II : 'Dual-Split'

(Average of 5 Teleconferences)

These results suggested a relatively hostile response when participants were communicating in the present 'Cross-Split' system. If task categories of Phase III were compared with those of Phase II in terms of frequencies of occurrence, for instance, to compare the total frequencies of : giving opinions, direction and making analysis (29.78% : 21.20%), giving orientations and supplying information (18.52% : 29.35%), the results showed that in both system designs ('Cross-Split' and 'Dual-Split' arrangements), the modes were task oriented. The implications of such an interaction profile could be explained in the following aspects.

The general atmosphere of the total of five sessions at this Phase III was tense and unbearable to some participants. Jokes were infrequent and sense of satisfaction was rarely shown. The nature of interaction with images was mostly toward a task purpose. The duration of each message fluctuated, so that only the method of 'continuous observation' could be employed to collect sampling data so as to prevent the risk of either losing short messages (less than 10 seconds) or over-weighing and emphasizing speech-like information (more than 30 seconds).

4.4.2 The Implications of the Participant Behaviour

These performance characteristics might be caused by :

1) The ignorance and uncertainty of participants who did not know and had no means of learning the 'unconventional' way to behave. This style of interaction was to communicate (among group participants) with two perceptions - as people being present in the studio as well as images on the video channel at the same time.

2) Participants had acquired no previous experience in establishing this particular kind of relationship. Therefore they were lacking the ability to predict the forthcoming development of the communication. Their self defensive mechanism subsequently urged them to initiate and to respond in an extremely cautious and concise manner. Jokes and

laughs were observed less (1.85% of the total interaction, Fig.14). Participants communicated within one studio only when necessary, for instance on such occasions as giving opinions or offering expert information (14.81% of total Side-Talk, 5.56% of total Cross-Talk) to solve a problem (Fig.15).

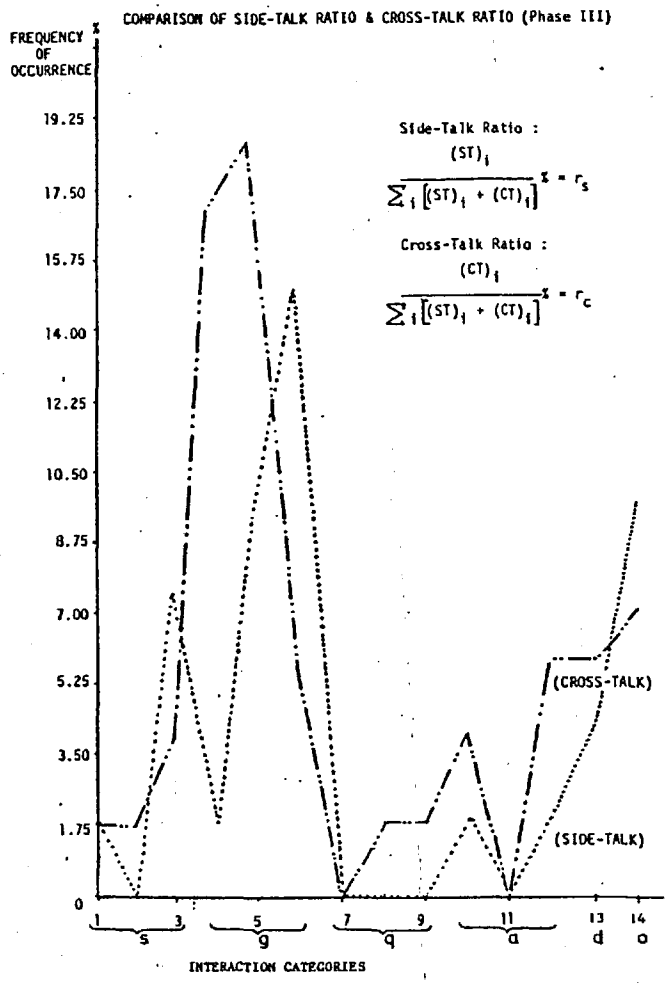

Fig.15 : Comparison of Side-Talk Ratio (st_i/sum) and Cross-Talk Ratio (ct_i/sum) at Phase III

3) 'Self Consciousness' was another crucial factor which affected the behaviour of teleconferencing. In this system design, it was impossible to avoid viewing one's own 'mirror' image; in order to 'look' and 'communicate' with either the between-group or the within-group images. Due to individual differences in preference and personality, some participants did not feel at ease and subsequently found this type of communication distracting and constrained. Symptoms of frustration and unconstructive aggression caused by this embarrassment were observed on many occasions while participants had lost control of their communication environment. For instance : showing tension and withdrawal (12.79% of total interaction)

from the process of teleconferencing were frequently recorded during the teleconferencing sessions (Fig.14)

4) Participants would also find themselves in the psychological state of 'anomie'![27] Participants sufferred a complete lack of guidelines and norms for interaction in such an alien environment and they felt powerless to control the communication progress and unable to perceive the intention and response of other members. The consequences of these uncertainties discouraged most of the participants from developing interpersonal relationships. Their teleconferencing behaviour was directed to the limited categories of task area (70.37% of total interaction s.l.= 0.05). Their socio -emotional expressions were supressed to the minimum (Fig.14) Finally they became an aggregate of isolaters.

5) Another common type of escaping behaviour from the system constraints was to concentrate on conversing face-to-face among the participants' own group. In some categories of interaction the frequency of Side-Talk was exceeding that of Cross-Talk (Fig.16, 17); (For instance, giving information : 72.73% > 27.27% at Phase III, 37.5% < 62.5% at Phase II; asking for confirmation : mostly Side-Talk in Phase III, 40% < 60% at Phase II.) However, there were more frequencies of showing antagonism and tension in Side-Talk rather than in Cross-Talk at the present Phase III; This was not true in the case of Phase II.

The general atmosphere of 'Cross-Split' arrangement was mainly task-oriented. Most participants were having a strong sense of self consciousness and were responding to the initiations submissively. The behaviour of passive acceptance was mostly dominating the process of teleconferencing, except in one case -- When participants did not know exactly how to respond to their within-group members whose images they were also communicating with on the screen, frustration arose as a consequence of these system constraints. In such a chaotic situation, a chairman (formal or informal) might be important to take up the leadership role to control the teleconferencing development.

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[1] The feeling of 'anomie' in an individual is a condition of hopelessness caused by breakdown of rules of conduct, loss of belief and purposes, or in a state of lawlessness.

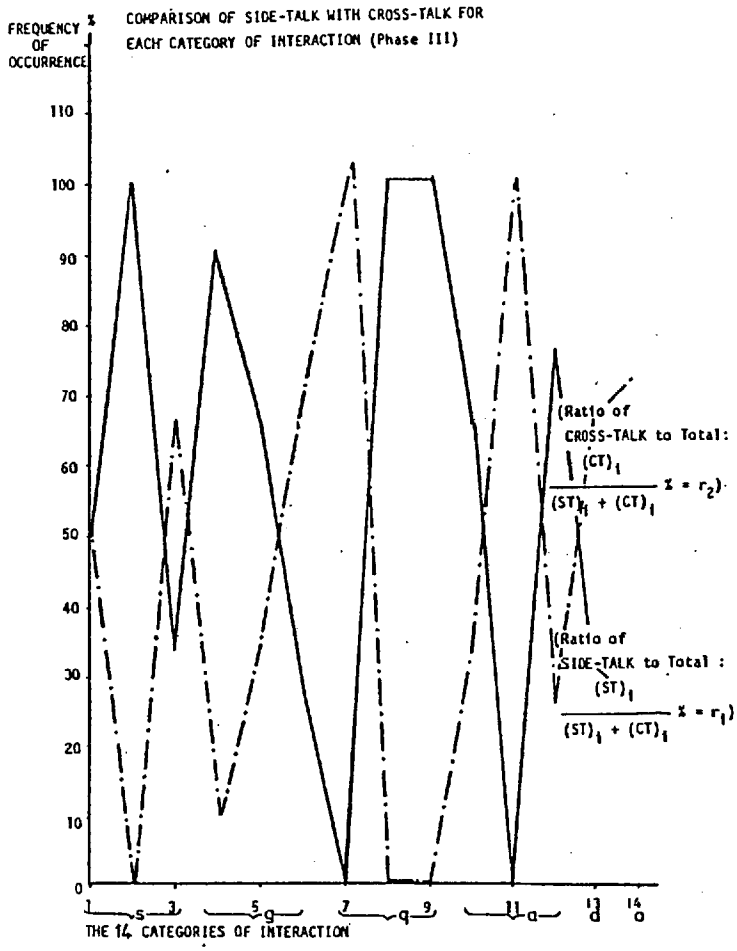
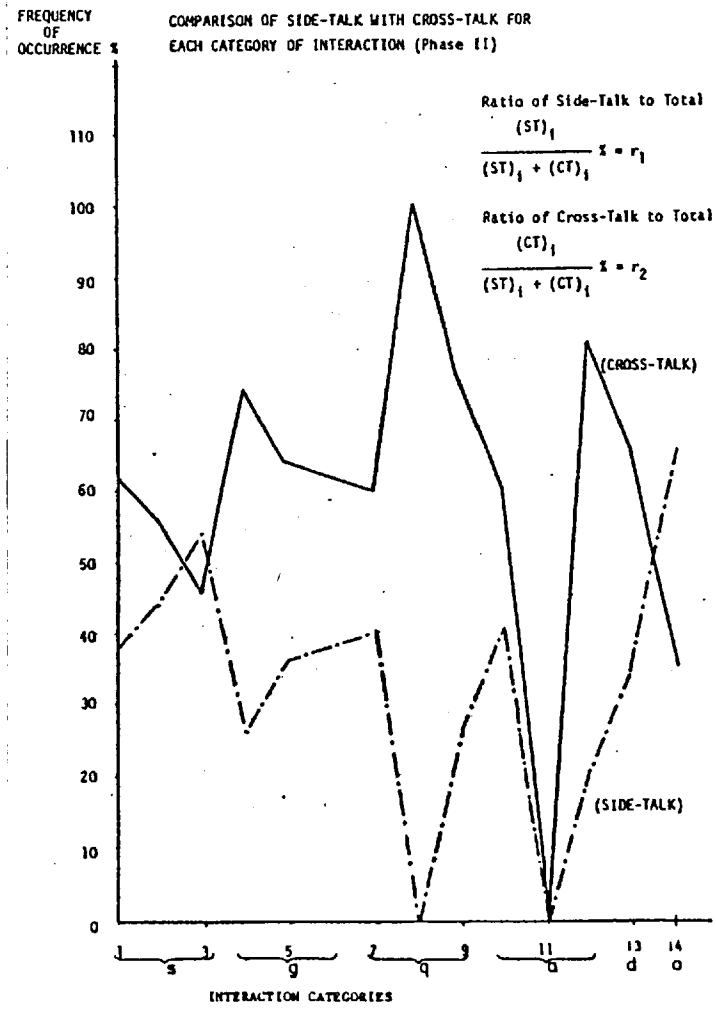


Fig.16 : Comparison of Ratios of Side-Talk $st_i/(st_i+ct_i)$ and Cross-Talk $ct_i/(st_i+ct_i)$ to Each Interaction Category at Phase III

Fig.17 : Comparison of Ratios of Side-Talk & Cross-Talk to Each Interaction Category at Phase II



4.5 SIGNIFICANCE OF THE CHAIRMAN BEHAVIOUR

Phase IV : 'Single - Chairman' Arrangement

4.5.1 The Selection of a Teleconference Chairman

Complex relations were observed between participants interacting with between-group and within-group images in Phase III. Group performance on such occasions referred to two indicators : 1) the efficiency of teleconferencing operations and 2) the motivational or emotional returns to the members of both teleconferencing groups. These indicators of group performance were actually reflections of the behaviour of a chairman and his influence on the group (both formally and informally). However, the traits of a leader and the role of a chairman which are necessary and effective in face-to-face group meetings may be different from those in the teleconferencing setting. This implies that the usual criteria and procedures for selecting a chairman or an emergent leader may not be suitable for the functions he (or she) needs to perform during teleconferencing. The two basic group functions are : the achievement of some specific teleconference objectives or goals, and the maintenance or strengthening of the teleconferencing system itself. Examples of the former are to initiate actions, keep members' attention on the goal, clarify issues, develop a procedural plan, evaluate the quality of the conference and make expert information available, etc.. Examples of the latter are to keep interpersonal relations between and within groups pleasant, assist participants in overcoming operational difficulties and distastes due to unfamiliarity with the system, provide encouragement, arbitrate disputes, stimulate initiations and self direction, increase the interdependence of within-group and between-group participants, and lastly but not least, give the 'minority' a chance to be heard.

In a normal face-to-face small group discussion it is always possible to differentiate between a person who stresses on task accomplishment and a person who satisfies the social and emotional needs of members (Bales and Slater[28], Fleishmann[29], etc.). However, in teleconferencing the roles of these specialists merge. A teleconference chairman must perform both types of activities and find a proper balance between these two requirements.

4.5.2 The Behaviour of a Teleconference Chairman and Other Group Members

It has often been asserted that groups display a tendency to preserve themselves whenever they encounter a threat to their existence. Such a threat makes a group to be more cohesive or preserved and this is especially valuable to the group[30]. The average results of 10 sessions at this Phase IV, depicted in figure 18, illustrate this point : compare the group profile of 29.03% (cummulative sum of columns within s for the case with a chairman) with that of 16.66% (no chairman). The observed interaction records suggested that the activities of a group with a chairman consisted of : showing solidarity, raising others' status and offering help and rewards to the members. The chairman performed the 'rescue' of group preservation with assumed responsibilities to strengthen the group's cohesiveness and resources.

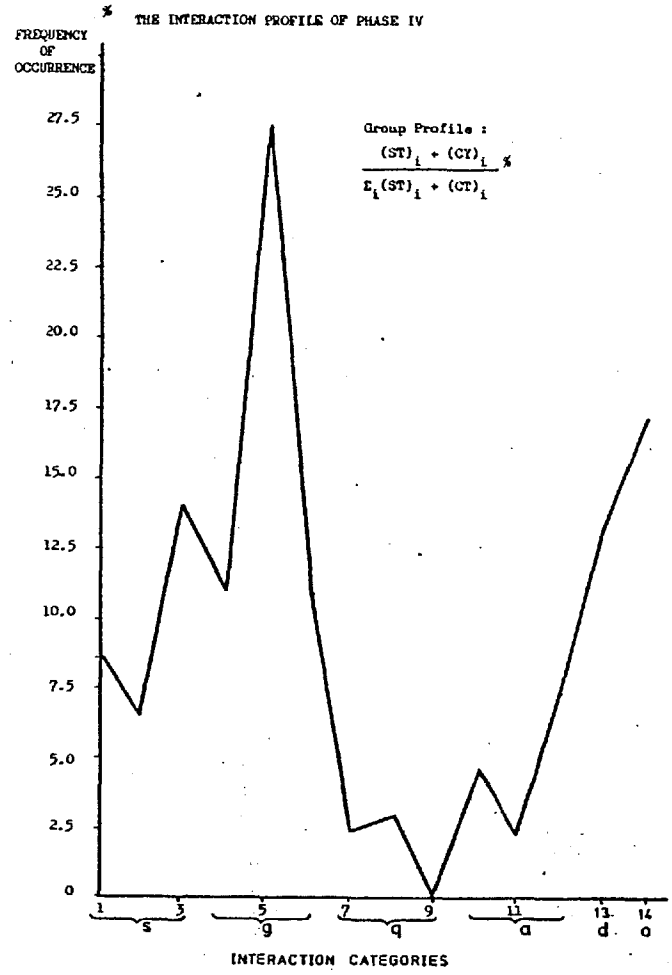


Fig.18 : Nature Profile of Phase IV

(Average of 10 Teleconferences)

For a similar reason, task accomplishment became very valuable to the teleconferencing groups. Participants located in two teleconference studios were given a topic to discuss. The chairman frequently led and channelled the interaction to a conclusion within a forty-minute session. Specific natures of interaction were observed when :

1) discussion topics became difficult in accordance with the increase in teleconferencing experience after a number of participations; or

2) interpersonal conflict was intense due to numerous system constraints (discussed in the previous 3 phases); or

3) unfamiliarity of individuals to communicate with images. The nature of discussion would likely be confined to the 'safe' activities; endless discussion (e.g. evaluating opinions) even though this made very little contribution to the task. However, it is difficult of course to determine definitely whether or not such escaping behaviour is making any actual contribution to the preservation of the teleconferencing group.

4.5.3 The Authority of a Teleconference Chairman

The second important function observed in a chairman-operated teleconference was the use of leadership authority. A teleconference chairman is recognized by his role of maintaining the progress and the course of events during the conference; and his ability to influence the attitudes and beliefs of members in the interacting groups. Through the authority of a chairman, teleconference activities were coordinated; and harmonious relations of group members (between-group and within-group) were established. A relatively even distribution of Side-Talk and Cross-Talk was recorded to illustrate this; (Side-Talk ratio : Cross-Talk ratio was 40.65% : 59.35% of the total interaction).

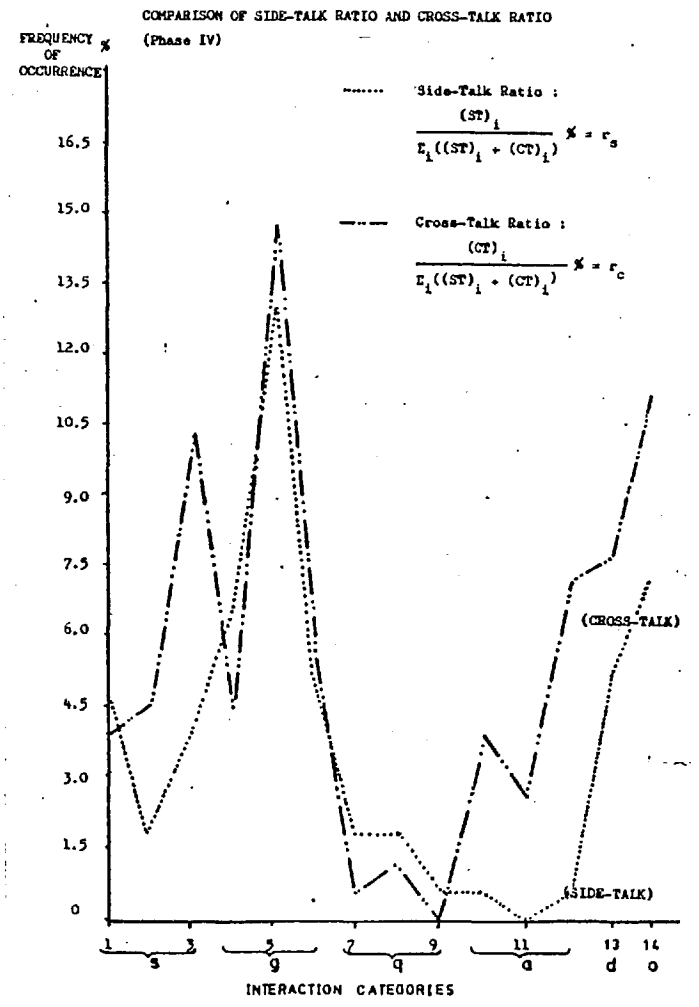


Fig.19 : Comparison of Side-Talk Ratio (st/sum) and Cross-Talk Ratio(ct/sum) of Phase IV

It should also be recognized that the authority given to a teleconference chairman should have at least five bases of power :

1) Reward Power is derived from the belief of group members that their initiation-attempts and responses to within- and between- group members will be rewarded.

2) Coercive Power arises to sooth antagonistic and destructive group behaviour as well as to 'punish' noncompliance.

3) Expert Power results when a chairman is experienced in all kinds of knowledge required for teleconferencing (e.g. operation, information or skills).

4) Referent Power is held by a chairman whom members like and can work with.

5) Legitimate Power is held as a right to influence the group. It is derived from e.g. election, appointment or other determinants.

If chairmanship of teleconferencing is effective, these bases of power must be assumed in order to obtain a successful control of the whole session.

4.5.4 Distribution of Functions Among Members

One direct consequence of having a teleconference chairman stemmed from the use of the authority and power. This was a relatively even distribution of Side-Talk and Cross-Talk to each category of teleconferencing behaviour (Fig.20). For instance, at Phase IV, the ratio of Side-Talk to Cross-Talk of giving suggesions was 58.82% : 41.08%, (but 10% : 90% at Phase III); giving opinions was 46.51% : 53.49%, (but 33.33% : 66.67% at Phase III); giving orientation was 47.06% : 52.94%, (but 62.73% : 27.27% at Phase III). Within-group and between-groups participants were given equal opportunities (either by self initiations or uder the chairman's direction) to communicate with each other (People-People and People-Images). Whereas in non-chairman teleconferences, frequencies of Cross-Talk in each nature was exceedingly

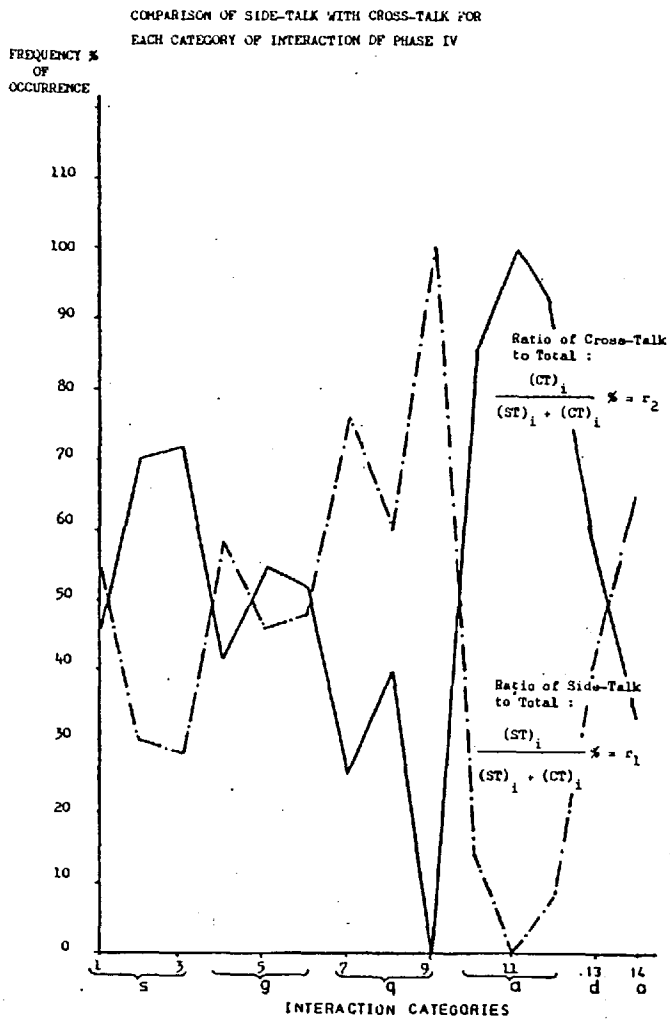


Fig.20 : Comparison of Ratios of Side-Talk $st_i/(st_i+ct_i)$ and Cross-Talk $ct_i/(st_i+ct_i)$ to Each Interaction Category at Phase IV

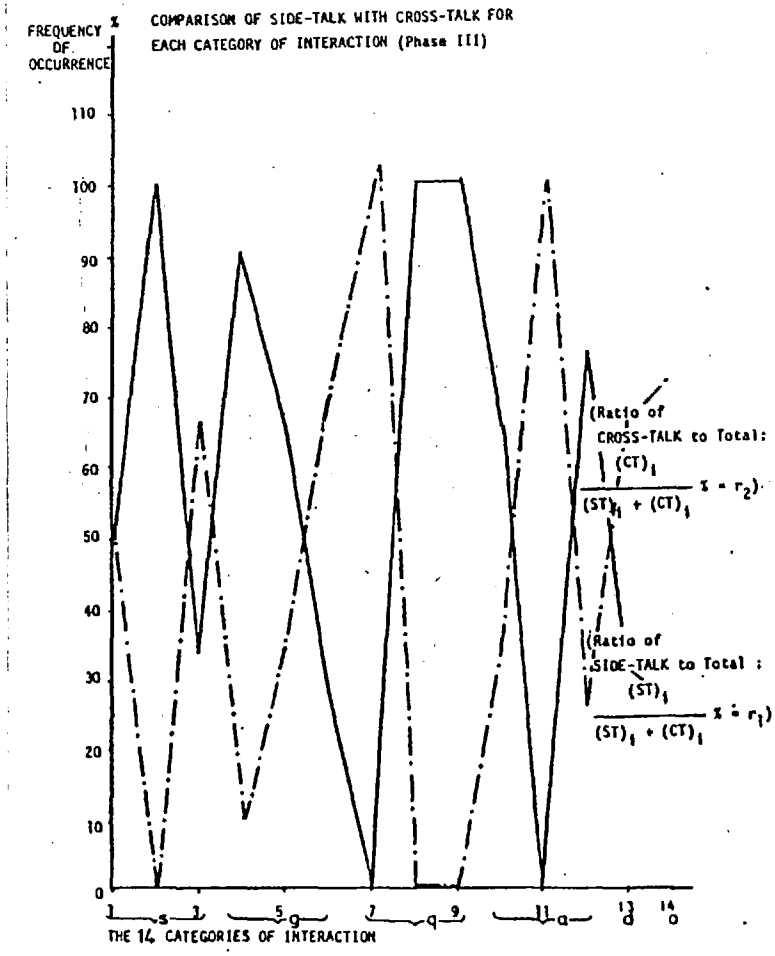


Fig.16 : Comparison of Ratios of Side-Talk & Cross-Talk to Each Interaction Category at Phase III

above those of Side-Talk. (Fig.16) Furthermore, in some socio-emotional categories, the Side-Talk vs.Cross-Talk ratios of each nature on the two occasions (with or without chairman) produced additional information.

In the situation when a chairman was assigned to a teleconference, the interaction of question and answering was mostly recorded in Side-Talk, (e.g. 75% in asking for information, 60% in asking for opinions, almost 100% in asking for suggestions). These indicated that group loyalty, mutual trust and cooperation were developing within a group. On the other hand, disagreement (85.7%), tension, antagonism (91.67%), self defense, withdrawal were observed mostly between teleconferencing groups. (Fig.20) These characteristics within a group (cooperation) and between groups (antagonism) were shown in a reversed style of group performances in the case of non-chairman teleconferencing. (Fig.20 & Fig.16)

If the group performance profile of Phase IV is compared with that of Phase III (or other non-chairman teleconferences), the Side-Talk vs. Cross-Talk ratios were 29.06% : 27.11% (with chairman) and 25.92% : 44.45% (without chairman) of the total task categories; and those were 11.53% : 13.55% (with chairman) and 12.96% : 16.66% (without chairman) of the total socio-emotional categories. (Fig.19 & Fig.15) The general phenomenon of Cross-Talk dominance during teleconferencing (without chairman) was dispersed when a chairman was present to control the progress and to execute his leadership authorities, by initiating and assigning opportunities to both groups. This characteristic was also shown in another aspect when the ratios of Side-Talk and Cross-Talk were compared to each of the performance profiles at two different phases in Section 4.5.4.

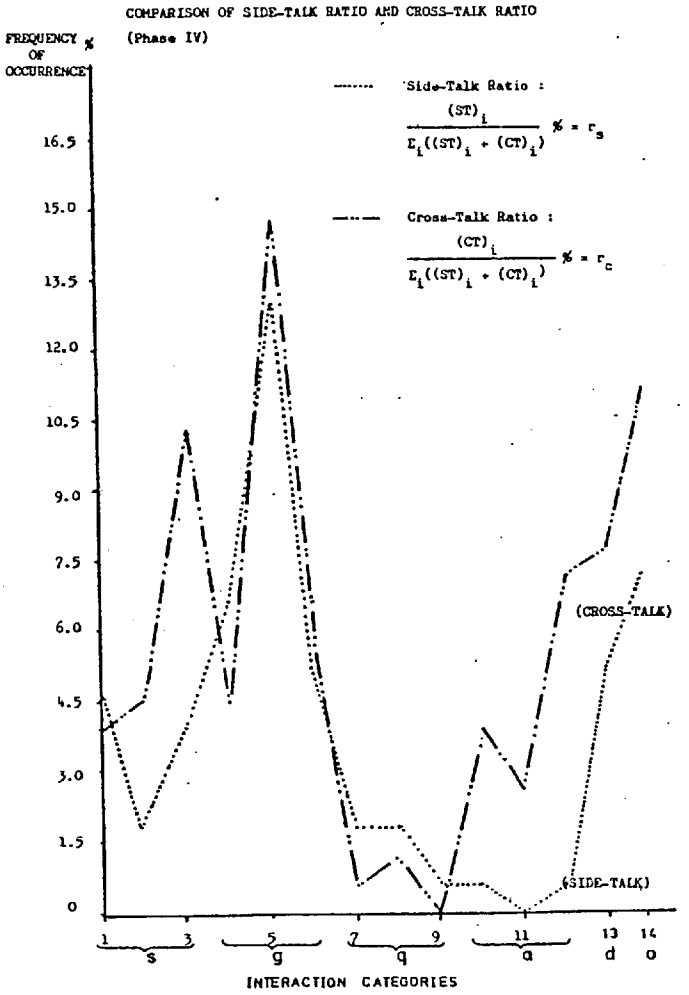


Fig.19 : Comparisons of Side-Talk Ratio (st/sum) and Cross-Talk Ratio (ct/sum) of Phase IV

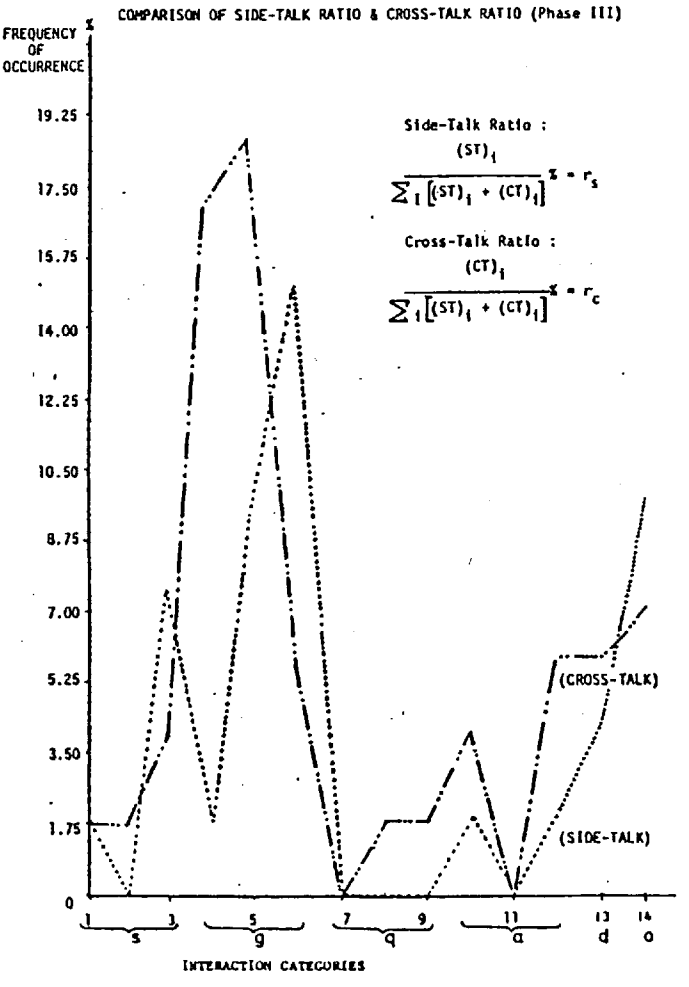


Fig.15 : Comparisons of Side-Talk Ratio & Cross-Talk Ratio of Phase III

However, the duration of each interaction varies. For instance the initiations and responses (in both task and emotional areas) of participants were made according to the requests of the chairman. Those were normally shorter than the self initiative expressions. Reactions of the former were normally much less than 10 seconds. 'Continuous observation' was used to sample the series of teleconferencing process with the hope of recording all messages.

The general atmosphere of individual teleconference sessions is highly influenced by two factors. They are :

1) the style of a chairman e.g. dominating vs. laisse-faire, authoritative vs. democratic, formal vs. informal, etc.; and
2) the members' attitudes toward their chairman e.g. satisfied vs. discontent, agreeing vs. challenging confident vs. suspicious, etc..

Every member or participant of teleconferences should be aware of the authority and the functions of a chairman who in turn should be able to perform them with considerable tact and with sufficient skills; in order to fit the members to the system and adjust the system to fit the members.

4.6 GENERAL COMPARISONS OF THE 4 TELECONFERENCING PHASES

Certain characteristics of the general atmosphere of teleconferencing have been analyzed in the previous sections. The major features are highlighted below :

1) Four phases of the teleconferencing system : 'Single-Single', 'Dual-Split', 'Cross-Split' and 'Single-Chairman' were included in 28 sessions of the experiment.

2) Observations of these teleconferences were conducted in 3 interval-samplings : 'Continuous Observation', '10 seconds' and '30 seconds' interval-samplings.

3) Messages of each teleconference session (of 40 minutes) were classified in terms of 6 interaction components :'showing solidarity' (s),'giving'(g) and 'asking'(q) information, etc., 'showing antagonism'(a) , being 'dominant'(d)and 'obedient'(o). These components represent 14 categories of interaction and may further be regarded as the 6 extreme points of 3 Vector axes :'Nature'(N),'Value'(V) and 'Style'(S).

4) Any one 'message' during teleconferencing corresponds to a vector in the space. The totality of these vectors subsequently describes the atmosphere of a particular teleconferencing session.

5) The general atmosphere of the teleconference phases can be depicted by two dimensional 'Group Profiles'.

6) The distinction of 'Within-Group' (Side-Talk) and 'Between-Group' (Cross-Talk) teleconferencing was a major basis of comparisons, in addition to the 'Vector Analysis' and 'Interaction-Variables Analyses'.

7) General comparisons of the 4 teleconferencing phases are shown in Table 4 with Figures 10, 21, 22, 23.

PHASE / INDICATOR	I	II	III	IV
System Arrangement	Single - Single	Dual - Split	Cross - Split	Single - Chairman
Atmosphere	Emotion Oriented (54.83% of the Total Interaction s.l. = .10)	Task Oriented (67.41% of the Total Interaction s.l. = .10)	Task Oriented (70.37% of the Total Interaction s.l. = .05)	Emotion & Task (depending on Total Interaction)
Distribution of Expression	Non- Random	Random	Non- Random	Random
Major Vectors				
'Nature'	Show Acceptance & Opinion Giving (23% & 30% of the Total Interaction*)	Opinion Giving & Suggestion (21.2% & 29.35% of Total Interaction**)	Asking & Giving Opinions & Information (27.78% & 20.37% of Total Interaction)	Asking & Giving Opinions (11.77% & 28.67% of Total Interaction)
'Style'	Positive Dominant	Positive Dominant	Submissive	Legitimate Authority
'Value'	Show Agreement (22% of the Total Interaction**)	Show Tension Release (14.67% of the Total Interaction)	Show Tension & (12.79% of the Total Interaction*)	Show Agreement & Disagreement
	Level of Significance : * = .10 ** = .02			
Ratio of Side-Talk vs. Cross-Talk to Total Interaction	CT> ST (28.38% : 71.62%)	CT > ST (34.78% : 65.22%)	CT > ST (38.89% : 61.11%**)	CT ≒ ST (40.64% : 59.35%)
	Level of Significance : ** = .02			
Interaction Mode				
'Side-Talk'	Show Agreement	Show Solidarity	Show Passive Acceptance & Self Consciousness	Individual Response to the Chairman
'Cross-Talk'	Tendency to Debate	Show Tension	Repetition of Information	- do -
Interaction Variable	'People vs. Images'	'Relaxation vs. Tension'	'Convenience vs. Constraints'	'Cooperation vs. Antagonism'

Table 4 : General Comparisons of the 4 Teleconference Phases

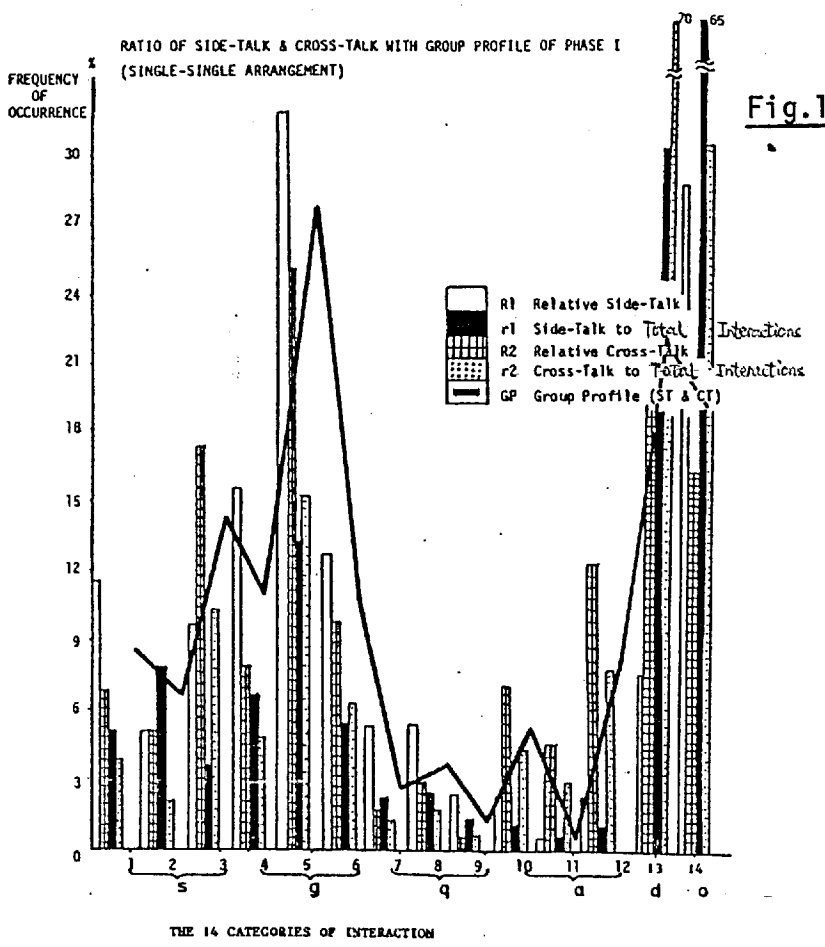


Fig.10 : The Group Performance Profiles of Phase I

(No-Chairman)

'Single-Single'

(Average of 8 Teleconferences)

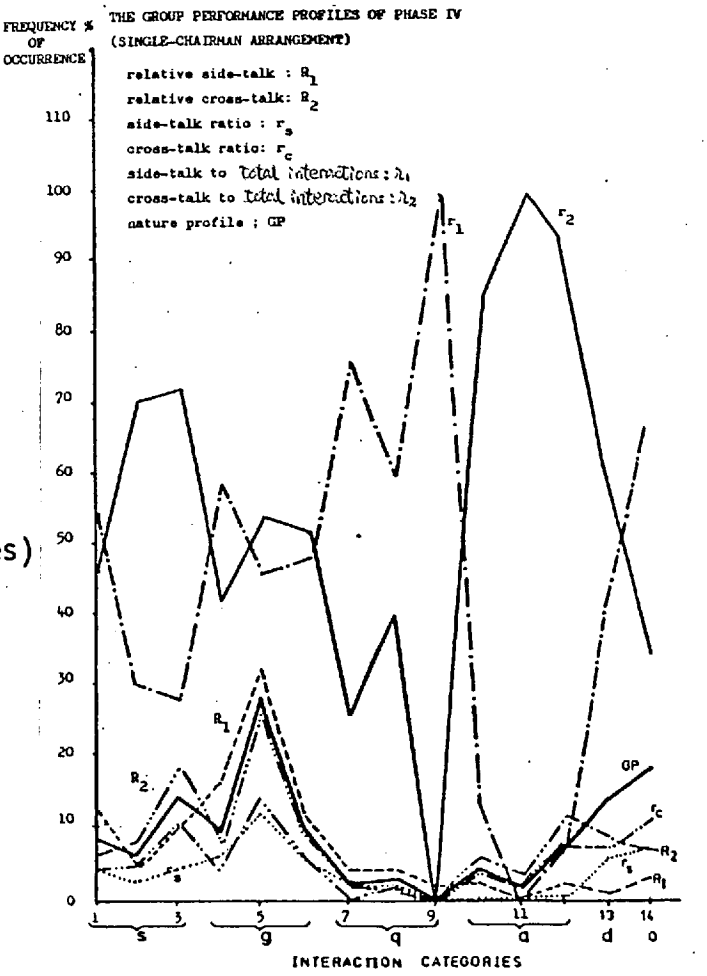


Fig. 21 : The Group Performance Profiles of Phase IV

(With Chairman)

'Single-Chairman'

(Average of 10 Teleconferences)

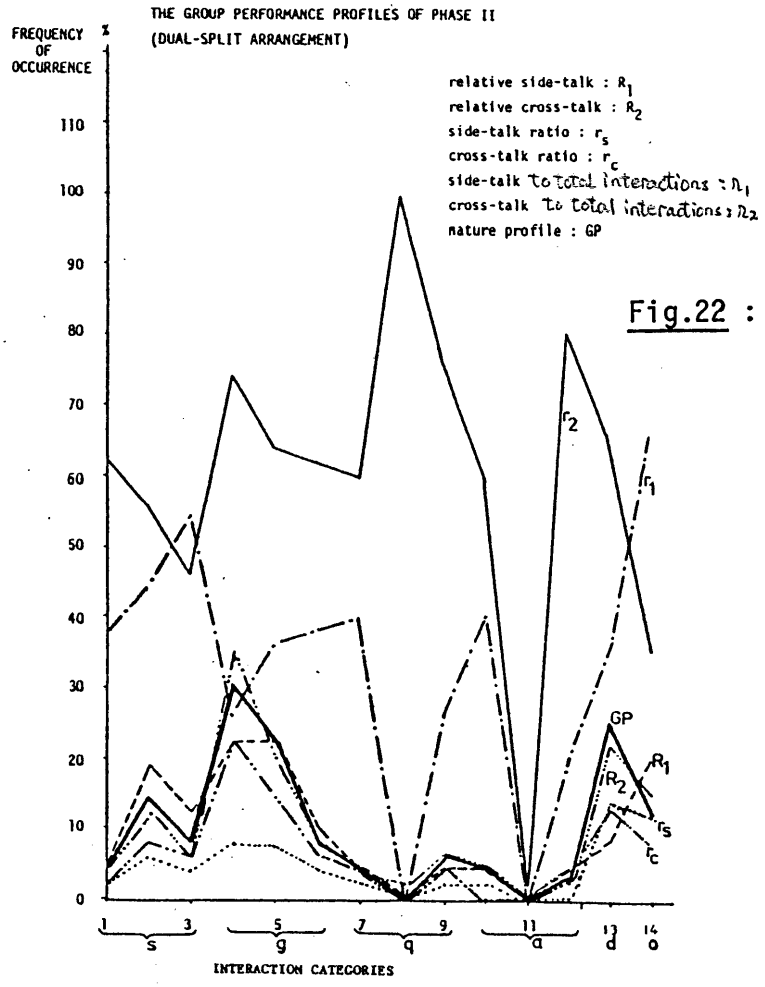


Fig.22 : The Group Performance Profiles of Phase II

'Dual-Split'

(Average of 5 Teleconferences)

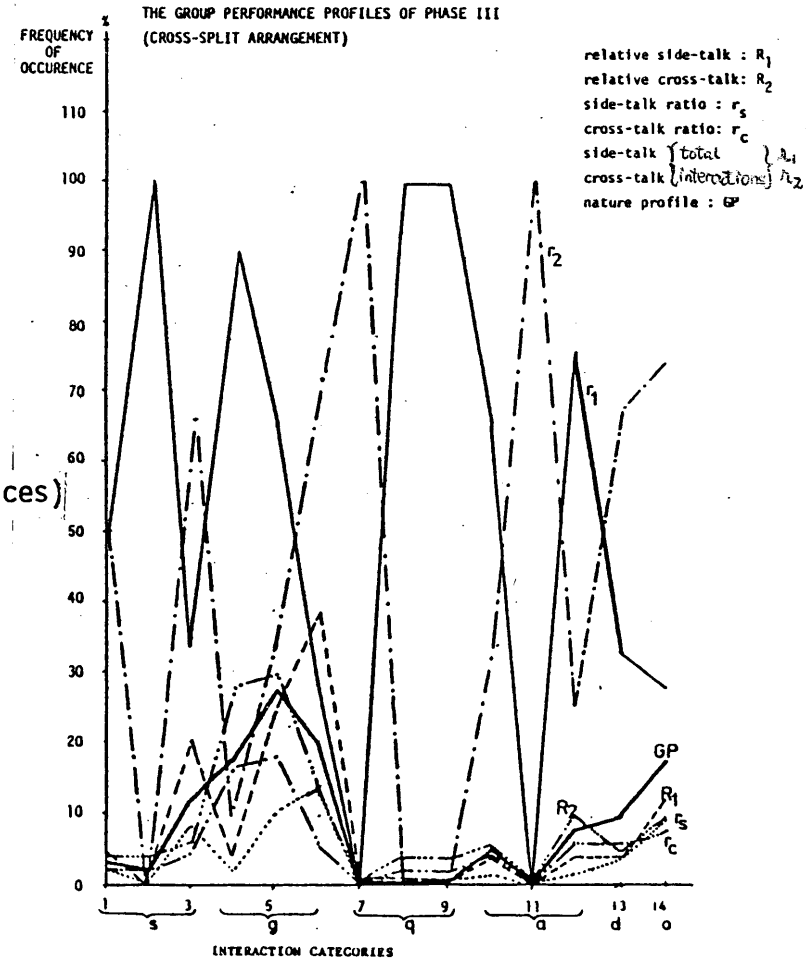


Fig.23 : The Group Performance Profiles of Phase III

'Cross-Split'

(Average of 5 Teleconferences)

Phase I : 'Single - Single' Arrangement

1) The frequency of between-group interactions was exceeding that of the within group interaction,. This high frequency of between-group interactions indicated that participants were strongly attracted to the 'novel' style of conversing with distant 'images' of sight and sound.

2) Participants' attitudes toward communicating with 'people' and 'images', their established relationships and responsibility, the development of mutual trust and group loyality and the choice of communication, etc. are highly influenced by such unusual communication rituals.

Phase II : 'Dual - Split' Arrangement

1) The frequency of within-group communications increased when the system arrangement allowed participants to view not only the images of their counterparts in other studio(s) but also the 'images' of their within-group members shown, on the second monitor in their own studio.

2) The characteristic of within-group members who were having the properties of both 'people and 'things' was a new feature of teleconferencing.

3) The degrees of showing relaxation or tension within-group and between-group suggested a potential development of teleconferencing patterns.

4) Participants were gradually overcoming certain operational constraints or difficulties. Then they would consequently feel more relaxed and less distastful of using the system. Teleconference participants were accustomed to the method and style of teleconferencing through practice, self-familiarization with the system.

Phase III : 'Cross - Split' Arrangement

1) This phase was designed to amplify the above findings of Phase II.

2) The sense of self awareness and group loyalty arose when participants were facing an 'inescapable' situation to view themselves, their own group, together with other group-images on the same screen.

3) The unfamiliar interaction styles : e.g. the dual perceptions of 'within-group people' who were also 'within-group images', the self awareness and embarrassment and the degree of adjustment to the change, etc. constituted particular teleconferencing rituals.

Phase IV : 'Single - Chairman' Arrangement

1) Teleconference participants had minimal frame of reference or norm to behave and interact in such a foreign situation. They found the communication inconvenient.

2) Uncertainty about the teleconferencing development gave rise to a strong defensive mechanism in some participants. The feeling of normlessness and powerlessness to work in an alien environment might cause passive withdrawal from the teleconferencing communication.

3) It is essential for a teleconference chairman to have a well defined role and legitimate authority in order to monitor the communicating processes and teleconferencing procedures.

Teleconferencing is a 'novel' style of communication. It is far from being ritualized as is conventional face-to-face interaction. However certain types of distinctive teleconferencing behaviour was observed and interpreted in detail in this chapter. Despite the limited available manpower and resources, the

analyses of within-group and between-group teleconferencing have been conducted with a considerable degree of comprehensiveness. However these analyses should not be assumed to be sufficiently exhaustive to reach an ultimate generalization. After all, the development of the human aspect of communication is still in its infancy compared to other 'conventional' aspects related to the development and control of machines. It is this author's contention that an accumulative effort is necessary to attain a significant achievement in this seemingly unexplored area. The success of a communication system relies on an effective match between users and systems. The effect of an User-System integration is therefore of paramount importance.

Chapter 5 THE EFFECTS OF USER-SYSTEM INTEGRATION

Summary

The objective of this chapter is to assess the generalized applicability of teleconferencing systems. Two approaches : a subjective Vector Analysis and an objective Questionnaire Answering were chosen (App.5) to make such evaluations. 'People', 'Technologies' and 'Organizational Processes and Structures' are the three interrelated system components. System cost-effectiveness is achieved by formulating and implementing this criterion framework of 'Fitting the Users to the System and Fitting the System to the Users'.

The analyses show that teleconferencing behaviour can be interpreted as emotional effects and attitudes of participants; such as 'People vs. Images', 'Relaxation vs. Tension', 'Convenience vs. Constraints' and 'Cooperation vs. Antagonism'. These four pairs of Interaction Variables have been deduced from the studies of 28 sessions of cross-cultural teleconferencing messages and 7 sets of questionnaire-answers. It is the teleconference system itself that is being analyzed and evaluated at this stage, not its specific values for different types of conference.

The chapter concludes with certain statistical difficulties encountered during the analyses together with the author's belief and recommendations for designing and developing teleconferencing systems.

5.1 THE IMPLICATIONS OF TELECONFERENCING AS A PEOPLE-IMAGES COMMUNICATION SYSTEM[31]

Investigations of 'novel' styles of communication, by means of audio or audio-video aids have attracted the interests of many multidisciplinary experts. However, cultural, economic and technical constraints have limited their probable and possible applications. Therefore studies of specific modes of communication, of planning and of the understanding of users' behaviour and attitudes are essential and conducted. The implications of these factors suggest some reliable estimates of the possibility and degree successful implication of this 'unconventional' communication style. Furthermore, the need for this investigation is reinforced by the significant demand for personnel training and system maintenance at all levels, in telecommunication enterprise and administrations. The ultimate purpose is to reach a stable user-system integration. Hence, the level of users' needs and behaviour should be ascertained together with the flexible design of appropriate user training strategies for such systems. It is not only essential to consider the sequence of interactive processes as a dynamic system of man-machine interaction; for these perspectives, it is also necessary to understand the change and development in users and interaction processes, with their implications, before technology can be applied to achieve maximum compatibility (Fig.24)

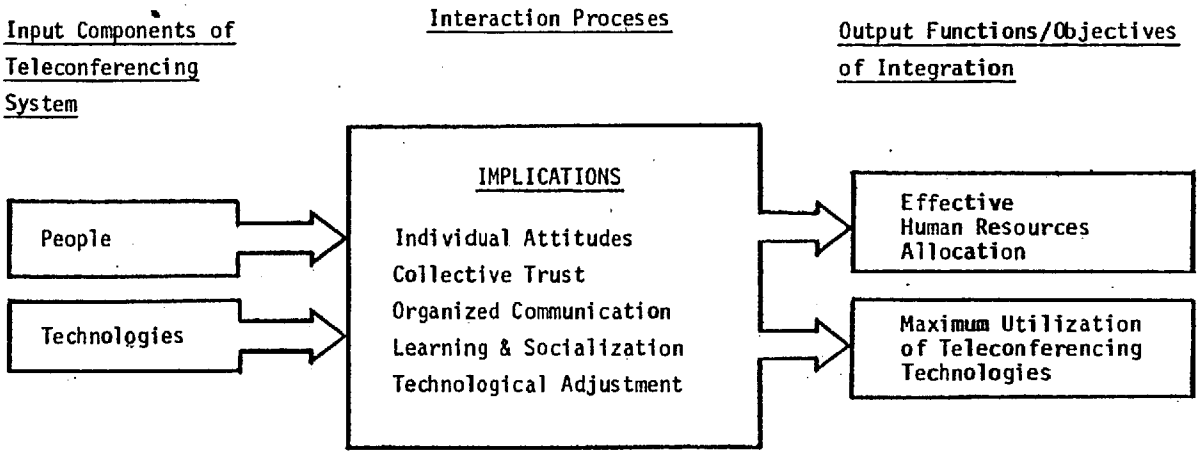


Fig.24 : The Integration of a Man-Machine Teleconferencing System

5.2 THE EVALUATION PROCEDURES

The overall Group Performance Profiles of four teleconferencing phases were presented (in Chapter 4) with detailed discussion of within-group and between-group distinctions. Two approaches of evaluation of such performance profiles will be emphasized in this chapter. They are :

1) a subjective observation of a 5-point sematic differential vector analysis, and

2) an objective questionnaire-answering of the participants.

Their functions are to study :

1) the teleconferencing 'messages' in terms of the six components (solidarity, antagonism, giving, asking, dominant and obedient) of the three vectors (Nature, Value and Style) and

2) the 'attitudes' of ninty-two teleconference participants toward the 'novel' style of communication.

5.2.1. The Vector Analysis

The observation and analytical processes for the 28 teleconferences (in 4 phases) with 4-5 participants in each studio were completely the same. Teleconference messages were recorded and classified according to the 6 vector components. They were measured on a 5 point scale of each axis. The average scores of each vector component described the teleconferencing atmosphere of each phase. They were as a whole varied, depending on the four particular system arrangements (Fig.25)

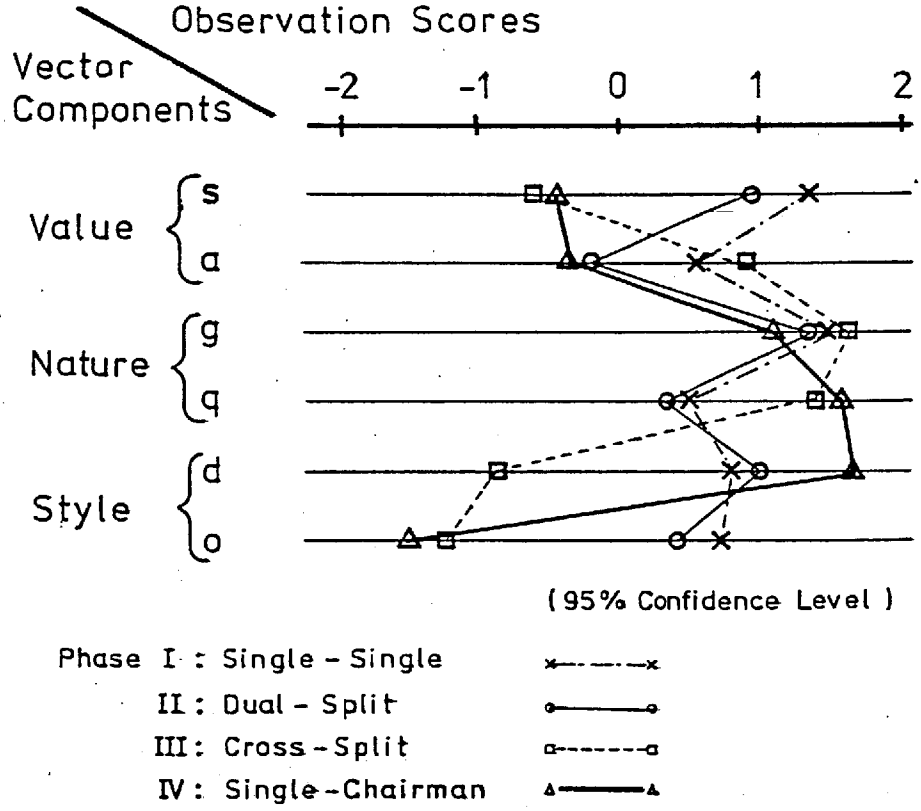


Fig.25 : Observation Scores for each Vector Component
(4 Teleconferencing Phases)

1) From these results, teleconferencing was (in 4 phases of arrangement) considered to be quite satisfactory for task-performance.

2) Participants were more relaxed and accustomed to the idea that they could 'choose' to view the 'images' of themselves and their 'within-group members' on a distant monitor (Phase II) rather than on the same screen with their 'between-group' images (Phase III).

3) Antagonism were shown when participants felt uncertain and unwilling to handle the teleconferencing processes. These might be caused by unskillful conferencing techniques and inexperienced operations in teleconferencing; for instance, their ignorance and unfamiliarity in communicating with an 'image' which has the properties of both a 'person' and a 'thing'.

4) The sense of 'physical distance' associated with 'images' on the screen also created a 'psychological distance' between teleconferencing participants. This sense of 'separateness' prohibited the development of mutual trust and confidence between and among participants. A sceptical style of interaction was observed.

5) The communicative mood of teleconferencing could be 'anti-social' and 'unfriendly' when the role of a chairman was not clear to all participants, or the chairman did not get acceptance from his members.

6) Teleconferencing might degrade the communicative mood when the participants were separated into two studios, and it made the participants lose interest. People felt it difficult to handle the communication themselves, though it was considered to be a modern and efficient means of communication.

7) The format of 'debating' arose because the spatially separated condition made the participants feel rather 'opposed' to each other as well as 'artificial' and 'unnatural'.

8) Skilful and experienced operational techniques were the basic aptitudes of teleconferencing participants, in particular the chairman. Efficiency and interest shown in participating in teleconference were highly affected by these factors.

There are many kinds of approach to the study and evaluation of teleconferencing. In addition to the subjective observation, the questionnaire was a complementary tool for investigating the psychological aspects of the teleconference participants in a relatively objective way.

5.2.2 The Interaction Variables Analyses

Sixteen pairs of interaction-adjustives were derived from the six vector components (s/a, g/q, d/o); such as 'far vs. near', 'comfortable vs. tiresome', 'artificial vs. spontaneous', etc.. Teleconference participants were asked to take part in simulated conferences and to check each of the seven set of semantic differential questionnaire, which contain a total of 114 items after the teleconferences were completed. The 114 items were elaborations of the 16 pairs of interaction-adjectives. Each set of the questionnaire was carefully designed to include numerous interaction-adjustives of the six vector components. Data from the questionnaire were analyzed by Interaction Variable Analyses. (The 7 sets of questionnaire are presented in Appendix 5).

Four phases of teleconference with a total of 28 sessions were held successively. Participants of each session were rating an average of sixteen interaction-adjectives in terms of 5-point scales. Some of them were listed in Table 5 below. The significant interaction-adjectives are listed in decreasing order of variance.

The four pairs of Interaction-Variables were obtained by collecting the factors of each pair of interaction-adjectives which had close correlation with each other. The Interaction Variable Analyses were extracted from the 16 × 16 correlation matrix. This matrix was derived from the factor scores rated in the 114 item questionnaire on 16 pairs of the interaction-adjectives.

INTERACTION VARIABLES	INTERACTION - ADJECTIVES (1 .....5)	FACTOR LOADINGS (Correlation Factors to the Interaction-Variables)	CONTRIBUTION TO THE TOTAL VARIANCE
1. People vs. Images	Artificial vs. Spontaneous	0.82	43.4%
	Separated vs. Acquainted	0.79	
	Uncertain vs. Certain	0.61	
2. Relaxation vs. Tension	Tiresome vs. Comfortable	0.74	23.4%
	Vigorless vs. Lively	0.69	
	Excited vs. Calm	0.67	
3. Convenience vs. Constraints	Difficult vs. Easy	0.66	8.5%
	Unaccustomed vs. Accustomed	0.52	
	Inexperienced vs. Experienced	0.51	
4. Cooperation vs. Antagonism	Antisocial vs. Socialable	0.61	8.3%
	Irritated vs. Relieved	0.52	
	Dominant vs. Obedient	0.52	

Table 5 : Results of the 4 Interaction-Variables Analyses

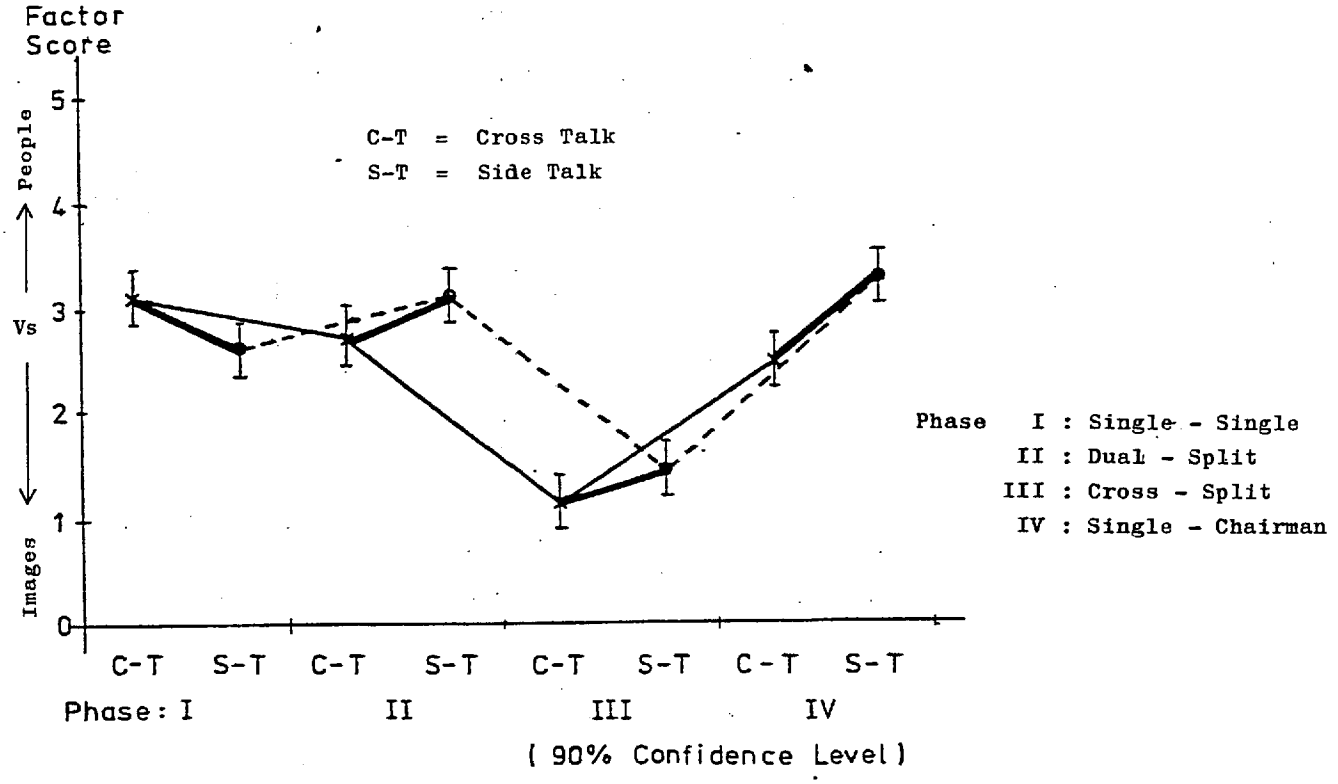
5.3 THE INTERACTION-VARIABLES

5.3.1 'People vs. Images' - Collective Trust in the Social Relationships

The first Interaction-Variable -- 'People vs. Images' had close correlations to the pairs of interaction-adjectives, e.g. 'artificial vs. spontaneous', 'separated vs. close', etc. (correlation factor : 0.82). Its correlation factor to the factor scores obtained from evaluation of the teleconferences as a whole was 0.76. The 'contribution factor' (43.4%) represented the ratio of its variance to the total variances. Therefore, it meant that almost half of the evaluation differences in four phases (28 sessions) of the teleconferences was represented by this 'People vs. Images' Interaction-Variable.

The score on each Interaction-Variable varied with the different aspects of emphases. According to the present results, the first Interaction-Variable showed that 'People vs. Images' was the general characteristic of the overall impression of the teleconferences conducted. There were psychological and operational characteristics of teleconferencing. Differences between the relationships of a speaker to another speaker physically present, compared to that between one speaker and a television image were significant. Loudspeaker voices and television images were not 'people' but might have some qualities of 'things'. Relationships, attitudes, moods and the sense of 'realism' of 'images' were vital factors in the conduct of meetings.

A 't' distribution was used to compare the view of the participants in four phases on their Social Relationships with other members at the same physical location and remote-user-images. A distribution of 'People vs.Images' was drawn at the confidence level of 90%. That was a significant difference in respect to possible trust and confidence developed during the teleconference interaction processes (Fig.26).



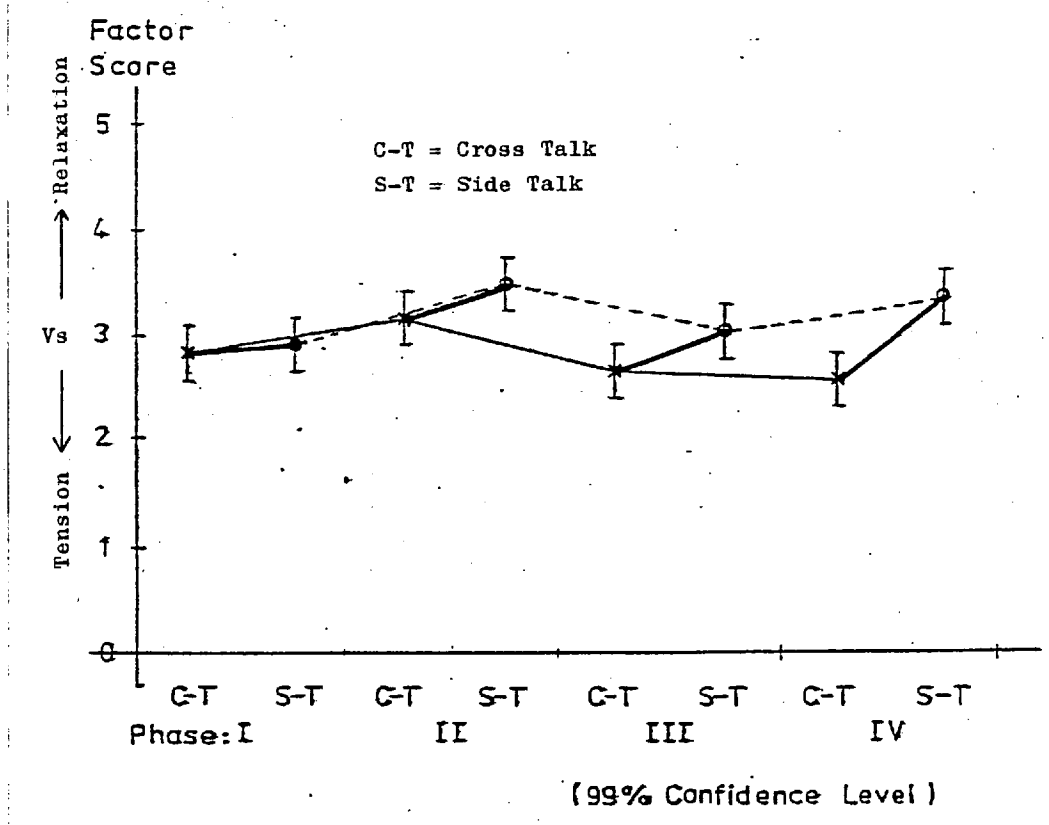
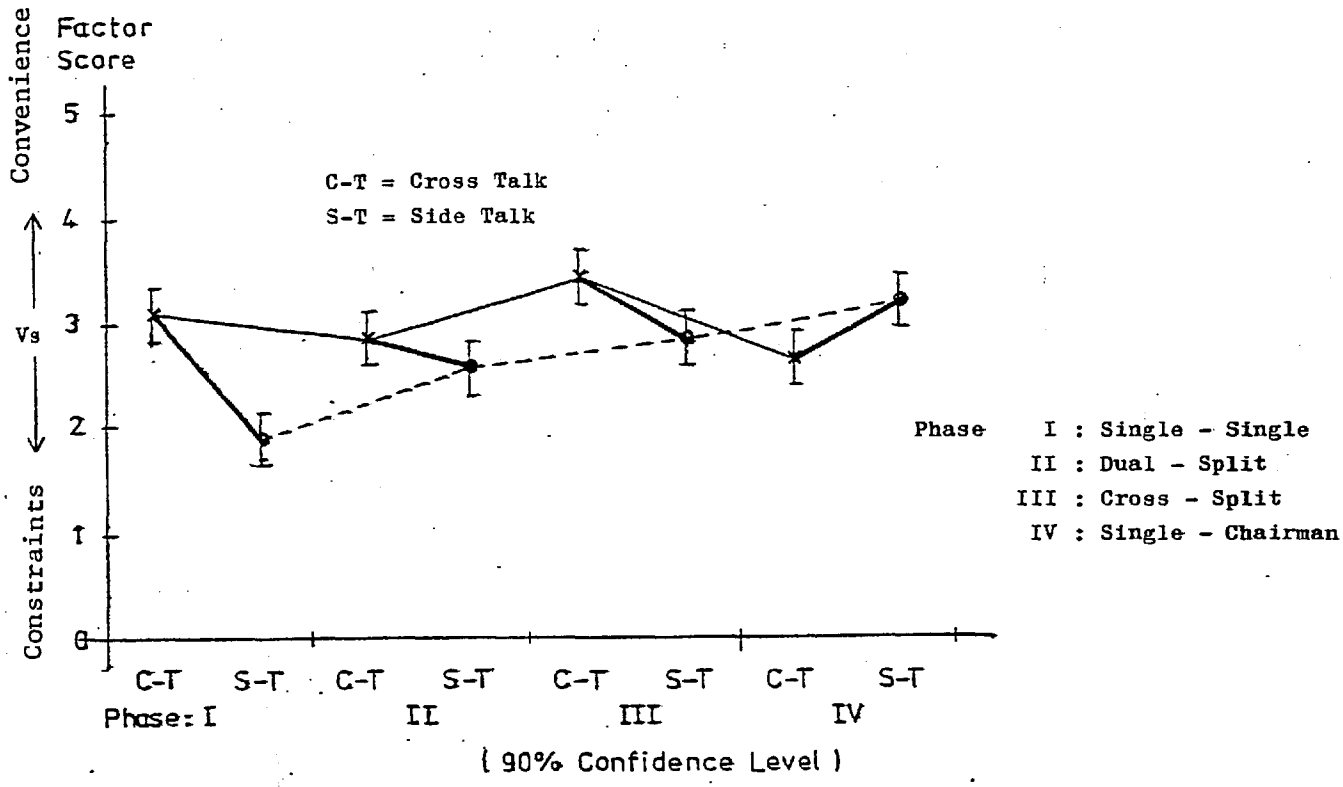


Fig.26a : Comparisons of the 4 Interaction-Variables for the 4 Phases of Teleconferencing



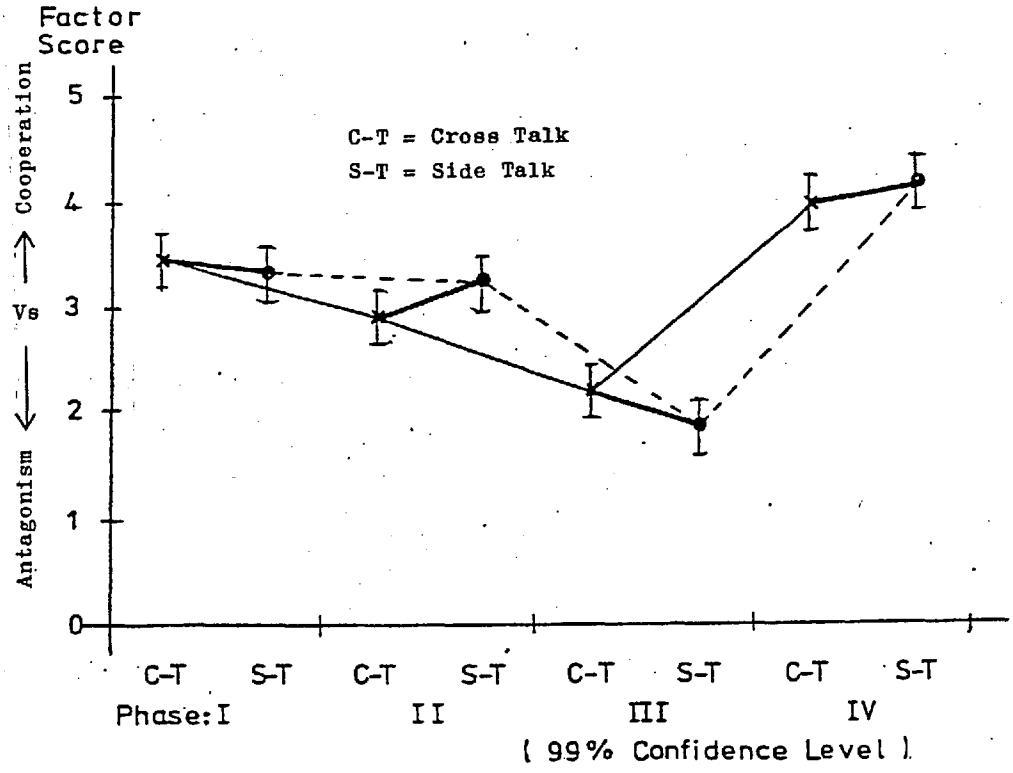


Fig.26b : Comparisons of the 4 Interaction-Variables for the 4 Phases of Teleconferencing

5.3.2 'Relaxation vs. Tension' - Individual Attitudes towards Participant Satisfactions

The distinction of individual attitudes and feelings towards the teleconferencing system was mainly based on two criteria. They were the sense of familiarity with the operation processes and participants, as well as the feeling of ease and comfort during the interaction. In order to achieve maximum output functions and objectives of such a communicating system, it was very important to create a lively and relaxed atmosphere during the conferencing processes. For example, participants might feel 'indifferent' to the expressions of their interaction partners while they were watching the images on the monitor(s).

Two criteria inherent in this aspect were considered. The feeling of relaxation could be attained by the least degree of personnel training (this will be elaborated in Chapter 6). On the other hand, the demand for teleconference system maintenance at all levels, in telecommunication enterprise and administration was equally necessary. The results (Table 5) showed that the Interaction Variable : 'Relaxation vs. Tension' contributed 23.4% to the total variance. This was quite different from the first Interaction Variable ('People vs. Images'), where the emotional effects occupied a large part of the total variance. A general comparison of the four teleconferencing phases on this Interaction Variable will be shown in Figure 26.

5.3.3 'Convenience vs. Constraints' - The Styles of Organized Communications

Various factors were influencing this Interaction Variable. Geographical distance to travel to the teleconference studio, timing arrangement to attend the meeting, the nature and suitability of the conference itself, the requirement for displaying documents and drawings through the system, simplicity of the system design, techniques to operate the system, etc., were the main features for consideration. The major criteria for evaluating this aspect of teleconferencing then relied on the outcome of efficiency, facilities impression, ease of operation and experience, etc.. Their contribution to the total variance (8.5%) and individual correlation factors to the Interaction Variable ('Convenience vs. Constraints') were presented in Table 5. Furthermore, cultural, economic and technical constraints may also limit the probable and possible applications of the teleconferencing system. Therefore studies of its specific modes of communication, of its planning and of the users' behaviour and attitudes are essential to estimating the degree of successful implementation of this 'unconventional' communication style. Social adjustment and planning for quality, level and types of human resouces and of capital investment require further investigations.

5.3.4 'Cooperation vs. Antagonism' - The Chairman-Members Relationships

To base on the 'Fitting the User to the System and Fitting the System to the User' (FUS-FSU) framework, the author is concerned with the analysis of capacities and inclinations of users. That is to assess what users are capable of when using a teleconference system, and what motivates them to participate. In order to recognize that being 'liking or enthusiastic' and 'keen or good' at participation are distinguished. Many mistakes

are made in assessing people and system interface because it is rashly assumed that individuals who 'like' a particular system will be 'good at' performing in it. For instance, members have a loyalty to their own group and a different relationship to the other group. Then two groups might start to compete with other another. A certain degree of showing tension and antagonism (16% of total interaction)[23] was observed during teleconferencing. This indicates the possible competitiveness or disagreement during the sessions. Furtheremore, this introduces the importance of 'the role of a Chairman' at the conference. Besides, the occurrence ratio of natures of interaction (within-group vs. between-group) was 28.38% to 71.62% [19]. The frequency of between-group interaction was preponderant. For instance, the within-group vs. between-group divergence at the interaction categories of 'disagreement' (12.5% vs. 87.5%), 'showing tension' (9.09% vs. 90.91%); with the confidence level of 95%. It further reinforces the hypothesis that participants tend to express more competing or hostile feelings to the remote audio or audio-video images, (at least during the styles of teleconferencing employed).

The main interactive adjective pairs which evaluated the performance of teleconferences with chairmen were 'dominant vs. obedient', 'anti-social vs. socialable', 'irritated vs. relieved', etc.. The group performances of the ten teleconferences (with chairmen) were quite different from those of the non-chairman teleconferencing. The emotional effects of members to the chairman and vice versa, and the interrelationships among and between members occupied 8.3% of the total variances. (Table 5)

General comparisons of the four Interaction Variables : 'People vs. Images', 'Relaxation vs. Tension', 'Cooperation vs. Constraints' and 'Cooperation vs. Antagonism' in four phases (Single-Single, Dual-Split, Cross-Split and Single-Chairman arrangements) are presented in Figure 26.

The objective in extracting these Interaction-Variables is to assess the general applicability of teleconferencing systems. The differences between teleconferencing and face-to-face group interaction are occasioned by :

1) individual users' attitudes and performance because of the involvement with technical equipment, and

2) the general atmosphere of any particular teleconference session while participants are physically separate groups.

These facts affect the perception of social relationships, individual satisfactions and group performance of users and potential users. A three dimensional Equilibrium Model which has been developed by the author will be discussed in Chapter 7 to further verify the influences of such teleconferencing modes.

It is strongly believed and recommended that teleconference designers and their multidisciplinary organizers should be well informed about the details of such specific interaction patterns and the conditions under which possible modes and atmosphere of teleconference participants may be developed.

5.4 SOME STATISTICAL IMPLICATIONS OF TELECONFERENCING ANALYSIS

5.4.1 The Observation of Group Performance Profiles

The results given in the previous sections(Table 5) and those in Figure 26 were based upon averages of observations obtained from 28 different teleconference sessions which had different characteristics (participants, system arrangements, tasks,etc.). Nevertheless, it was found that there were gross similarities between the interaction processes for each separate conference. This suggested that the Group Profiles and other results of averaging over all 28 conferences were reasonable measures of the characteristics of a teleconference system. It was the system itself that was being evaluated, not its specific values for different types of conference.

However, certain statistical difficulties arise. Some of the problems are similar to those encountered in face-to-face small group analysis[32]. The present purpose is to overcome this by stricter control of sampling units and intervals; together with the recognition that two groups are interacting via technical equipment (the system). The author is then concerned with the socio-technical problem of 'Fitting the System to the Users and Fitting the Users to the System', in order to provide a satisfactory teleconference system and groups of satisfied users.

In Chapter 3, teleconferencing processes were classified by means of 3 Vectors: Nature, Style and Value of interaction, which are interrelated. According to the data of teleconferencing interaction, task and socio-emotional areas of the conference activities were regressing on a continuum where no distinct boundary could be drawn. From this the Vector Model (Fig.3) was derived; we subsequently interpreted this model in terms of 3 types of sampling :

a) 'Continuous Observation, b) at 10 second intervals and c) at 30 second intervals. This needs further explanation.

Previous small-group researches have suffered from a lack of control of the sampling size (Sampling units). By taking each teleconferencing session as a 'sample frame'[33], the problem of high flexibility of the total sampling units also existed in the situation which was based on observing and measuring within-group and between-group participation. On the other hand, when the total sampling units which were based on the continuous-observation sampling were too voluminous, the two types of sampling (30-second and 10-second intervals) were introduced to serve as auxiliary controls in addition to the 'continuous observation, hoping to overcome this difficulty. There were constant numbers of sampling units (either 80 units in 30-second or 240 units in 10-second interval) with every teleconferencing session which was also audio and video tape recorded and analyzed within a constant duration (40 minutes). Human behaviour and response are highly variable and spontaneous, so observations at sample points in time, over a fixed duration enabled us to make direct comparisons of different Group Profiles of different conferences.

The Cross-Talk and Side-Talk matrices, reveal an additional characteristic. Basically, the amount of activities of either Cross-Talk or Side-Talk was empirically dependent upon :

1) the total numbers of messages recorded of each particular mode of interaction; and
2) the amount of activities which could be classified into each of the 14 categories in the Group Profiles.

There are other differences between teleconferencing and single small group interaction patterns, occasioned by :

1) individual users' attitudes and performance because of the involvement with technical equipment, and
2) the general atmosphere of any particular teleconference session because of the division into 2 totally separate groups.

For example, the occurrence of Side-Talk affects the likehood of Cross-Talk and vice versa.

Furthermore, in teleconferencing, a statistical problem arises out of the fact that Chi-Square and similar tests of significance of difference assume independence of variable, which cannot be the case. Our measures were based on the Vector Model, in which interrelatedness of the task and socio-emotional continuum was assumed. The fact of interdependent variables left us without the significance-test of difference on the major distributions of profile.

Teleconferencing profiles were all distributed over a number of messages, and ordered over the 14 categories. The frequency of occurrence of each category was recorded on the two different bases;

1) as the grand total of messages during a series of conferences (28 teleconferences in 4 phases), and
2) as the total of both Side-Talk and Cross-Talk of each category.

But in both cases, all rates added to 100 percent. In the first case, since they were calculated on a common base, the distribution of frequencies was based on a relative probability[33]. In the second case, it was like a binary situation, that all messages were presented either in the mode of Side-Talk or of Cross-Talk. This 'zero-sum' situation emphasized this point. It is of course not correct to assume that the most frequently occurring categories in any profile are necessarily the most

important in telconferencing. The frequencies of each category were of widely different ranges. The reasons being :

1) the empirical interdependance of the categories of messages; and

2) their great differences in frequency of occurrence.

5.4.2 Questionnaire Study on Users' Opinions

Seven sets of questionnaire were distributed to a total sample frame of 120 subjects in the studies. They included 92 teleconference participants and 38 non-participants[1] (who were not randomly selected to take part in a single teleconference session). All subjects were asked to rate some 5 point scale statements. These statements were designed to record a general description of their feelings or experiences towards the atmosphere of the teleconferencing discussion, as well as their own descriptions or perceptions of the characteristics of the teleconference which they had completed.

Those opinions included :

1) The formulation of 'efficiency' of teleconferencing, i.e. the participants tend to reduce the frequency of conversation which are not relevant to the subjects being discussed;

2) Some improvements of teleconferencing were suggested -- for instance, if teleconferencing could create an atmosphere of 'physical nearnesss' with the remote-group(s), then the 'physical separation' with the remote-group(s), will no longer promote the tendency of opposing and competing with the other group(s).

3) Some apparent immediate pleasure of travel is lost; however, it is felt that teleconferences could be used as preliminary meetings. Consequently, eventual travels may be encouraged.

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[1] These participants were held as reserves.

5.5 SOME MAJOR FEATURES OF TELECONFERENCING BEHAVIOUR

The semantic differential analyses clarified the differences in features of teleconferencing among the four phases of system arrangements. Significant features are summarized as follow :

1) The 4 major Interaction-Variables in teleconferencing are : 'People vs. Images', 'Relaxation vs. Tension', 'Convenience vs Constraints' and 'Cooperation vs. Antagonism'. These are the four different bases of analyzing the teleconference systems, and attitudes of, emotional & operational aspects of participants.

2) The major interaction components in teleconferencing are task oriented; e.g. giving and asking for opinions, suggestions, information,etc..

3) The psychological effects of participation in teleconferencing are inherently different from those of face-to-face communication. Teleconferencing has not yet been exhausively studied by the cooperation of multidisciplinary experts; many interaction norms and rituals are still required to be defined. Experience of a face-to-face communication will certainly be benefitial for this purpose.

4) Although a large number of teleconferencing tasks are 'neutral' in value, the development of group processes is rather difficult to predict (e.g. whether group processes are cooperative or antagonistic?). However, it is certain that teleconferences are quite suitable for the exchange of information and ideas, planning actions, making analyses and conducting discussions.

The implications of the 'Fitting the Users to the System and Fitting the System to the Users' framework are of paramount importance. Without understanding the above specification of teleconferencing modes (e.g. Side-Talk and Cross-Talk), cost-control or cost-effectiveness cannot be effectively considered. Teleconference designers and their multidisciplinary organizers should be well infromed about the details of these specific interaction patterns and the conditions under which 'difficulties and distastes'[34] of participation may be caused.

We recognize that 'difficulty' and 'distaste' are not necessarily cause and effect. For instance, some participants in separate locations may find it distasteful because they are not accustomed to conversing with images (which is after all what TV pictures and loudspeaker voices are) nor familiar with unconventional conferencing rituals.

We feel that the same knowledge is required in training[35], designing equipment, modifying systems and indeed in everything else that concerns 'the human factor' in utilizing technology. Therefore, people who wish to introduce teleconferencing and even market promoters should know about the participants' difficulties and distastes, so that they can make their training and marketing thoroughly relevant. It is their role to reveal to the participants the difficulties they will meet, and to help them to face these. It would also be responsible of promoters to ascertain distastes, so that they may explain to customers and assist them. Similarly, the designer of teleconference system should know about the difficulties and distastes, for the same reasons. His task is to design systems that enable the teleconference participants to utilize the facilities with a minimum of difficulties and distastes and a maximum satisfaction.

Chapter 6 SOME PREREQUISITES ON DESIGNING TRAINING-STRATEGIES FOR TELECONFERENCING IN CROSS-CULTURAL ENVIRONMENT[35]

Summary

Investigations of 'new' communication technology by means of audio or audio-video aids such as teleconferencing, have attracted the interests of many multidisciplinary experts. However, cultural, economic and technical constraints have limited its probable and possible applications 'cross-culturally'. Therefore, studies of its specific modes of communication, of its planning, and of the users' behaviour and attitudes are essential to estimating the possibility and degree of successful implementation of this 'unconventional' communication style. Furthermore, the need for this investigation is reinforced by the significant demand for personnel training and system maintenance, at all levels, in telecommunication enterprise and administration. The theme of this Chapter is to ascertain the levels of personnel training-needs and the design of appropriate user training strategies for such systems.

6.1 THE NECESSITY TO CONSIDER THE IMPLICATIONS OF APPLYING CROSS-CULTURAL TELECONFERENCING

Present practical application areas (e.g. education, medical, government, social, industrial and financial organizations) suggest that a number of well developed teleconference networks have been in active operation.(App.1) However, it is essential to avoid making an over-simplified decision about the value and utility of this technological innovation in cross-cultural societies : social adjustment and planning for quantity, level and type of human resources and of capital investment require urgent study. They must be planned to ensure adequate maintenance and constant high quality

of service. No technological device can be successfully adopted in any social context without struggling up the socio-technical ladder of a) Acquisition and Acceptance by users and b) the Specialized Users and Modifications required for the teleconference system itself.

Teleconferencing style is conversing with certain audio or audio-video images rather than with a person or group of people who are physically present. Members of each teleconferencing group involve membership of 'I-thou' relations among themselves but relationship between the group via individual links has some characteristics of 'I-it' relationships. For instance., this particular aspect of teleconferencing substantially influences the general oriental interaction pattern.

Consequently individual values and attitudes, interaction rituals and group processes in face-to-face meeting, which is the basic social infrastructure of interaction, are not necessarily identical with those of teleconferencing. Some manners and values of communication in particular cultures , e.g. oriental, seem to be suited to a face-to-face ideology. For instance, the meaning of 'face' is not only a social and an internalized sanction connected with oriental and some western moral codes[36], but more important, it is also a much recognized social-concept to show personal attachment and respect to the other communicating party. Therefore this crucial value of 'face' and the fear of losing it may hamper the acceptance and effectiveness of teleconferencing. This further indicates that there should be the least degree of modification of conferencing style and minimal training for the prospective cross-cultural users. Training should aim to overcome these difficulties and distaste[24] which will be likely to occur in many cultural backgrounds, for example, personal unfamiliarity with the system, unexpected risks which may occur during operations, unwillingness to experience a

relearning stage, fear of losing face as a highly intricate social mechanism, sense of reservation and conservatism, and unwillingness to change habitual behaviour.

The Level of Adjustment Model is designed to overcome such operational tension and frustration. It will encourage the adaptation of such a 'new' communication technology to the local environment.

6.2 Design of User-Training Strategies

If attention is focussed on the sequence of teleconferencing as the interactive processes within an integrated man-machine system, it is composed of technologies, organization structures and users behaviour which need to be adjusted to the specific target cultures.

The Level of Adjustment Model will be explained in terms of :

1) Functional Levels of Adjustment, which involves technological, institutional and behavioural transformation; and

2) Operation Stages of Adjustment in each transformation which include three continual stages of acceptance, maintenance and innovation (Fig.27).

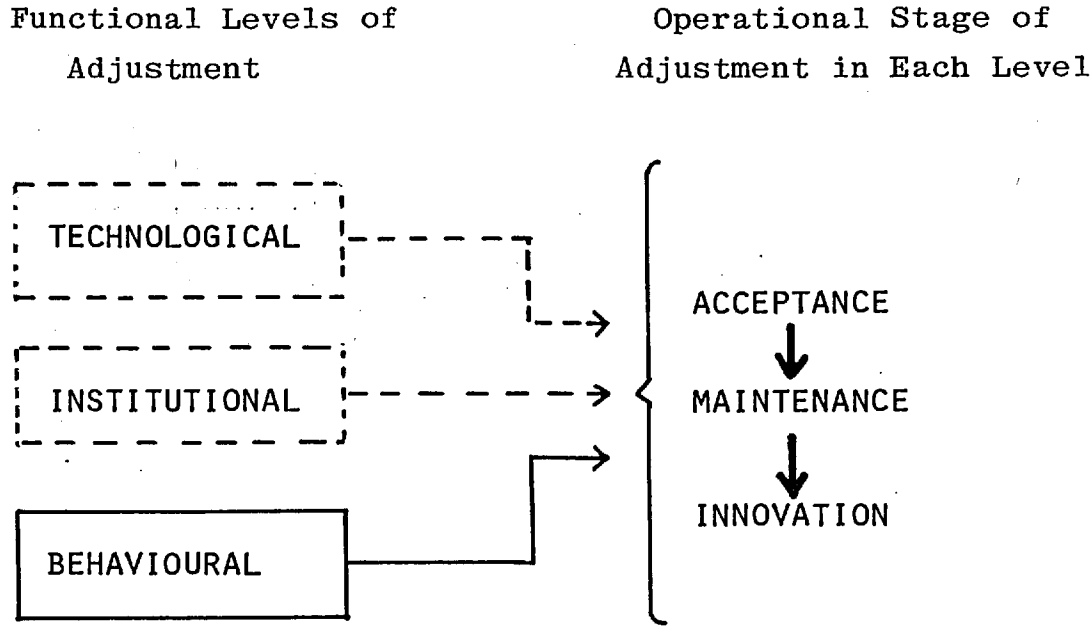

Fig.27 : The Level of Adjustment Model of Teleconferencing

Training is an intervening activity inserted in each level to reach the three operational goals. The strategies of training will accommodate all components of the levels of adjustment indicated above. From the operational point of view, the processes of adjustment to the three functional levels: Technological, Institutional and Behavioural, are following three continuous stages : Users Acceptance, System Maintenance and Technological Innovation.

6.2.1 Strategies of the Technological Level

1) The appropriate information and the goal of operating teleconferencing should be explicitly known to the top level of all potential user-organizations. The social values and the original communication pattern of those organizations should also be taken into consideration.

2) Technical and operational information could be given through short term training or at preliminary trial period to all levels of organizations. These information or trial schemes are best conducted through the cooperation of the government communication-technology department, voluntary or private trade promotion agents, international communications authorities and even at the extra mural courses of universities.

3) It is also helpful to draw parallel situations and compare similar cases of development with other countries. Practical applicational experiences are then shared.

4) External expertise and consultancy could be helpful to assist in analyzing the local situation for implementation and applications.

5) Mass media and publications are the important channels to communicate and advertise for the present stage of development of teleconferencing.

6.2.2 Strategies of the Institutional Level

1) An effective institution with organized promotion policies and services is the major condition of a successful application of teleconferencing.

2) Internal consultancy and expertise (e.g. system engineers, telecommunication experts, ergonomists, psychologists, etc.) are especially essential at this stage. Problems of application and reorganization, such as tremendous operational costs, long training period, planning and reorganizing roles of some potential users in organizations, scarcity of expertise and up-to-date technical information, can only be solved by individual tailor-made systems.

3) Cooperation and constant communication between countries of similar cultural background to exchange information of developing progress are fruitful to avoid unnecessary maladjustments.

6.2.3 Strategies of the Behavioural Level

Apart from the appropriate information of the technological aspect and a systematic organization of how such knowledge can be conveyed through various institutions during training, the prospective users should also be made aware of various qualities through their operational experiences- environmental, factual and heart-felt awareness.

1) Environmental Awareness :

Prospective users and teleconferencing promoters should be sensible to the environmental demand and be conscious of their interacting patterns and to cope with the technology.

2) Factual Awareness :

This could be gained via communication media and publications which provide up-to-date and accurate information regarding the present promoting progress and also the trend of development. This requires certain modification of communicating habits and rituals in order to achieve a compromised view in both direct and indirect means.

3) Heart-Felt Awareness :

Prospective users' attitudes and behavioural changes are likely to be neglected. These changes imply the withdrawal of cultural assumptions to which people have previously commited themselves and which they value. Changes occur during socialization and practice which also involve the individual' 'self' and 'identity' [37]. We recognize that users may develop 'difficulties' and 'distastes' toward the system because they are not accustomed to conversing with images (TV pictures and loudspeaker voices), nor familiar with these unconventional conferencing rituals. At this stage, teleconference planners and promoters should take the role of :

i) Creating Motivation to Change
They should reveal to the participants the possible difficulties and distaste they will meet and help them to face these by creation of psychological safty which becomes the motivation to change their attitudes.

ii) Developing New Responses based on New Information
They should provide information from multiple sources in order to reduce individual threat and remove psychological barrier due to uncertainty with the system.

iii) Stablizing and Integrating
They should integrate 'new' attitudes toward teleconferencing into personality; then a general acceptance of such systems will be gradually established.

Certain psychological impacts regarding the adaptability of teleconferencing rituals to specific cultures, and individual inhibitions in interaction habits are considered in training processes. The strategies must be emphasizing behavioural constructs[38], including personal attitudes toward the technology, collective trust within and between conversing groups, learning processes during operations, etc.. Furthermore, these strategies of adopting such a communication technological device should be based on

the most thorough understanding of the cultural environment and specific needs of the social context, together with the accurate estimation of :

1) Its Rating for Survival
2) Its Economic Necessity
3) Its Development Opportunity
4) The Probability and Possibility of becoming Socially Accepted as 'Goods' and 'Services' and
5) The Degree of User 'Voluntarism'.

6.3 Some Prerequisites for a Successful Adoption or Application of Teleconferencing

The above training strategies provide a guideline to a possible successful adoption or application of Teleconferencing. Understanding of their socio-cultural factor plays a significant role.

6.3.1 Is There a Necessity to Derive Training-Needs?

Training is a means of preparing for and improving individuals' competence and capabilities. The needs for training and development are so synonymous that they share a close relationship with the individuals' active learning behaviour. Human beings are provided with specially designed environments for learning skills (e.g. in educational institutions and business organizations), in order to discover and cultivate basic aptitudes and capacities. Though the investments in technical and manpower resources have attracted broad attention and the need for training is unavoidable, the real training-needs are still considered with scepticism. Their limited applicability is an obvious limitation to their usefulness. Training-needs are meaningful only if they are highly flexible and

responsive to, for instance, the changes of learners' attitude and morale, together with the changes of technologies.

6.3.2 Developing a Training-Needs Strategy

Training-needs should be anticipated by making adequate evaluation and estimation of individual demands, and organizational goals. Constant appraisals are therefore crucial. To monitor these training-needs, some criteria should be considered :

1) The 'objective' of training should be explicitly conveyed to the 'learners'
2) The 'desired-behaviour' of learners and the intention of receiving such training must be communicated to them; with the conditions under which a certain behaviour is expected to occur.
3) 'Relevant' content of the training instruction is important to provide a basis for an immediate application of tele-conferencing to the working environment.
4) The 'criteria' of an acceptable performance (of learners) must be stated clearly in order to measure the extent of success.
5) Of course, the training should involve only a 'minimal' change of the current behaviours and habits.

A developing process will explain how the general training phenomena should be developed.

The fitness of a training-needs system is discussed in several procedures. First of all, training-needs can be shown and represented through the interaction processes of tasks, organization, learners and trainers (designers)[39]. The objective is to improve the 'effectiveness' of the whole system in order to cope with the rapid growth of technologies

and the gradual changes in social values. Certain hypotheses and developing procedures should be taken into consideration through the method of deduction(Fig. 28).

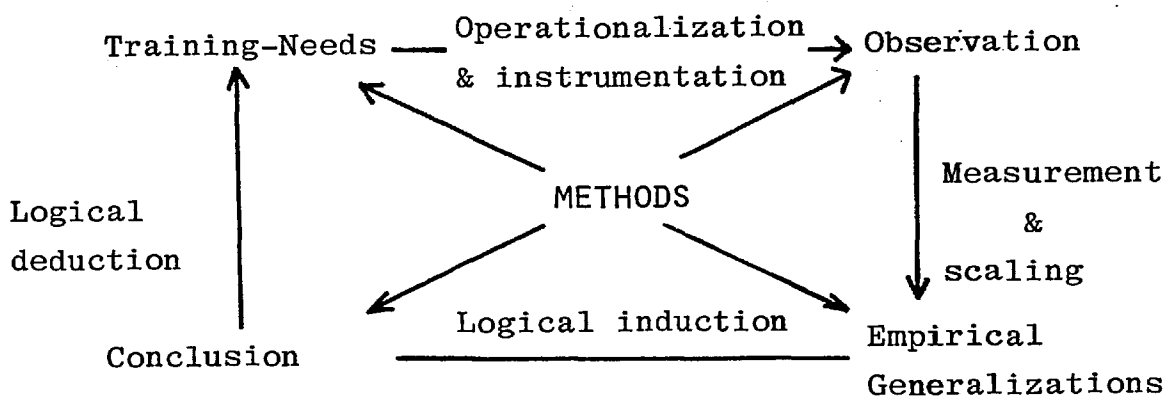

Fig.28 : A Development of Training-Needs

Step 1 : Stating the Training-Needs

Hypotheses : Training-needs can be derived from the phenomenon of learners' performance and execution deficiency.

Definitions :

1) Training-needs : the needs for coping with technological and behavioural changes by instructing or providing new knowledge for self development and organizational goal attainment

2) Performance Deficiency :

$$PD = M - I$$

PD : Performance Deficiency
M : the complete set of behaviour necessary to do the task
I : all the behaviour necessary to do the task that the leaners have already possessed
M-I: a training-need is only applied to this area

Types of Variable :

Independent Variable : Performance Deficiency

Dependent Variable : Training-Needs; which can be interpreted by :-

1) Task Analysis through the information sources, e.g. trainers, designers, clients, etc.

2) Organizational Structure and Training Technologies with role patterns and system objectives

3) Training Variables, e.g. training philosophy, styles of training, role expectations, etc.

4) Learners Variables, e.g. the aptitudes, intelligence, attitudes, capabilities, etc., together with the deficiency of knowledge and experience.

Step 2 : The Problems of Observation and Measurement of Training-Needs

Training-needs may be discovered from the feedback of employees, learners, or students through, for example, personnel appraisals and tests, in selection or in exit interviews,[1] and reports by supervisors and instructors. They provide evidence of when changes occur. Learners' attitude surveys may also call attention to such needs.

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[1] is an interview between the personnel (or employer) and the employee who is leaving the institution, so that some feedback from the employee may be obtained with the purpose of improving the institution.

The diagnosis of training-needs recognizes a variety of symptoms. Needs for training and retraining programs may be rather obvious when communication plans require new skills and the phenomenon of individual-obsolescence exist .

It is difficult to control the progress of both psychological and technical variables, such as learning progress and training effectiveness. Means of identifying qualitative attributes (such as motivation to learn, group norms and values) are also difficult to describe. This is caused by cultural and environmental hindrance, and also by lack of mutual understanding between the designers, trainers and learners in relation to the training-needs and other related information.

Step 3 : Empirical Generalization of Training-Needs

According to R.K. Merton[40] empirical generalization is an isolated proposition summarizing observed uniformities of relationship between two or more variables. As Dewy[41] noted, use of 'empirical' means that the subject matter of a given proposition which has existential inference[1], represents merely a set of uniform conjunctions of traits repeatedly observed to exist.

The relationships among the four dependent variables of the training-needs (which are listed in Step 1) always function in a uniform style (i.e. they always function in the same way). The role of these training-needs is depicted in Figure 29.

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1 Existential Inference:
The assumption is that reality can only be based on empirical experience but can never become the object of thoughts.

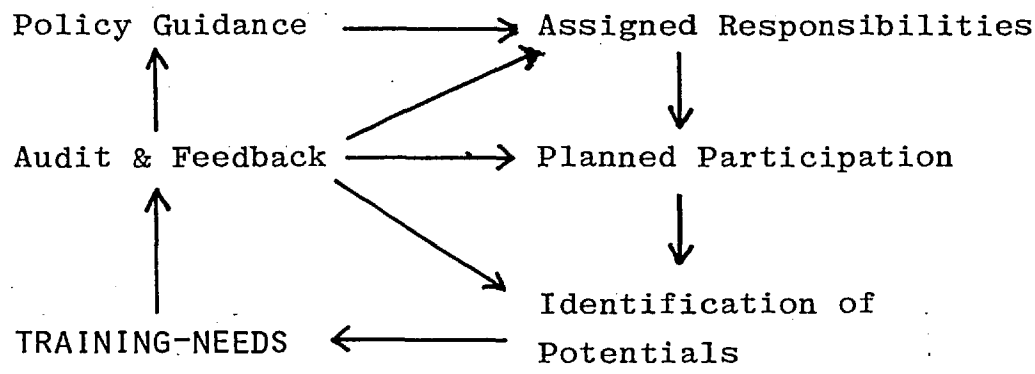

Fig.29 : General Procedures for Training-Needs

Public systems and organizational policies have been established to adapt to the changes of communication system information, execution deficiency and personnel obsolescence. In addition, trainers, designers and learners are following the planned role-expectation. According to Postman and Weingartner[42], the former is expected to be a mediator to provide guidelines (new information and messages concerning the existing and changing communication environment) for learners who, therefore, are expected to identify or judge by themselves what is worth knowing in order to reduce the cultural and technological lag.

Training-needs are the reflection of far reaching changes which include a persistent shortage of skills, rapid technological changes, personnel and organizational obsolescence and adjustments. They should be prepared for reassignments and conditioned to the impact of change.

Accurate and timely evaluations of the capability of adapting to changes at the organizational and individual levels are necessary, together with long range planning for future needs. Evaluations are concerned with training strategies, technological aids and the learners' realization of training objectives.

Step 4 : Conclusion

The need for deriving an appropriate training stategy in teleconferencing is unavoidable due to the cause of universal performance deficiency at this stage.

6.4 DESIGN OF A TRAINING PROGRAM

Since teleconference is an aid or a new mode of meeting, it involves specific operation procedures and communicating norms.[1] Training the prospective participants therefore become essential to meet the emerging demand. Hence, the objective of the training scheme should be as minimal as possible. Hence users (or potential users) may adapt to the new mode of the communication system (i.e. teleconferencing). Participants as trainees will be trained to overcome their uneasiness and uncertainties in operating the new system. The more the participants are familiar with the external conditions and the physical situations of the new system, the closer they will achieve the psychological-safety. Consequently, teleconference participants will behave and react as naturally as in ordinary conferences.

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[1] 'Norms' : Recognized or expected behaviours of individuals in a particular role, e.g. being teacher, parent, etc..
'Rituals' : Standardized behaviour within a particular context, e.g. church, classroom, etc..

The design of the proposed training program will follow the model of four continuous procedures :

1 Where is the training program going ?

a) Acceptance and Adaptation of individual user to the system and its equipment

b) Adjustment of general policy of the involved organization

c) Appropriate Modifications and Maintenance of the equipment and materials

d) Innovation and Integration of the whole teleconference system (with the effective man-machine interface)

2 How can the training program get there ?

[with minimum changes of : (i) Operating habits and communicating styles of trainees,
(ii) Designs of equipment and facilities]

a) By Knowing : 1) 'Job-Specifications' of each part of the teleconference system

2) 'Job-Requirements' of each participant

3) The 'Difficulties and Distastes' in operating the system of each individual member

b) By Operating: 1) Recruitment of professional trainers

2) Design of training instructions according to the known training needs

3) Receiving current feedback from trainees and trainers

4) Constant modifications and readjustment of the present training program

3 What is the training program bringing along ?

a) Appropriate job-equipment and materials, e.g. a teleconference studio

b) Practices in the teleconference

c) Other supplementary programs to facilitate the major program: e.g. Programs of management training

4 How does the planner know that the training program has arrived its destination ?

a) Evaluation program of the system

b) Feedback from participants

c) Consultation from 'outside' the involved organization

d) Current readjustments of the program

e) Performance appraisal of people involved

6.5 PROBLEMS WHICH TRAINING SHOULD ACCOMMODATE

Though training-needs can be methodologically or theoretically proved to fit into the communication system, problems of their suitability to a particular system and their own flexibility still need to be solved.

1) Problem of Evaluation and Feedback :

Evaluations enable the teleconference systems to have improved capacities and encourage users to develop their professional skills. The former may consequently obtain better facilities while the latter may be provided with resources for learning. However, there are some difficulties involved :

a) The lack of suitable conceptual evaluation framework
b) The general lack of precision in training objectives
c) The difficulties in any form of training measurement
d) The very nature of most training programmes

2) Problem of Flexibility and Adaptability :

Based on the system approach, goal attainment, adaptation, pattern maintenance and integration are the four variables (external and internal) of an active communication system. However, there are still the problems of flexibility and adaptability to change, while there is resistance to the new concepts and conformity to the old communication patterns. The general phenomenon of 'cultural-lag' and the idea of 'future-shock' are strong stimuli to encourage sensitive training-needs which should never be bounded by traditional styles and methods of applications.

3) Problem of Limited Applicability

Training-needs are derived from the phenomenon of performance-deficiency due to social, cultural and technological differences. Training strategies and methods are developed according to the values and norms of an individual society which constantly changes in both technological and behavioural aspects. Training strategy needs to be 'tailor-made' as there is no training-need which can universally fit every system of communication.

4) Problem of Verification

Although the idea of verification of a training strategy is less emphasized, it is of paramount importance in showing the validity and reliability of the entire system. The very complexity of a new phenomenon of training-needs does not necessarily prove that it is completely recognized and understood. Unknown factors may cause important influences or serious side-effects to the effectiveness-measurement of a communication system.

5) Individual Feedback Problem

There are operation difficulties in fulfiling the task of training. Three important operational components -- input (information), action and feedback are considered. A task may be difficult to learn because the input or signal for 'action' is not discriminated by the learners. These action-difficulties can be of two kinds. Firstly, the learners may be unaware of the appropriate response, and secondly the learners have already developed their habitual response to the 'input' which happens to be incompatible to the situation. Feedback difficulties

are a matter of perceptual discrimination which may be a failure to appreciate what feedback indicates the correct completion of the response.

6.6 APPLICATION OF THE TRAINING STRATEGIES -- A SCHEMATIC CHECKLIST TO ASSURE ITS SUCCESS

With the awareness that the speed of 'changing' the behavioural pattern and value systems of people is always behind that of the material and structural modifications, we realize that it is necessary to develop an institutional structure which is capable of continuously 'absorbing' and 'internalizing' the various social and technological changes. These changes are inherent in the processes of modernization and contain different degrees of ability of achievement in various societies.

We should be optimistic and yet cautious about applying such a Western communication technology to Cross-Cultural Patterns. However, with the clear understanding of training strategies which differ in emphases on three levels of adjustment (Technological, Institutional and Behavioural), a schematic checklist to assure its success is given in Figure 30.

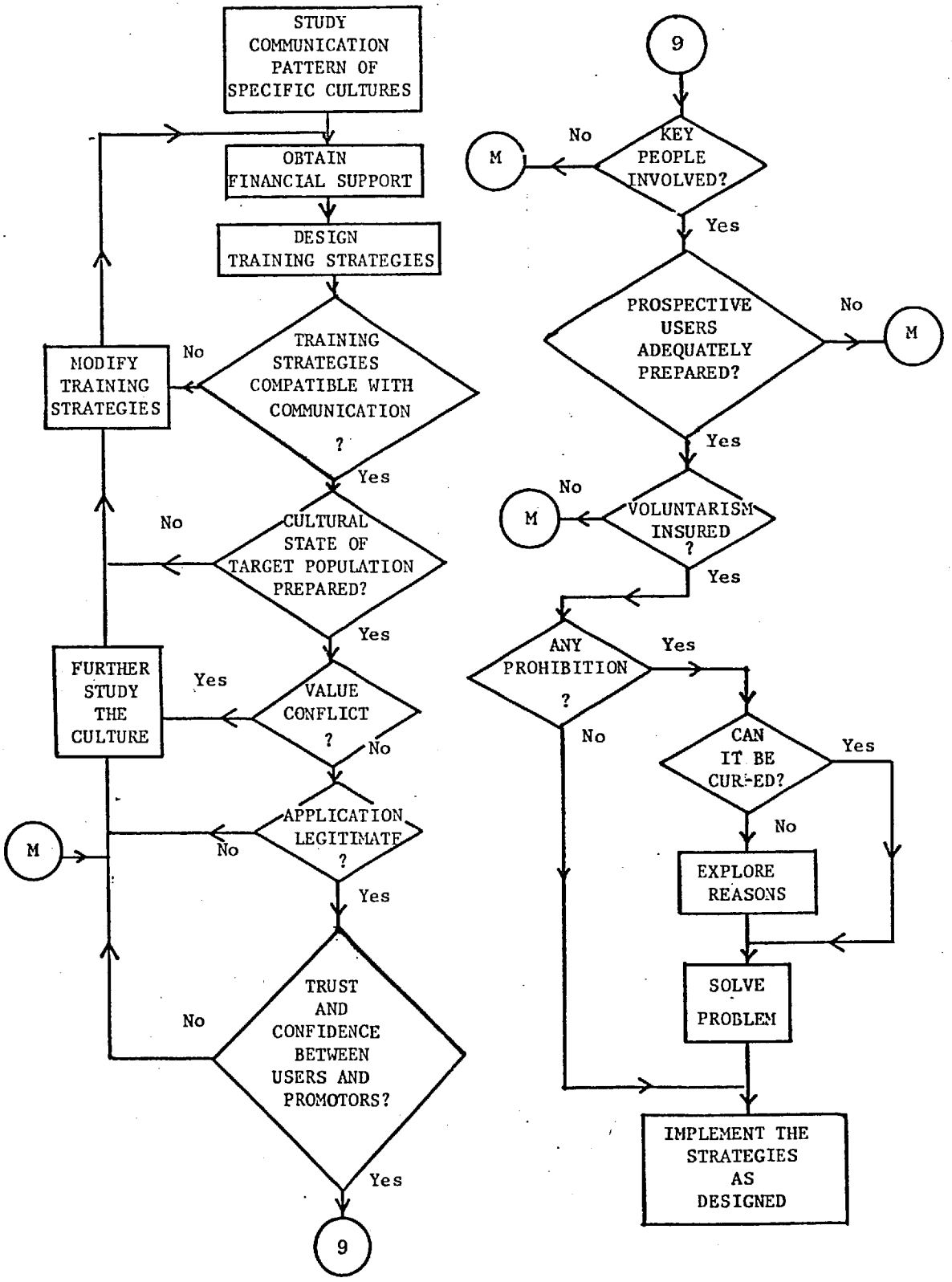

Fig.30 : An Operation Model of Technologies Transfer

Note : 9 - the 9th proceedure commences

M - Further Study & Modification

Chapter 7 A MODEL OF SOME PSYCHOLOGICAL FACTORS IN TELECONFERENCING ASSESSMENT[43]

Summary

Rapid technological advances and effective users training strategies make possible the development of teleconference systems using either audio or audio-video media. Teleconferencing involves different personal modes of communication of participants and requires different kinds of preparation for both formal and informal styles of discussion. This author's contention is that it is basically not psychologically equivalent to conventional face-to-face conferences. Therefore, an improved understanding of the psychological differences and other human aspects can only be achieved through cooperation between telecommunication specialists and social psychologists.

This Chapter discusses various kinds of group behaviour and interaction patterns between teleconference participants. There are different unique group interaction profiles among participants when they are conversing with a person or group who is physically present and when they are with certain images in either audio or audio-video modes. This feature of teleconferencing can be interpreted in terms of a model of 'Users' Behavioural Needs'. The model affects the course of arguement and decision-making processes within the conferences and offers a basis for analyzing the psychological impacts and individual inhibitions toward teleconferencing.

Since many of the accustomed rituals of conventional conferences are not relevant to teleconference system, there is 'natural reluctance' of acceptance in potential and current teleconference participants

owing to their unfamiliarity with the system, with the unexpected risks which may occur during operations, their unwillingness to change present acquired behaviour, etc.. The Chapter concludes with suggestions for Technologies Assessment procedures and behavioural modification to overcome these difficulties.

7.1 TELECONFERENCING IS BASICALLY NOT PSYCHOLOGICALLY EQUIVALENT TO FACE-TO-FACE CONFERENCE

Advanced technologies, sophisticated training strategies and widespread information-systems have offered the possibility of developing teleconferencing using either audio or audio-video media. Teleconferencing was designed to enhance interactive communication between two or more groups of people in separate locations; enabling them to confer together in the same conference, at the same time, sharing values and exchanging ideas and views on subjects of common interest. The style and nature of the discussion is entirely decided by the organization and participants involved within the constraints of the technology employed.

Present practical application areas (e.g. education, medical, government, social, industrial and financial organizations) suggest that a number of well developed teleconference networks have been in active operation. However, there are social, psychological and operational differences in modes of communication between teleconferencing and face-to-face meetings; and detailed studies and experiments are required to elucidate these. Teleconferencing is basically not psychologically equivalent to conventional conference. It is the purpose of this chapter to show that teleconferencing can only be treated as an additional style of communication; not a mere substitute for face-to-face meeting.

Psychologically speaking, participants converse with certain images in either audio or audio-video modes rather than with a person or group of people who are physically present. Members of each group involve membership of 'I-thou' relations among themselves but relationship between the groups via individual links has some characteristics of 'I-it' relationships. This particular aspect of teleconferencing substantially influences the general behavioural pattern of the groups. Consequently individual values and attitudes, interaction rituals and group processes in face-to-face meeting and teleconferencing are not necessarily identical. There are unique group-interaction profiles in teleconferencing. Several aspects of conferencing, (e.g. task control, information orientation, opinion analysis, suggestion evaluation, length of conversation and frequencies of showing positive or negative reactions, etc.), have been found to differ in teleconferencing and face-to-face meetings. Furthermore, apart from psychological and social differences in the two conferencing styles, technical design of the system itself has suggested necessary operational divergences.

Studies of specific modes of communication and preparation, users' demand and attitudes, are essential in estimating the degree of successful implementation of teleconference facilities. Furthermore, a learning phase for designing to aid participants in accepting changes in their pre-conference activities is indicated. The desire to communicate and the way in which this takes place are conditioned by the nature of the interaction-patterns and physical atmosphere within teleconferencing (e.g. the degree of informality, flexibility, distracting effects and communication responses, etc.). We should therefore be aware and careful not to consider teleconfencing as a substitute for face-to-face communication without paying substantial consideration to their

psychological differences. Participants who are conferring in 'I-it' (rather than 'I-thou') relation with remote images, will also encounter difficulties in tracing emotional signs of their recipients that are usually omitted in teleconferencing.

An improved understnading of the basic psychological core underlying teleconference and other human aspects, can only be achieved through multidisciplinary team work in conducting the necessary analysis (e.g. specialists of telecommunications, social psychology, system engineering, economics, ergonomics, etc.). The application of heterogeneous professional criteria, efforts and emphasis as contributed by these experts, will undoubtedly facilitate the system development. However, this can be achieved if each is willing to adjust or educate himself to accept sets of norms and values that are independent of his own expertise. There must be a working towards a recognized goal as a cooperative 'group' rather as an 'aggregate' of specialists. The problems and solutions, information and analysis of each, are interrelated and of equal importance.

This chapter discusses ways of analysing group behaviour and interaction and interaction patterns in teleconferencing. Its features can be interpreted in terms of an Equilibrium Model which consists of two interacting subsystems : the Conference Activities Inventory (CAI) and the Users' Behaviour Needs (UBN). CAI, which is the value-subsystem of the Model, represents the general behavioural patterns of participants and the basic nature of teleconferencing activities. Social Relationships, Participant-Satisfactions, Group Performance and Mission Completion are the major units of CAI. While UBN on the other hand, is the criterion-subsystem of the Model. It is classified into four specific levels : Acquisition, Acceptance, Specialization and Modification or Innovation. The purpose of UBN is to estimate the gradual growth and development in

implementing the characteristics of teleconferencing into the whirl of CAI (Figure 29). The four levels of the UBN-subsystem progress in a time sequence while the four units of CAI-subsystem integrate with time according to the progress of the UBN.

7.2 AN EQUILIBRIUM MODEL OF SOME PSYCHOLOGICAL FACTORS IN TELECONFERENCING

CAI and UBN subsystems seek dialectically to reach the stage of equilibrium. New ideologies, ideas, or problems will be encountered at different levels along the time span (Figure 31); synthesis at each level must be attained before proceeding to the next higher level. An element of 'continual change' is inherent in both CAI and UBN. This is the intrinsic force which maintains the internal dialectic processes of the model. On the other hand, it also prepares the subsystems for necessary responses to other external influences discussed below.

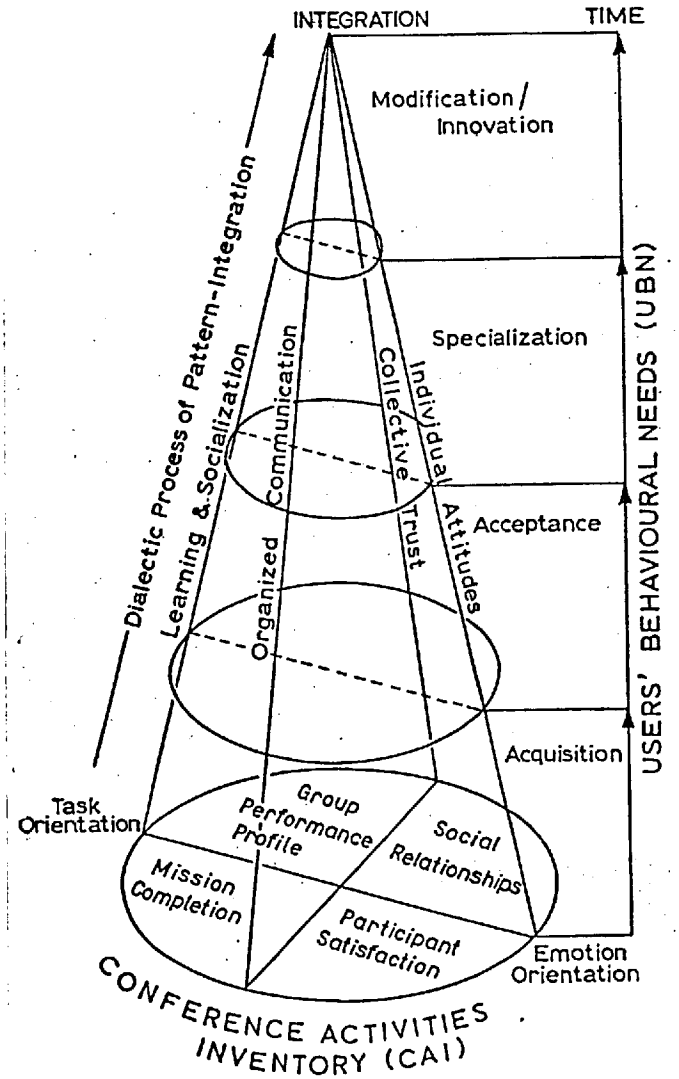

Fig.31 : The Equilibrium Model of Teleconferencing

7.2.1 Conference Activities Inventory (CAI)

Conference Activities Inventory can be dichotomized along a functional continuum of Emotion- and Task- Orientation. The general nature of conferencing namely : Participant-Satisfactions, Social Relationships, Group Performance Profile and Mission Completion, are regressing along this continuum. The first two patterns of conference behaviour tend to approximate to Emotion Orientation and the remaining polarizes to the category of Task Orientation. These four natures of teleconferencing themselves are a set of behavioural constructs derived from observation. Their qualities which include personal attitudes, collective trust, learning and socialization, and organized communication, are cumulative and are processing in a 'spiral' manner (Figure 31). The dialectic progress of pattern-integration is a series of socio-cultural and man-machine interfacing processes.

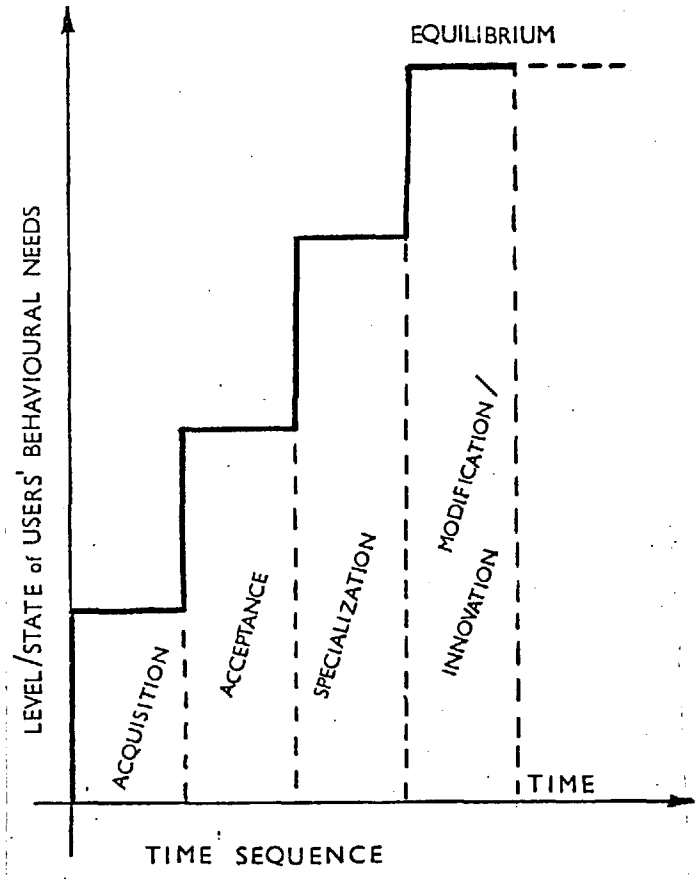

Fig.32 : Dialectic Progression of CAI & UBN towards Equilibrium

7.2.1.1 Emotion Orientation

'Individual Attitudes' and 'Collective Trust' are two fundamental values of emotion orientation of teleconferencing patterns. They are inherent in the two components of emotion-activities which are :

1) Participant-Satisfactions in conferring with remote audio or audio-video images, and with which
2) Social Relationships may be developed.

There is no distinct boundary between the two components, because they gradually integrate among themselves as teleconference users grow increasingly familiar with the system.

1) Participant-Satisfactions

There are numerous emphases on individual preference to different levels of satisfactions. Individual attitudes towards teleconferencing are unpredictable. However, people's motives for attending conferences can be classified as :

a) to satisfy their self-esteem or self achievement in the conference by exhibiting their leadership, aptitudes, expertise, status, prestige, power, etc., i) to those at the conference and ii) to their colleagues outside.

b) to satisfy their needs for social-affection, being appraised and liked, meeting old friends, establishing new contact, seeking attention, or enjoying the occasion of social gathering and relaxation,

c) to attain a specific goal or purpose; for instance, exchanging ideas with other participants, information seeking, business promotion, etc.,

d) even to 'escape from the office and telephone'.

Teleconference system must be designed to accommodate the above conferenceing capacities with an additional consideration of the 'visual orientation' factor. Since teleconference participants are interacting with audio or audio-video images, some basic values are essential and must be taken for granted. Thus,

a) Users must be able to 'look' at one another; this is a social act in itself and is also important to the 'I-it' and 'I-thou' distinction.

b) To meet the gaze of another is a significant event, which is an important part of the goal sought in an interaction.

c) In seeing another, much important information (about whom) may be gathered in addition to the direction of gaze.

Therefore, in order to comply with the participant-satisfactions in teleconferencing, the functions of 'visual orientation' during interaction must be achieved. They are playing the role of information-seeking, signalling an open-channel, concealment and exhibitionism, establishment and recognition of social relationships during interaction (Argyle & Dean; 1965)[44].

2) Social Relationships

There are 'basic elements' to attract and determine current and potential teleconference users to develop social relationships within their own group and with other remote images. For instance, the two groups might start to compete. Members have loyalty to their own group and a different one to the other group. The value of 'collective trust' between individual users and other remote-user-images is the basic essence of developing a successful relationship. The basic elements are :

a) Interaction Rewardingness

This determinant of satisfactory social relationships is based on the exchange approval, mutual acceptance and attitudes support of

users-parties. Teleconference participants have to realize that it is possible to develop a social relationship with remote images and at the same time, admit that the relationship is rewarding and trust-worthy.

b) Value-Similarity

Teleconference participants have to share a balanced view and a consistant value-background about the system prior to their understanding of the motives and behaviour of others. A new form of 'trust' must be generated among conference participants.

c) Feeling of Propinquity

One of the characteristics of teleconferencing is the interaction with remote audio or audio-video images. This deviates from the accustomed rituals of face-to-face conferencing that may give rise to a number of psychological considerations : the role and physical location of the chairman, the sense of availability of remote-recipients, possibility of developing continued interaction, predictability of recipients' motives and intension, and familiarity with the teleconference exposure. These are the major variables which link with the feeling of 'nearness' during the interaction with remote images.

Deutsch (1962)[45], for example, argues that 'trust' is the central prequisite of cooperation. The quality of teleconferencing therefore is related closely to the degree of 'collective trust' developed by participants. This value will not only influence the participants in realizing that their interaction is rewarding, but also develop a feeling of psychological propinquity, so that the quality of tele - conferencing will consequently be improved (Figure. 33).

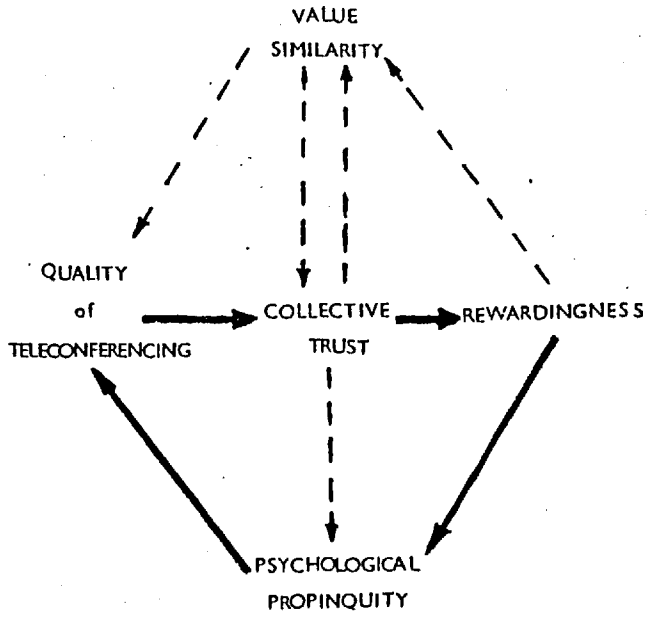

Fig. 33 : Social Relationship of Teleconferencing

7.2.1.2 Task Orientation

The other polarity of the functional continuum of Conference Activities Inventory is Task Orientation. This composes two units :

1) Group Performance Profile, and
2) Mission Completion.

The former is a description of interaction-profiles of conferencing groups while the latter is the operating functions of various organizations and institutions which have permitted the implementation of the teleconference system.

1) Group Performance Profile

Bales' Model of Interaction Process[18] and two additional categories of interactions are used to describe the group performance of teleconferencing. This is a highly idealized and schematized conception of standardizing group interaction. In actual operation, all functional interactions are potential at any given time within the total span of meeting. Any specific element of conferencing : orientation, evaluation, control, decision, tension management and integration, is occuring only as a matter of relative emphasis. However, all of them are existing in cumulative effects during the continuous group process. Besides, the separate conferring groups have a high likelihood of coming from different organizations, divided by geography and so may be partial strangers. The group loyalties and the separate groups cross-loyalties and trusts may differ a priori. Teleconferencing increases such risks.

There are unique group performance profiles in teleconferencing which are influenced by external conditions : users' personalities and preference for the teleconference system, characteristics of conferring groups, nature of discussion and technical design of the system (Figure 4).

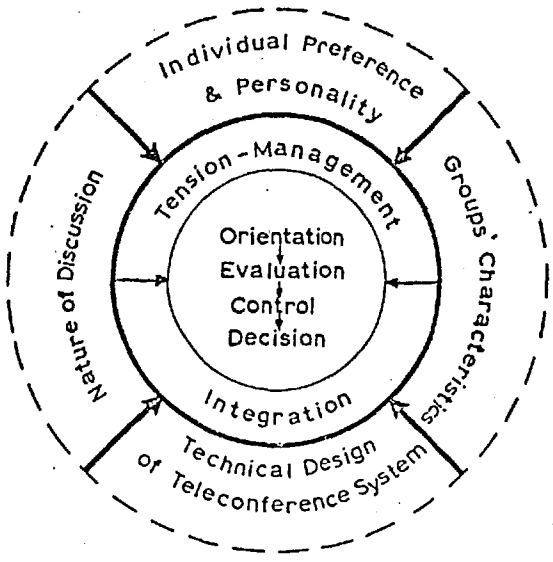

Fig.4 : Group Performance Profile of Teleconferencing

The six elements in the inner circle (Fig. 4) are fundamental ingredients of all teleconferencing. Different degree of emphasis of each external condition (outer circle) will mould the group performance profiles into various unique features. If we are concerned with the group process according to this figure, we can assume that there is a general tendency toward its regular pattern of group interaction. To illustrate, there is no difficulty in imagining two teleconferencing groups, meeting for a certain period, dealing with a single major topical problem, and coming to a successful conclusion; the order of events might be something like the following order : to get an initial factual or cognitive orientation to the problem, followed by anlayzing and diagnosing the situation in the light of values, needs, and desires of the groups that involve learning and socialization processes of their members. The next phase is devoted to finding means of controlling factors in the situation that includes the activities of all physical-present members and remote images : then decision of the intent might appear. The elements of emotional reactions (showing tension and integration) of group members will appear as interludes during the whole process.

2) Mission Completion

The final construct of teleconferencing is a set of 'organized communications'. This refers to the application of a teleconference system in various functional organizations and institutions. Demonstration programs using a teleconference network[46, 47, 48] in traditional and novel educational environments, continued experiments on the use of random-access-system facilities in health care delivery[49, 50], the impact of teleconferencing in finance and commercial [51,52,53,54] administration[55], and organization decentralization programs[56, 57], the adverse impact of the system in regional development and transport systems[58, 59, 60], and the operation within the deaf community[61], etc., are the few examples and evidences to show that teleconference system is practical and comprehensive.

Diffused institutions or organizations have been applying teleconference networks and are sharing a number of basic activities to fulfil specific functions and purposes. These functional characteristics of teleconferencing are depicted in Table 6. The similarities between those organizations and their relations to categories of teleconferencing purposes or activities are self explanatory.

The task- and emotion- orientation continuum of the CAI has shaped the basis of conferencing conducts. They are integrating and progressing together with the UBN subsystem along a time span. The four natures of conferencing : Social Relationships, Participant-Satisfactions, Group Performance Profiles and Mission Completion, are suffering from common elements -- the sense of unfamiliarity to interact with remote-images and the establishment of cross-loyalties and trusts among or within groups. These psychological uneasiness and estrangement are the core of researches in designing the UBN subsystem which shall be discussed in the next section.

PURPOSE	FUNCTIONAL INSTITUTIONS: EDUCATION	SERVICE & SOCIAL ORGANIZATION	MEDICAL SERVICE SYSTEM	FINANCE AND COMMERCE	GOVERNMENT
Orientation/ Information Exchange	*	*	*	*	*
Adminstration	*	*			*
Clarifying, Queries & Instruction			*	*	
Problem Solving	*	*	*		*
Profit Making/ Marketing		*		*	
Education Service & Occupational Training	*	*			*
Institutional/ Legal System Promotion					*
Regional Development & Community Integration		*			*
Organizational Development,	*		*		
Decision Making				*	*
Medical Care/ Health Service Delivery		*	*		
Cultural Expansion & Entertainment	*	*			

Table 6 : Distributive Functional Relations between Institutions and Teleconferencing Purposes

7.2.2 Users' Behavioural Needs (UBN)

The four levels of Users' Behavioural Needs (UBN) subsystem : Acquisition, Acceptance, Specialization and Modification or Innovation are the dynamic components that enhance the dialectic process of the four patterns-integration (CAI). Both CAI and UBN subsystems are playing complementary roles in maintaining equilibrium stage of system growth. The basic principles inherent in each level of the UBN subsystem will be analysed in a time sequence order with reference to Figure 31.

7.2.2.1 Users' Acquisition

The teleconference system is a relatively 'new' communication technology which involves 'new' styles of preparing for the conference, 'new' ways of operating the system and 'new' manners of interacting with recipients. These unconventional rituals of conferencing which are deviations from the usual mode of spontaneous communication, require exertions of current and potential users. Individual consciousness in teleconferencing entirely depends on sufficient understanding of one's attitude toward the system and the degree of personal satisfactions. These will be obtained from formulating the new pattern of social relationships during the operation. A ratio of Within-Studio Acquiantance or Between-Studio Acquaintance (Christie; 1974)[63] is also computed to estimate this interaction pattern.

The second component of the UBN's Acquisition Level is system recognition. It involves both subjective opinions and objective learning experience of users to discover what the system really is and how it actually works. The integration process of CAI with this level is mainly regressing on the basis of passive in-taking experience of users. When potential users are exposed to the teleconference system, they can proceed to a further step of the UBN subsystem.

7.2.2.2 Acceptance

At this level, teleconference participants tend increasingly to assume active roles in accepting this new mode of communication. Individuals are gradually formulating their own values or views on the system. The possibility of developing a collective trust among participants is the prerequistite of its successful application. Two kinds of value-formation are formulated : 'Sentiment-Preference' for like versus dislike of the system itself; and the 'Unit-Relation' which refers to some common bonds for attracting people to agree with the system.

Analogy of acceptance (Figure 34 can be expressed in terms of the Similarity-Attraction Principle[63].

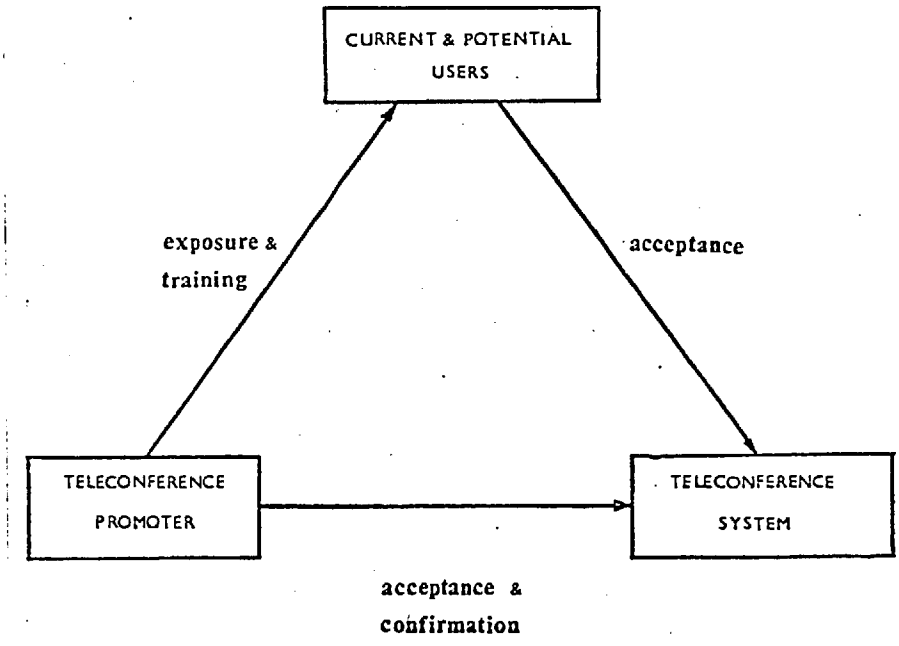

Fig. 34 : Similarity-Attraction Principle of Teleconferencing

It is assumed that the relations among the teleconference promoter, current and potential users, and the teleconference system (as an object) can be depicted as a triad. The level of acceptance can be achieved if the three relations of the three components are positive. It means that if teleconfeence promoters' perception of and the users' reaction to the teleconference system are satisfactory; the acceptance level of the UBN subsystem has arrived at its equilibrium stage. Otherwise, the tendency to 'change' will occur in three alternative ways : to modify the present teleconference system itself, to attempt to influence users' feelings and views about the system, or to reconstruct the introducing or promoting strategies (e.g. training and exposure trials), in order to attract both parties towards sharing a similar attitude to the teleconference system.

7.2.2.3 System Specialization

The teleconference system has been applied to diffused areas of institutions as an alternative system of communication. Teleconferencing plays different roles in different organizations; for instance, serving :

a) as a means of 'Intracommunication' to improve internal communications within or between plants,

b) as an 'Extension' to strengthen the services of an institution into a community,

c) as a 'Common Carrier' seeking to provide additional services, and

d) as an 'Inter-Institutional Organization' to provide better coordination and exchange of information between its member institutions[49].

Together with the integration process of the CAI subsystem, all applications of teleconference systems (e.g. medical, educational, government and industrial) can be classified into four common modes of interaction : 'One - to - One', 'One - to - Many', 'Many - to - Many' and 'Many - to - One'. Selection of communication modes is determined by the specific areas to which teleconferencing is applied. Basically, each teleconference system includes more than one mode; for instance, interaction patterns of 'One-to-One' and 'One-to-Many' conditions occur in most systems while a participant is addressing any particular other (this may also include the chairman) or addressing general conferencing groups. However, in the 'Many-to-One' situation, a common occasion will be when participants are conferring with audio images, in which case there is a limited ability to 'foresee' who is the intended speaker without any specific 'built-in' device; the 'Cross-Talk' problem is therefore occuring frequently. The case of 'Many-to-many' communication is most obvious when a conference may develop into a chaotic situation that teleconference designers and users are most anxious to avoid.

7.2.2.4 Modification & Innovation

This is the final and the most critical stage of the UBN subsystem. Although the teleconference system has reached its equilibrium state in integrating the users' acceptance and operational mode with the four components of the CAI, there are certain existing problems which require immediate attention. The teleconference system as a technological device, should not be adopted in various social contexts without thorough considerations of :

a) its rating for survival
b) economic necessity
c) development opportunity and
d) the probability and possibility of becoming a socially accepted as 'goods and service'.

In order to avoid oversimplified decision on its value and utility, we need to explore its effectiveness for satisfying demands and its impact on social relations. The implementation of teleconference technology will give rise to external changes in the communication sector. However, a society needs to make social adjustment if a technical innovation is actually to become adopted. In view of the speed of the present technical advancement, this problem is urgent. It is then essential to study the specific demands and value backgrounds of the social context.

No technological device can be successfully implemented in any social context without struggling up the basic social ladder of :

1) Acquisition by and Acceptance of users, and
2) the Specialization and Modification procedures of the system itself.

This can be applied to the analysis of teleconference systems in functional institutions. The Conference Activities Inventory is the social context of conferencing while the subsystem of Users' Behavioural Needs is the timing device for measuring the developing progress of the system.

7.3 SOME SUGGESTIONS FOR BEHAVIOURAL MODIFICATIONS AND ASSESSMENT OF COMMUNICATION TECHNOLOGIES

Research and experience have already demonstrated that Teleconference Systems, both as technical aids and as new styles of conference, may be progressively improved. An Equilibrium Model which integrates the two subsystems : Conference Activities Inventory (CAI) and Users' Behavioural Needs (UBN), has been constructed and analysed in details. Four basic values are inherent in the dialectic processes of task- and emotion-activities of teleconferencing behaviour. Social relationships and

personal satisfactions can only be achieved with the internalized values of collective trust between participants and individual recognition of the characteristics of teleconferencing. Participants are conversing with remote-images rather than physically present individuals. On the other hand, learning experience and organized patterns of communication can enhance better group interaction and may facilitate certain functional objectives effectively and efficiently in diffused institutions where teleconferencing has been applied.

The growth of CAI relies entirely on a developing ladder of UBN. On the other hand, the latter progresses along a time sequence. A teleconference system can therefore be presented to current and potential user via the user and system approaches. Procedures of acquisition and acceptance levels for participant include complicated learning experience and socialization processes, while the specialization level (of the UBN subsystem) involves careful selection of specific modes of interaction to attain the functional objectives of institutions. The modification or innovation level is designed to seek further understanding of the cultural environment in adapting the teleconference system to any specific social context. Full capacity and maximum effectiveness of the system can only be obtained if all components of the CAI and UBN subsystems are thoroughly considered and studied.

The theoretical model of some psychological factors in teleconferencing has been comprehensively discussed. However, since many of the accustomed rituals of conventional conferences are not relevant to teleconference systems, there may be some reluctance on the part of participants to accept such systems. This further indicates that there should be some consideration of social criteria for implementing appropriate

telecommunication policies. The purpose is to provide conceptual guidelines for government offices, communication industries, and the general public as a frame of reference.

Chapter 8 THE FUNCTIONS OF FORMULATING COMMUNICATION POLICIES

Summary

Teleconferencing being part of the very fabric of telecommunications in our industrial society, takes place at all levels; (between people and institutions, from government to people and vice versa, and through many channels both interpersonal and mediated.) It is understandable that when we discuss about telecommunications, our concern is not just the hardware, but also the organizations that control them and the impact they have on us - the ways in which communication is used; the networks through which it flows; the structures of the media-system; the regulatory framework for the system; and the discussion of the people who operate it, etc.. These are the outcome of communication policies which are principles, guidelines or rules on which this 'societal nervous system' is built.

The purpose of this Chapter is to sketch a profile of the criteria and the role of an independent third party (e.g. advisory body, government agency, etc.) in making recommendations to formulate such national and international communications policies. The Chapter concludes with an indication of the implicit requirement of this third party to carry such heavy responsibilities.

8.1 SOCIAL CRITERIA FOR IMPLEMENTING TELECOMMUNICATIONS POLICIES[64]

Advancement of communication technologies has been providing facilities for information storage, transmission and retrieval from computer data bases via telecommunication media, (e.g. wire, radio, microwaves, satellite, etc.). Users' preference and precautions, marketing strategies,

manufacturers' responsibilities, technical safeguards and suitability, legal remedies and global communication planning and cooperation are subsystems of an integrated communication system as depicted in Figure 35.

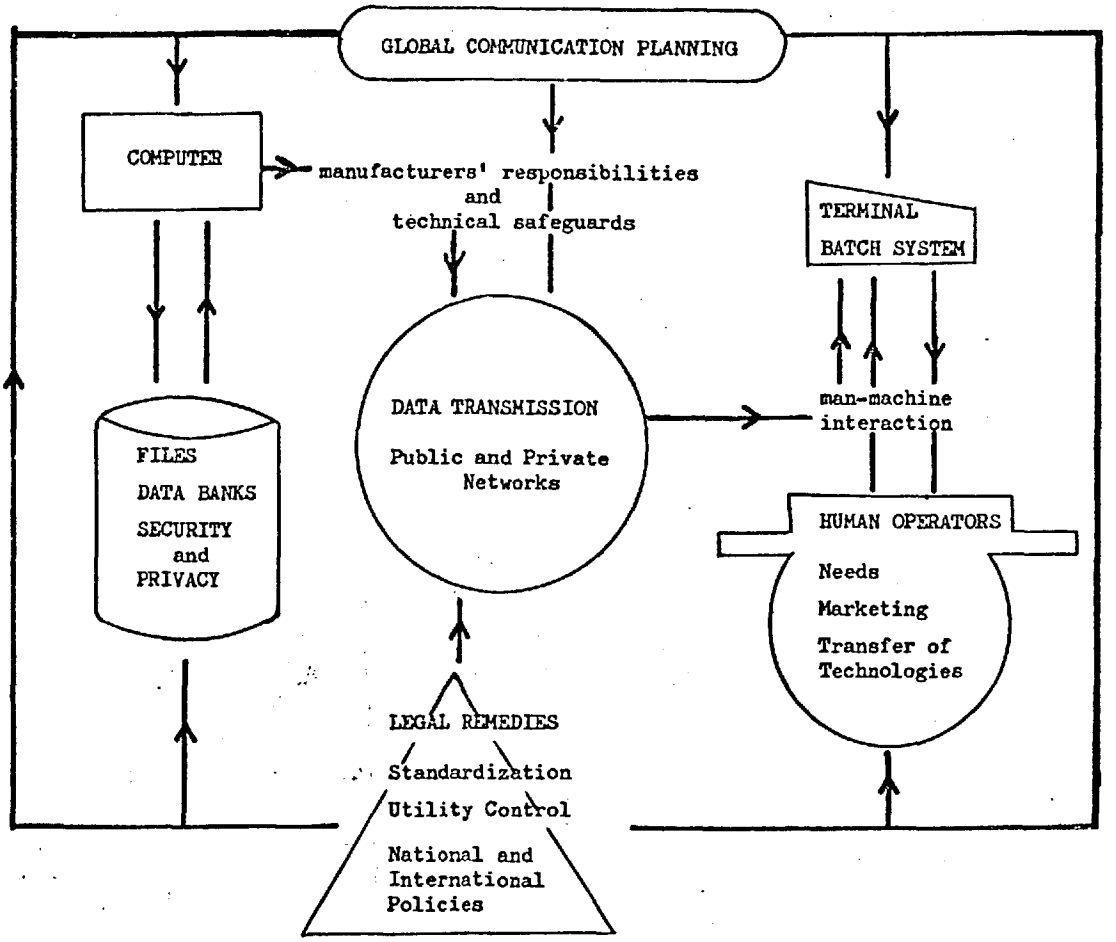

Fig.35 : Some Major Components of a Communication System

Each of these subsystems has its individual emphsis on technical, economic, socio-cultural and legal aspects. Furthermore, every subsystem is taking an equally important role; so that a successful integration of any communication system relies on a cooperative balance of them.

8.2 PROTECTION OF PRIVATE RIGHTS AND SYSTEM SECURITY

Novel communication technologies, computers and electronic devices threaten to intrude on the individual's right to privacy. National or international legislation may prohibit 'wire-tapping' of telephone conversation, surveillance or mail and telegraph or other transmitted material, while safeguards are required to ensure confidential data. It is collected for specific purposes and stored in computer, therefore it should be prevented from unauthorized access to it. Several data protection laws or acts[65] in many countries in force or projected are based on some independent agents which are not only skilled and experts in the field, but also working under a set of rules which is simple, clear and flexible, to take the role of enforcing the principles fairly.

However, a dilemma is then created by the conflict between the right to 'seek and impart' information and an individual's right to privacy. Although a definition was made by the 'Panel on Privacy and Behavioural Research'(67) to the United States President's Office of Science and Technology, privacy depends on many factors like the nature of the society and the particular circumstance of the occasion.

Teleconference systems, are directly influenced by and are having significant impacts on system securities and individual rights and privacy (as much as their predecessor, telephony). Teleconference assumes many styles; e.g. audio, audio-video, terminal or computer conferencing, etc.. Computer conferencing in particular associates with a vast data bank[66]. There are numerous implications as information is processed with imperceptible delays from many remote users. The multi-access characteristic with simultaneous 'real-time' or 'on-line' operation properties creates moral or ethical dilemma. It is for certain that, on one hand, the cost and

time for reproducing, transmitting, instant up-dating, amending, searching and retrieving data are reduced while users are able to enjoy the possible benefits that increased information flows can confer; however, stored information may at the same time reveal more than an individual wishes to be known; the opportunity of controlling the flow of information is also reduced. Four criteria are then suggested : (Fig.36 shows some relationships between major risks and their possible safeguards.)

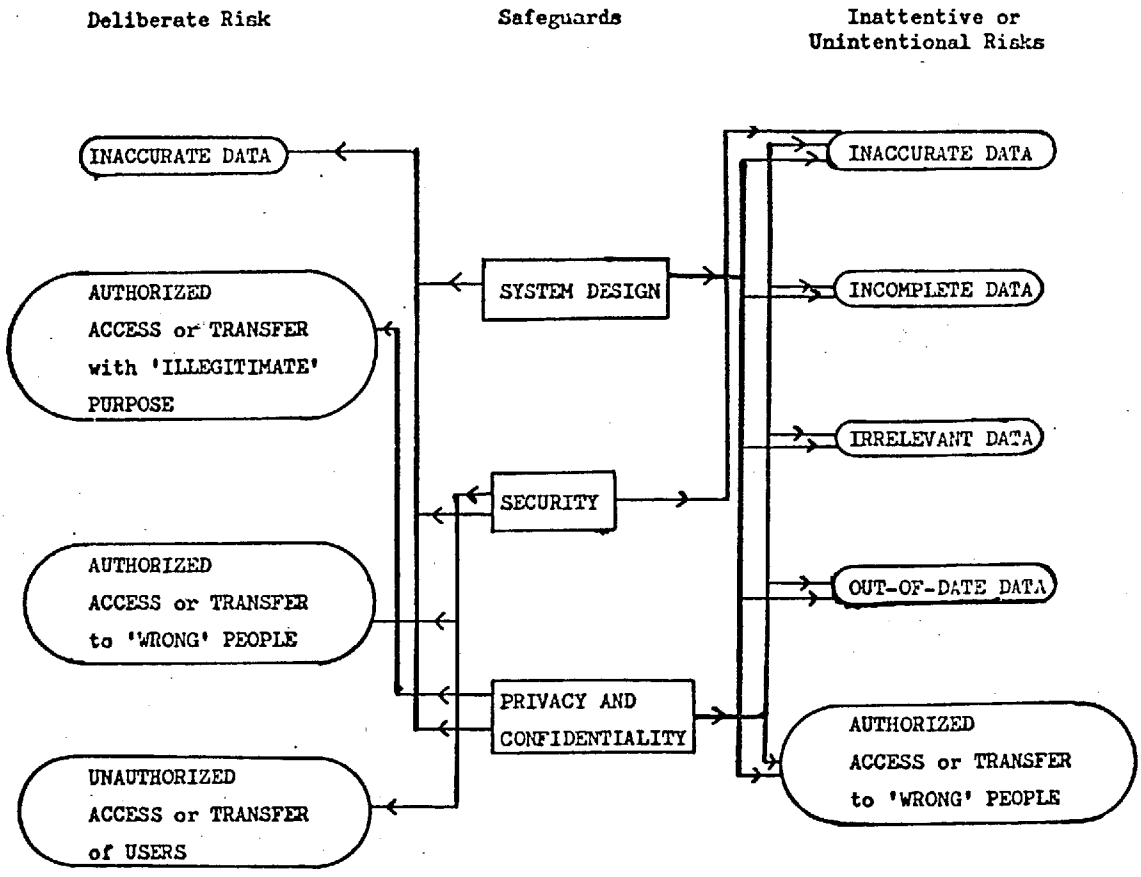

Fig. 36 : Principle Risks & Safeguards of Communication Systems

8.2.1 User Precautions

It is generally acknowledged that the training and professional standards of staff who operate and control computers are the prime safeguards against misuse of data banks. However, human errors are the weakest link to endanger the chain of security. Therefore, it may be cost-effective to introduce the role of 'Electronic Data Processing Security Specialists' to check for failure and sabotage, plan for emergency support, conduct periodic tests of duplicate files and other control procedures, and finally to minitor the security control system constantly. The need for rigorous professional concern and specific corporate security policies with professional ethical code should then be seriously tackled in relevant professional institutions.[67]

8.2.2 Manufacturers' Responsibilities

The next most important means of security will be features which are built into the basic design of the 'hardware' and the accompanying operating 'software' of the system. Manufacturers should provide such facilities before a system is installed. Techniques of limiting access to authorized users, controlling and monitoring the performance of the system for detecting 'unusual' activities are necessary. These of course involve deciding the levels of security, additional system-cost and reduced processing speed, etc.. Therefore, budgets of computer centres will have to allow for these.[68] In terms of importance, manufacturers should be responsible for[69] :

1) absolute protection within the central processor, e.g. with users' own separate memory, so that no other person can inadvertently have access to that source.

2) Strict control of all input-output instructions to prevent illegal access to files. The hardware must apply the constraint of complexity; the software should reduce all genuine program input or output to simplicity.

3) Available storage facilities and device to prevent operations to put new data in selected sections, so that it cannot be destroyed.

4) Application of special lockage to control manual or automatic operations

5) Independent switch of power-supply for every storage device and terminal, so that switches are lockable.

6) All data is 'coded' whenever it is sent over public communication circuits and facilities to perform 'scrambling' or 'cyphering' transformations are provided.

7) A 'printed-suppress' switch is fitted to every message-printing terminal to transmit individual-code (password) without being actually printed.

8) Connections between computers and their terminal networks at distant location over public telephone are being identified by specific signals being sent out by computer to 'dial-up' subscribers, etc..

8.2.3 Technical Safeguards[76,77]

Four main classes of protective measure can be identified :

1) Processing Restriction like - computer control program to restrict access to certain files, to arrange both program and data to remain in memory for only the briefest time (only when they are in operation); certain files to be held in dismountable devices.

2) Cyphering or Transformation - all transmissions are in a sense 'coded' for they require original input being transformed into a series of 'impulses', that the right equipment is necessary at the receiving end to reconvert these serial signals.

3) Intrusion Monitoring - the inclusion of programs to detect illegal attempts to extract information. This includes recording of all rejected attempts to enter the system or specific files, use of illegal access procedures, etc..

4) Password Control - all access control must depend upon this strategy. This is established to identify terminal users and verify that one has authority to proceed.

5) The use of Pseudo-Random Number - this is a novel idea similar to the principle of password control. It identifies and verfies users by unique simple calculation by users and then being recognized by the system itself.

8.2.4 Legal and Civil Remedies[72]

This can certainly assist in minimising the danger of data banks, though it is understandable that the present law does not yet provides adequate solutions to the problems created by new communication technologies and it provides no means to challenge the accuracy of facts or opinions stored in data files. There is no method by which a person can see his record and insist on modification or erasure of an inaccurate or false entry. Undoubtedly, new laws are required.

Three different models have been used for this solution :

1) Self-Help Model :

For instance, the 'U.S. Privacy Act'(74) is very much in the American tradition which dislikes paternalism and prefers to leave the citizen to pursue his rights through the courts and it also involves no great financial risk for the claimant. But its principle disadvantage is that it uses ordinary courts where judges in general are not experts in computer communications, nor used to making value judgements about conflicts of this kind. Morever, as communication technologies develop so quickly that there is a serious risk that such a statute will become out of date in a relatively short time.

2) The Ombudsman Model :

The German 'LAND HESSEN Protection Act'(70) adopts a solution at the opposite end of the spectrum from the American model. They extend only to public sector systems and are drafted in far more general terms. Likewise, the Austrian 'DATA PROTECTION BILL'(74) confers a right to system operators to print and to alter data-subjects, but

imposes an obligation of secrecy on them backed by criminal sanctions. However, it is striking that no power is conferred on anyone to enforce these rights and obligations.

3) The Licensing Model :

Swedish's 'DATA ACT'(73) is quite different from the above two models. A Data Inspection Board is established to register and issue operation license of each system. The principle advantage is its very high degree of system flexibility that could be tailor-made to ensure appropriate safeguards at the minimum necessary cost and all systems will then remain under permanent supervision. However due to the fact that the power of such an inspection board can be extended only to the private sector, the remainder is accounted for by 'sensitive files' in the public sector.

Data can be transmitted at high speeds over great distances and is by no means expensive. International data traffic therefore is both convenient and effective. In the long run, it is desirable to have international conventions which should ensure equally strong control regimes (e.g. in the Council of Europe and the the Organization for Economic Cooperation and Development). But it will be many years before effective international conventions can be agreed and brought into force. In the meantime, it is necessary that any national control regime should apply not only to the physical computer installations within the national territory, but also to the system operators who function within that territory. Then there should be further public control of all data traffic which crosses the national bounderies. That includes the control of import and export of physical objects like magnetic tapes or discs and trasmission of data over cable, radio, satellite, etc..

Regardless of which control model is adopted, any effective control regime's jurisdiction must extend to :

1) all automated data processing regardless of the technology employed
2) all classes of confidential data (personal or organizational)
3) data traffic across national frontiers

There is a good case for saying that professional societies and associations should be entitled to protection for their data, to claim for privacy of information which may at some time been published. However, given an effective control regime which can reconcile all conflicting values, it should be possible to ensure that we can derive many benefits from data-banks without any threat to individual privacy and system security.

However, no man-made system can ever be perfect. Even if all known safeguards were applied, regardless of cost, to all computer systems holding personal information or confidential conference notes and records, there would still be some unconvenanted infringements of privacy. Technical safeguards are designed to reduce the risks to some accpetable level. A list can be drawn to calculate such risks :

1) The risks from 'unauthorized' access to an information system are essentially security risks, which can be met by physical and electronic security safeguards.

2) The risks from inaccurate, incomplete, irrelevant and untimely data can be guarded against by intelligent system design, based on sound value judgements.

3) Security safeguards are technical, and the computer itself can often play the part of its own security officer.

4) The choice of adequate levels of security safeguards will ultimately depend on the cost of formulating them, and the value of the data which they protect.

5) The best safeguards against confidentiality risks fall into two classes : administrative and functional. The former refers to the minimum and necessary procedures and operations needed to transmit the data; while the latter includes contractual agreement and promises made between the data bank and its data owner.

6) Professional codes of ethics or conduct can provide useful support for, but cannot be expected to replace other safeguards.

7) No system of safeguards will ever be perfect.

8.3 AWARENESS OF INTERNATIONAL CONSTRAINTS AND FOREIGN RELATIONS[73]

While communication policy is formulated or implemented essentially as a matter for national determination as well as international implication, certain aspects (e.g. cultural, technical, economic, political, etc.) must be carefully considered. Although radio waves and satellite transmission recognize no frontiers, cooperation between nations is indispensable for establishing a regulatory framework for the movement of information materials and people between cultural, political and economic boundaries.

The flow of information both inwards and outwards is a vital concern of most countries to establish adequate structures and policies at the regional and international standards; such as those laid down for electronic equipment by the C.C.I.R.. Convention and regulations of the International Telecommunication Union and its various organs are also a possible frame of reference.

8.3.1 Awareness of the Communication Values and Norms of Target Foreign Market

The main concern especially in the case of teleconference implementation is the serious problem of 'Cultural-Lag'[73]. Telecommunication industry is no longer retricted to a particular culture. For instance, satellite communications have been so established that technical constraints and geographical boundary have become relatively minor problems. The 'Level of Acceptance' of novel communication technologies[36] varies between cultures. It is influenced or hindered by traditional communication habits and rituals, societal and individual attitudes toward 'novel' technology, 'cultural-shock' and 'uncertainty', etc.. These demand comprehensive studies of the basic interpersonal relationships and

perception of a particular target population before a technology can then be applied. Will or can telecommunication technology one day be a fully cross-cultural communication? (Fig.27)

8.3.2 Technical Suitability and Compatibility of Transferred Technologies[75]

Manufacturers developing new communication technologies in a competitive field, will frequently adopt different standards and produce incompatible equipment. For instance, developing countries accepting foreign aid may find themselves committed to the installation of imported equipment from a donor country which proves inappropriate in technical design or standards for their existing systems and facilities. For instance, the installation of a teleconference system in a developing rural country is certainly considered to be inappropriate at this stage. Even in urban and industrial countries, national policy decisions should be taken as early as possible with regard to technical standards and system specifications. This ensures that technical systems are developed on sound bases and imported equipment conforms to local systems as well as international standards. An operation model has been prepared to ensure successful implementations. (Fig.30)

8.4 GLOBAL COMMUNICATION PLANNING AND MODIFICATIONS

The quality and quantity of international and national data traffics are largely determined by economic pressures and mutual agreements. There is increasing recognition of the need for a global view and coherent planning of the communication system[76]. This further implies coordination at the levels of policy formulation, strategy planning and operational implementation. The utilization of technology for socio-economic and cultural development has so many aspects and such a vast potential, that

technological developments (e.g. cable television, displayed news information, electronic delivery of printed material to homes and offices, etc.) will blur the boundaries between the media. On the other hand, while placing still more information at the disposal of the public, it may well dislocate some existing services and institutions. Therefore, certain criteria should be taken on national and international bases.

1) Communication planning should be assumed in national economic planning; telecommunications should then be integrated in the whole communication infrastructure
2) The organization of a 'Communication Policy Council' should have 2 basic functional levels : the ministerial committee consisting of ministers of planning, finance & foreign affairs, concerned with communication structure and the policy implementation; the advisory committee consisting of the previous membership together with representatives from media and community organizations. This committee will be served by expert/technical sub-committee to make recommendations
3) The establishment of an inter-ministerial coordinating committee with its communication advisory body is useful to harmonize the program of various sections for developing and utilizing the media and interpersonal communication networks
4) The roles of a communication advisory body (which should be formulated by multidisciplinary experts and representatives from government & non-government organizations) are to establish study-groups/tasks-forces on specific aspects of communications; (e.g. making recommendations in policy issues, priorities, coordinations, strategies for utilizing communications for social purposes)
5) It requires agreements on goals and policies, a will to use communication in the development process, a knowledge of ways and means based on researches, cooperation of the media and the professionals, and the participation of the whole community
6) The achievement of complementary centralized and decentralized control directions to maintain flexibility, diversity and freedom of expression. The optimal combination depends upon political and social goals and norms
7) The interrelationship of social system components, e.g. political, economics, cultural and technologies, etc. should be understood and have been elaborated in previous sections of this discussion

while policies and strategic plans are determined at the inter-executive offices, operational planning and coordination take place at other levels, and decentralized to regional and district organizations, the final problem is the methodologies and standardization of such 'technological assessment'. Even though we may have decided on the most appropriate marketing strategies and adequately understood the particular target market, yet we still need to maintain constant attention to the social and economical changes. How are we assessing the development of a particular communication technology? Likewise, to what extent it can adapt to those changes? Furthermore, how competitive is a particular technology to its similar type? Our ultimate concern in the field of 'human factors of communication technology' will be, how far can this novel technology deliver the desired satisfactions more efficiently and effectively than the existing system? On the other hand, how much training-needs and manpower resources are required in promoting the use of such technologies? Finally what will be its effects on travel and energy (saving or expenditure)?

8.5 THE ROLE OF THE GOVERNMENT OR INDEPENDENT AGENCY

Communication systems both create the needs and grow in accordance with the needs of the people and the development of communication technologies. New means of communication may replace the old or establish parallel alternatives; market forces may determine the place of various media; and governments may have to resolve conflicts when new technologies threaten vested interests or dislocate established networks. To what extent governments or independent agencies should intervene to maintain an integrated social order and harmonious communication system - is itself a major policy issue. (For instance, they may implement policies through direct control of the system, or by excercising constraints in private interests undertaking communication activities and providing

support and incentives to encourage system-development in desired directions, etc..) In order to formulate and implement such policies, we have considered some of the fundamental conceptual problems and highlighted possible alternatives to reconcile the existing demand.

Government or independent agents are required to take up this heavy responsibility of formulating and applying the telecommunications policies. An individual in such a position needs to have the ability to identify and specify problem areas and the capability of suggesting solutions and their alternatives. It is of paramount importance to adapt oneself to the rapid changes in the social, economic, cultural, political and technical environments and to integrate these aspects in a global sense. Above all, the task involves the individual to liase with people of various disciplines and official capacities. It is a necessity to obtain a wide coverage of training and education in Governments, industries and universities.

Chapter 9 CONCLUSION

9.1 THE AUTHOR'S INTENTION OF THE STUDIES OF TELECONFERENCING BEHAVIOUR

The objectives of these studies are to explore the principle methodologies for analyzing teleconferencing behaviour. No generalization of such behaviour to all users and situations is intended.

The studies were designed to answer the possibility of using teleconference systems as an aid to cross-cultural communications and the necessary precautions and responsibilities which designers and implementers should be aware of and undertake. It should be noted that the studies are not concerned with the investigation of efficiency of teleconferencing and face-to-face interaction. The results of the experiments relate mainly to comparisons of the 'within-group' and 'between-group' behaviours at the twenty eight sessions of teleconference. They can be considered as a major pilot study to ascertain :

1) the teleconferencing behaviour (e.g. within-studio and between-studio, with or without chairman, etc.)
2) the levels and designs of appropriate user training stragegies
3) the social criteria for implementing such telecommunication policies, prior to the implementation of such teleconference systems (in any form).

Contributions of this research are therefore related to academic advancement, industrial connotations and administrative concerns.

In view of the specific purposes of teleconference studies, they are aiming at exploring the principle methodologies for analyzing teleconferencing behaviour.

The studies of twenty eight sessions of teleconference have been conducted with a considerable degree of intensity and comprehensiveness. A method of 'Vector Analysis' with a vast participant-data-base and an 'Interaction-Variables Analysis' regarding seven sets of questionnaire studies were designed by this author.

The present results of 'within-group' and 'between-group' teleconferencing behaviour have been presented in four phases of System Arrangements : 'Single-Single', 'Dual-Split', 'Cross-Split' and 'Single-Chairman'. 'Within-group' teleconferencing is basically a 'face-to-face' interaction. This interaction style features exactly that in the 'Control Group' of a classical experimental design of teleconferences. Therefore the 'within-group' communication itself could be considered as the 'control group' in the present studies. Morever, 'between-group' teleconferencing which is referred as a style of 'people-images' interactions, is no doubt the 'experimental group'. Teleconferencing features the experimental and control variables. A classical experimental design which suggested separate 'experimental' vs. 'control' group is not applicable nor suitable for these teleconferencing experiments; and therefore, not being employed in the studies.

Furthermore, the present results are only relative to particular social environments. Since the studies should be regarded as studies of methodologies, together with the confinement of time and human resources (available for this research), it is not necessary (and practically impossible) to obtain judgements from a sizeable team of experienced observers at this stage. It is undoubtedly fruitful for any future exploration along this direction of analyzing teleconferencing behaviour.

It should also be recognized that the subjective interpretation of observers is unavoidable. Although statistical weighting has been applied to the interpretation of these observations, yet it must be noted that the results only hold true 'statistically'. Furthermore, there are no means of telling what the overt behaviour could have been under natural, unobserved conditions. On the other hand, there is no reason for supposing that behaviour has been entirely transformed through the presence of experimental elements.

9.2 WHAT JUSTIFICATION DO WE HAVE IN RESEARCHING ON TELECONFERENCING?

Teleconferencing is a 'novel' style of communication. It is far from being 'ritualized' as is conventional face-to-face interaction. Certain types of distinctive teleconferencing behaviour were observed and interpreted in detail in this research. Many questions have been raised in order to justify the research on understanding the teleconferencing performance. These include :

1) The Economic Reasons and the Effects on Immediate Users
2) The Psychological and Operational Differences and Constraints
3) Group Discussion as a Common and Effective Mode of Communication
4) The Need for More Cooperation between Main Companies and their Branches through Teleconference Systems
5) Teleconferencing as a Means of Psychological Motivation

9.3 WHAT MORE DO WE KNOW ABOUT THE SOCIAL IMPACTS OF TELECONFERENCING ?

In achieving a cost effective communication system, we have encountered a number of difficulties. There are at least three major problems, regarding the human impacts of telecommunication industries. First of all, the key factor of a successful communication technology is not only determined by a 'sound' or 'sophisticated' technological design, but also accompanied by a 'thorough' or 'detailed' understanding of a target market.

It is relatively easier to understand the needs and values of a specific market and then to determine appropriate marketing strategies in terms of knowing the past and present trend of telecommunication development. We need to find out the functions and objectives of a particular communication technology, how and to what degree it can be applied to the target market, the estimation of time-scale, the cost of promotion and development, the procedures of promotion, the flexibility and adaptability of the technologies, etc.. This information can be obtained from marketing researches and management forecast. Much effort and attention have been expanded in these areas.

However, the main concern is the serious problem of 'Cultural-Lag'. Telecommunication industries are no longer restricted to a particular culture. For instance, satellite communications have been so established that technical constraints and geographical boundary have become relatively minor problems. The level of acceptance in any particular culture varies. It can be hindered by traditional communication habits and rituals, societal and individual attitudes toward a 'new' technology, the suffering from 'cultural-shock' and 'uncertainty', etc.. These demand comprehensive studies of the basic interpersonal relationsips and perception of a particular target population before a technology will then be applied.

The final problem is the methodologies and standardization of 'Technological Assessment'. Even though we may have decided on the most appropriate marketing strategies and adequately understood the particular target market, yet we still need to maintain constant attention to the social and economic changes. How are we assessing the development of a particular communication technology? Likewise, to what degree it can adapt to those changes? Furthermore, how competitive is a particular technology to its similar type? Our ultimate concern in the field of 'human factors of communication technology' will be, how far can this novel technology deliver the desired satisfactions more efficiently and effectively than the existing system? On the other hand, how much training-needs are required in promoting the use of such technologies?

9.4 POSSIBLE RESEARCH AREAS ON TELECONFERENCING STUDIES

1) Implementation of Teleconference Systems and their Influence on Decision Making Processes

   Via : 1) two-people communication
   (increase the number of participants)
   critical factor: the influence on every marginal participant (the significance of visual and non-visual communication)

   2) Conventional Committee Meeting vs. Leaderless Small Group Interaction

   3) Definitions of 'Conference' and 'Group'

   4) Exploration of the actual importance of face-to-face communications in activities normally found in the work environment

2) Implementation of Teleconference Systems -
Analyses of Participants' Behaviour in Various Types of Organizations

In : 1) Intraorganization Communication

2) Interorganizations Communication

3) International Organizations Communication

3) Problems and Effects of Implementing Teleconference Systems Cross-Culturally

1) Studies of gestures, facial expressions, performance, and attitudes

2) Comparison of attitudes (different cultures) toward acceptance of videophone

4) Further Studies on 'Within-Group' and 'Between-Group' Teleconferencing

1) Nature of Conversation (i.e. technical or non-technical)

2) $\left[V \xleftrightarrow{\text{difference}} \bar{V} \right] \longleftrightarrow$ face-to-face

where

V : with video channel(s)

$\bar{V}$: without video channel

Two-People Communication

$f \leftrightarrow \overline{V}$

3) Facial expression, gaze behaviour, gesture and body movements

4) Subjects' familiarity with $\overline{V}$ (i.e. telephone)

5) Subjects had acquired alternative social techniques for $\overline{V}$ condition

$f \leftrightarrow V$

6) Regional distance, personal touch, direct response

7) Technical media

8) Freedom of choosing channels and images

Three-people (and over) Communication

$V \leftrightarrow \overline{V}$

9) Clarity of voices -- identification of voices (can image help?)

10) Problem of presenting simultaneous 'life-image'

11) Can the significant difference of vision and non-vision be quantified?
Can weight be attached to 'significance'?

Choice of Techniques

12) Necessity of presentation of simultaneous 'still picture' -- for identification of participants and intended - speakers

13) Role of chairman in conventional conference - power of conducting, addressing authorities of members ,..., etc.

14) 'Life image'; Is it available for present technology?
Is it possible for future technology?

15) 'Multi-images' on one screen

16) The choice of listeners toward different kinds of image

The analyses of 'within-group' and 'between-group' teleconferencing have been conducted with a considerable degree of comprehensivenss, these analyses should not be assumed to be sufficiently exhaustive to reach an ultimate generalization. After all, the development of the human aspect of communication is still in its infancy compared to other 'conventional' aspects related to the development and control of machines. It is this author's contention that an accumulative effort is necessary to attain a significant achievement in this seemingly unexplored area. The success of a communication system relies on an effective match between users and systems. The effect of an User-System integration is therefore of paramount importance.

This thesis concludes with the awareness of needs for protection of private rights and system security; especially if 'telemediated' communications should develop across political and cultural boundaries. Telecommunications technologies involve enormous expenses; it is crucial to resolve a number of psychological questions in order to insure their value and success.

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Appendix 1 :

THE PRESENT APPLICATIONS OF VIDEOPHONE

APPENDIX I

The Present Applications of Videophone

Researches for applying the videophone-system have been conducted not only in various technological assessments, but also in diffused aspects of social concerns: the sociological exploration to the adverse impact of videophones used within the deaf community (the National Technical Institute for the Deaf), continued experiments of the use of random access video-telecommunications in health care delivery (Massachusetts General Hospital, Boston), demonstration programs testing the use of videophone in traditional and novel educational environments (the Open University, U.K. & Industrial Research, U.S.A.) and the impact of video-telecommunications in organizational efficiency and structure (University of Southern California),..., etc..

Similar efforts have also been spent in various countries as indicated in Appendix II.

Animated Videophones

Country	Manufacturer	Device Name	Stage of Development
U.S.A.	Western Electric (Bell System)	Picturephone®	In service (Chicago & Pittsburgh)
	Stromberg-Carlson	Vistaphone™	Manufacturing
	GTE (General Telephone & Electronics)	Pictel	Demonstration
Sweden	L.M.Ericsson	--	Limited production and trials
U.K.	Post Office	Viewphone	Limited trials
	Pye	Videophone®	Apparently only secured name
	Plessy	--	Experimental
Japan	Toshiba	--	--
	Fujitsu	--	--
	Nippon Electric	--	--
	Hitachi	--	--
Germany	Siemens	Videoset 101	Series production
France	CIT-Alcatel	Visiophone	Demonstration
	Thomson-Brandt		
	Matra		
Netherlands	Philips	--	--

Current State of Development of Video-teleconference

Video-teleconferences in industries have been proved valuable (McMananon1975) (Bell Laboratories Record 1969 & 1970) (Kenwood 1969). Teleconferencing systems can be classified in several ways. Functional approach of applying videoconference system is used:

1. INTRACOMMUNICATION:

   An institution seeks to improve internal communications within a plant or between plants.

   The earliest teleconferencing systems were constructed by New York banks to connect its brances to the headquarters. Recently the Boeing Teleservices System and that of the Institute for Tele-Sciences (ITS) have also developed this service at various plants for conferences, briefings, design reviews and the like. Audio and facsmile are transmitted.

2. EXTENSION:

   An institution seeks to strengthen itself by extending its services into the community.

   Examples of such systems are the essentially closed-circuit ITFS Systems (Instructional Television Fixed Service) built by universities (Florida, Stanford, Southern California) to provide graduate engineering courses to engineers at the industrial plants where they work. Major hospitals like Massachusetts General have this systems for telediagnosis, teleconsultation and other applications for telemedicine.

3. COMMON CARRIER:

   The institution is a common carrier seeking to provide an additional service.

   This is essentially a public an additional service for public utility function. For instance, Bell Laboratories have provided a regular Picturephone service to private offices in Chicago, Pittsburgh and Washington on a custom basis. One of the Post Office services in the U.K.

is a system of Confravision. Canada and Australia have built similar systems. To offer the service to people who wish to use it for internal communications, Confravision is designed to be private. The participants themselves may operate it and no operating personnel are required, either in the studio or in the control room.

4. INTER-INSTITUTIONAL ORGANIZATION:

An Inter-institutional organization is seeking to provide better coordination and exchange of informations between its member institutions.

A common example of this category is the consortuim of colleges and universities; such as TAGER in Texas, that operates a closed-circuit system to interchange courses by instructional television. Audio systems are generally used for responses in such cases. MRC-TV of the Metropolitan Regional Council (U.S.A.), is the first published government system which belongs to this category.

Videoconferences have been applied in diffused areas of functional institutions as alternative systems of communication. All the above application categories of teleconference system (e.g.: medical, educational, Governmental and industrial institutions) are facing some common unsolved problems which have been discussed in Section III.

Appendix 2 :

DESCRIPTIONS OF THE TELECONFERENCE STUDIOS AND OBSERVATION UNIT

Studio 1 : Room 1109A

Studio 2 : Room 1105A

Observation Unit : Room 1109B

(Electrical Engineering Building
Imperial College of Science & Technology
London, U.K.)

Definitions

0) OBSERVATION UNIT : situates near to Studio 1 and has the following hardwares

0.1 Three video monitors
0.2 One video tape recorder
0.3 Two-channel preamp/power amplifiers
0.4 One microphone for annoucements to either or both Studios
0.5 Monitoring speakers or headphones
0.6 Two 5-channel microphone mixers
0.7 Two audio tape recorders
0.8 One control panel

1) STUDIO 1 : is equipped with

1.1 Five microphones and stands
1.2 Two closed circuit TV cameras (Sanyo 1150 with ext.sync. input)
1.3 One large TV monitor
1.4 One speaker

2) STUDIO 2 : is identical to Studio 1, except that it houses

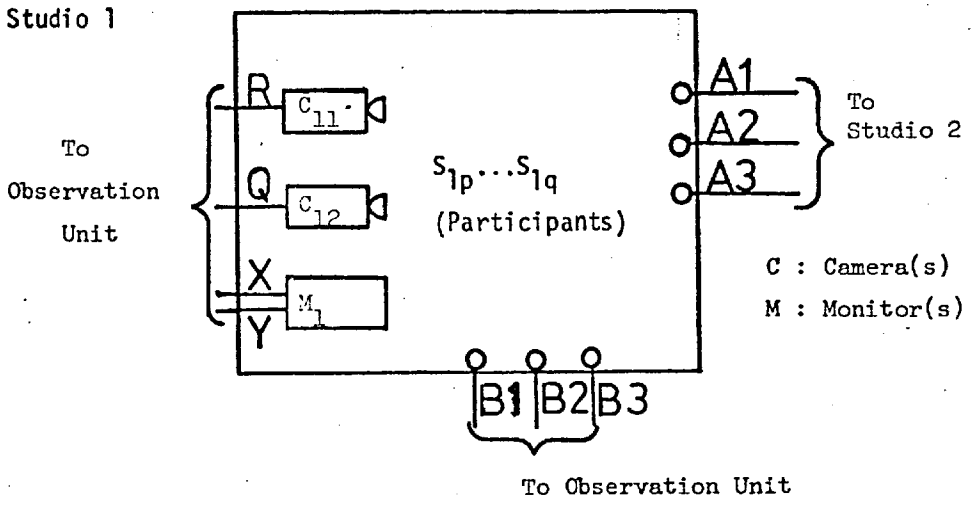
2.1 One Philip's Sync-Pulse Generator and the Camera Driver/Processor
2.2 One Link TV camera

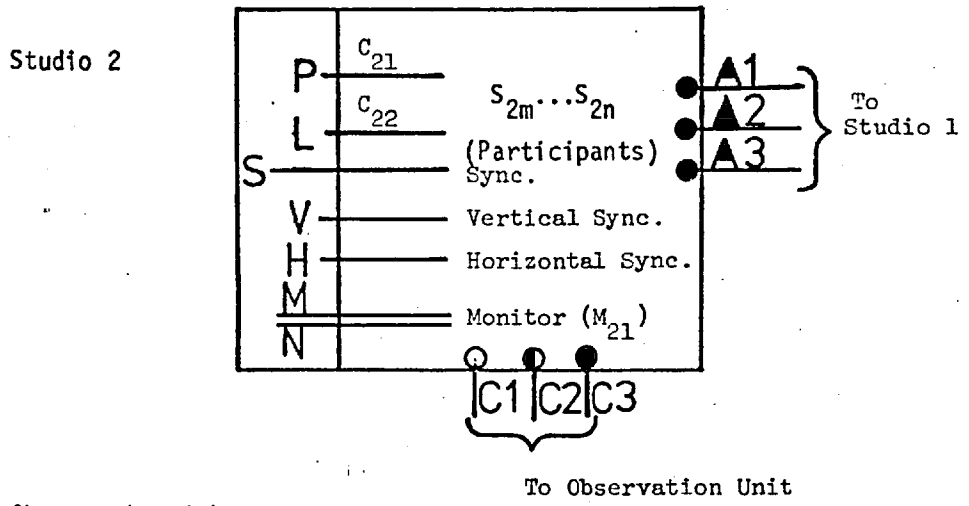
Additional Hardwares :

A.1 Two 'Split-Screen' device
A.2 One pulse-generator
A.3 An one-way-mirror is separating the Observation Unit and Studio 1

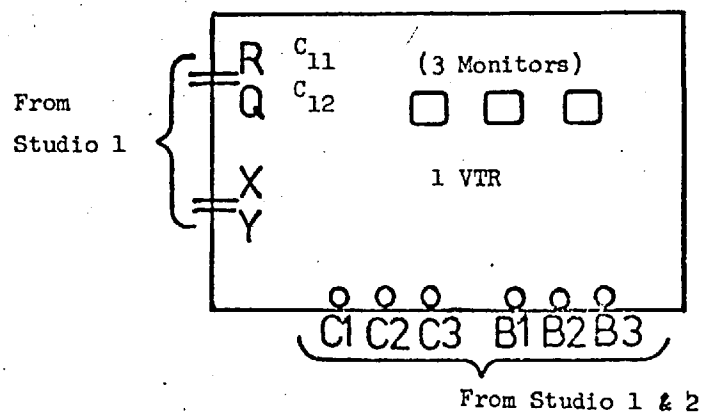
Teleconference Video Circuits (4 Phases)

Existing Cables and Equipment



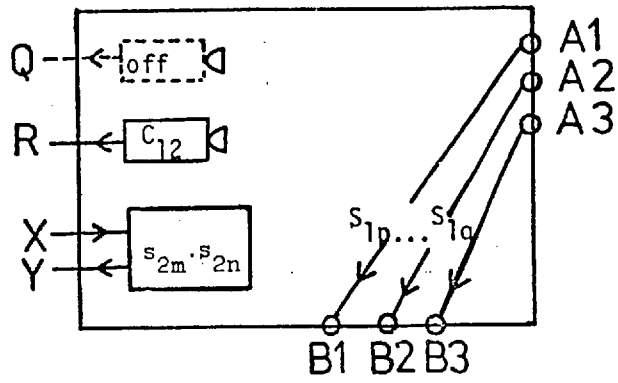


Observation Unit

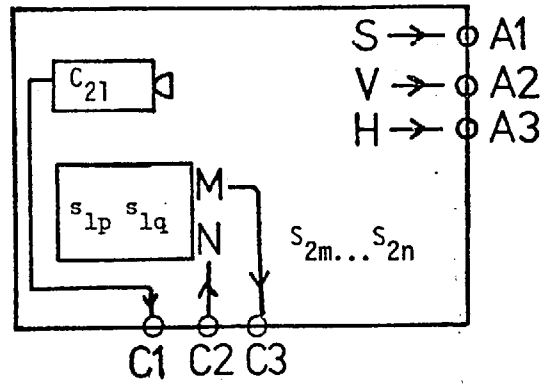


Phase I : 'Single - Single'

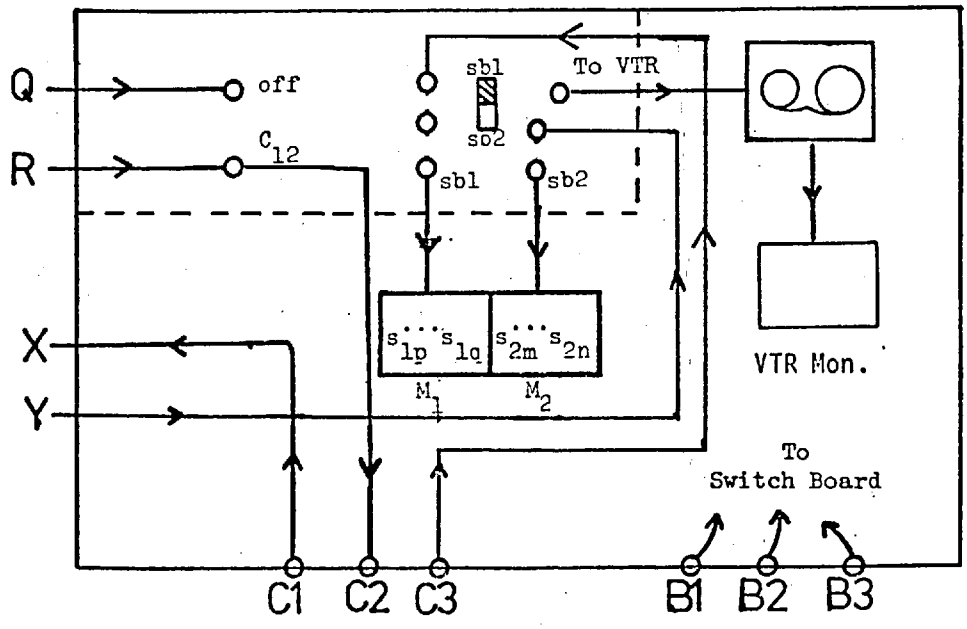
Studio 1



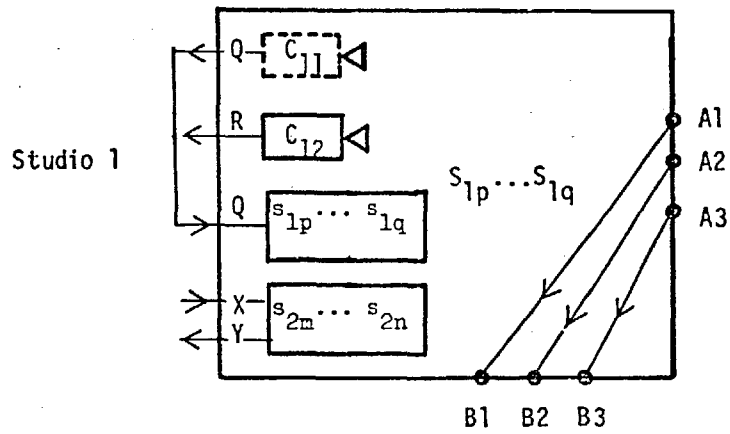
Studio 2

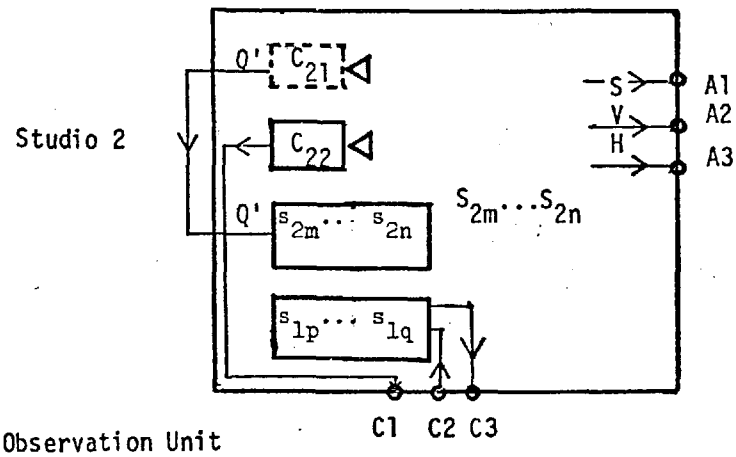


Observation Unit



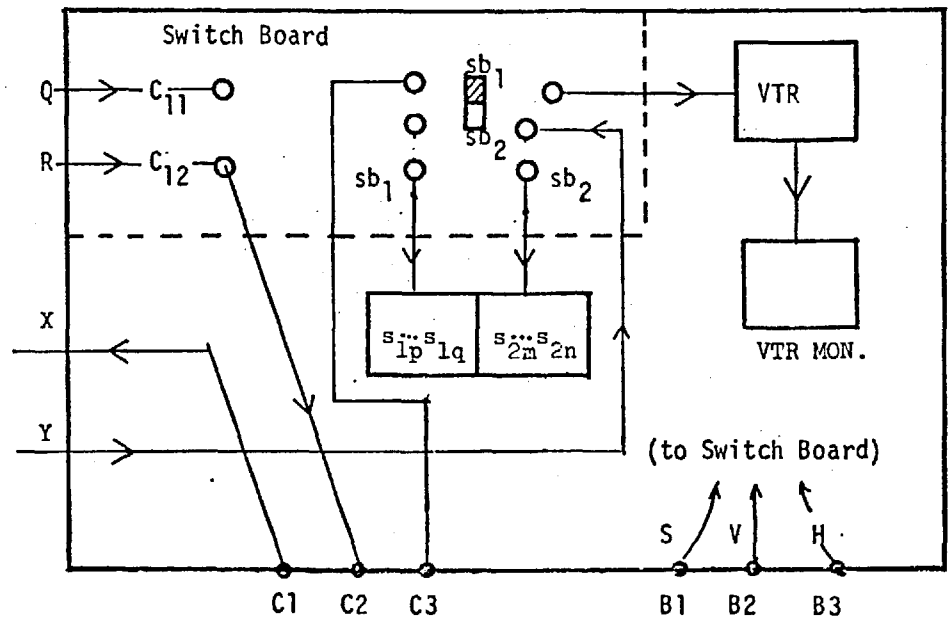
Phase II : 'DUAL -SPLIT'



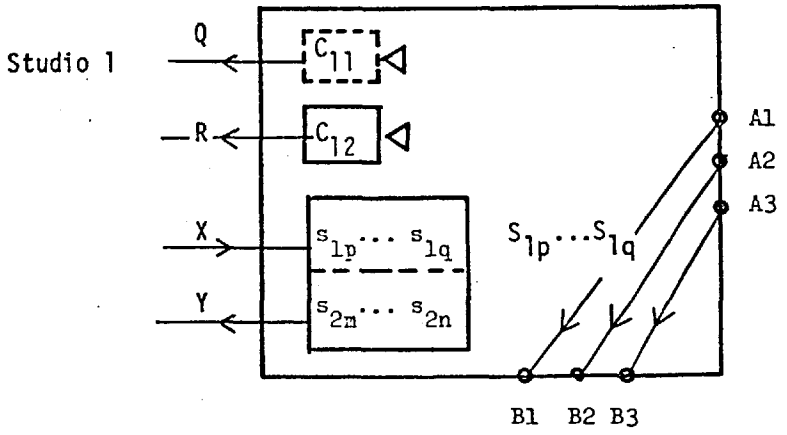


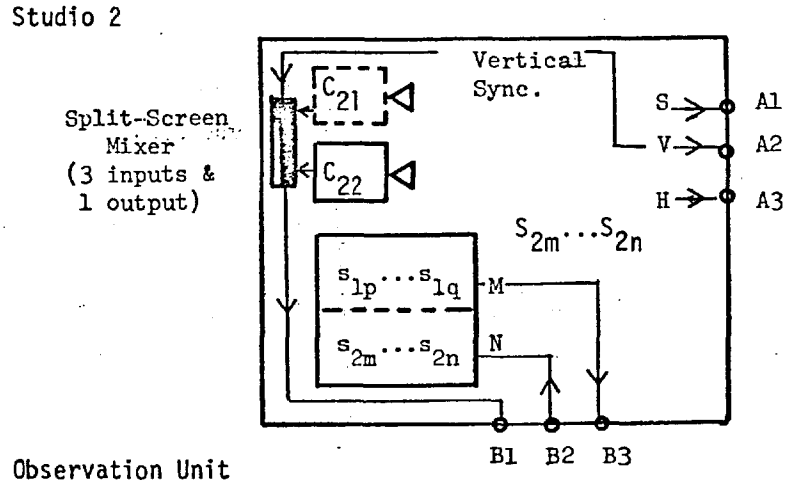
S : Composite
V : Frame
H : Line

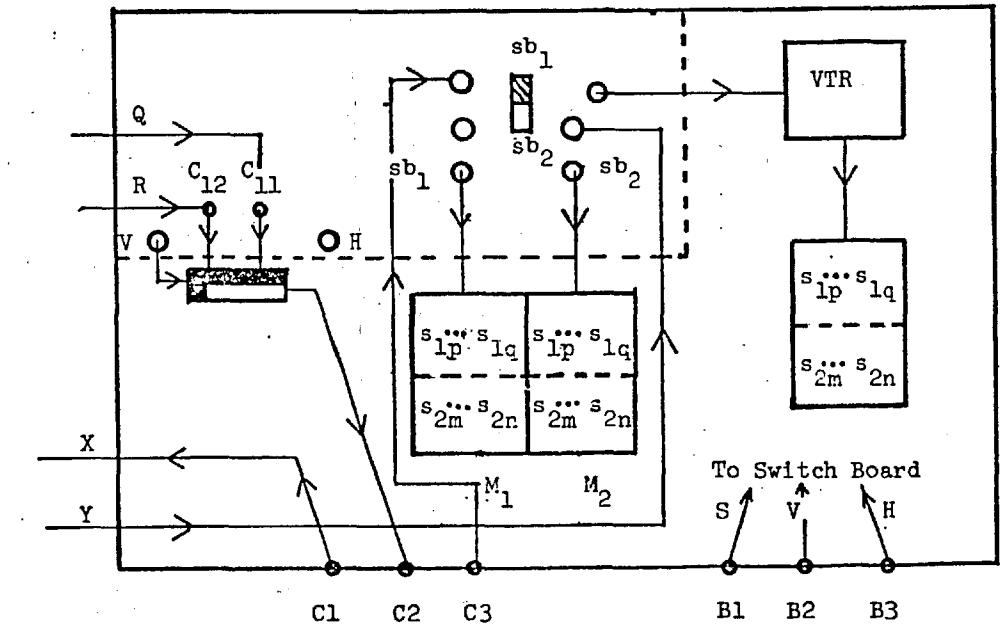
Observation Unit



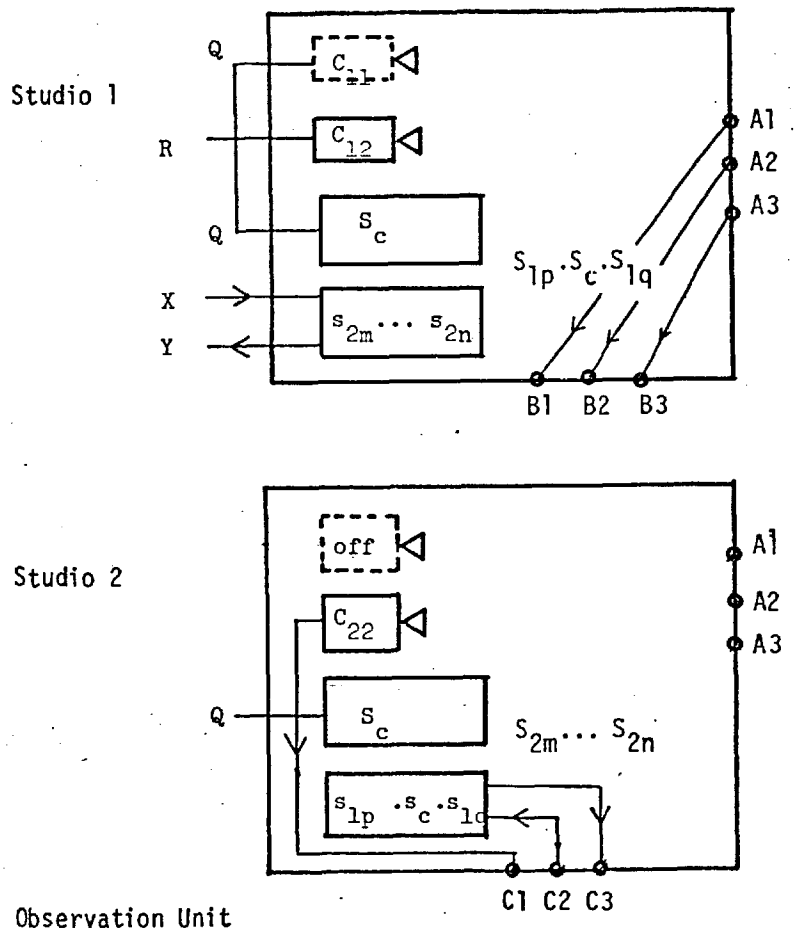
Phase III : 'Cross - Split'



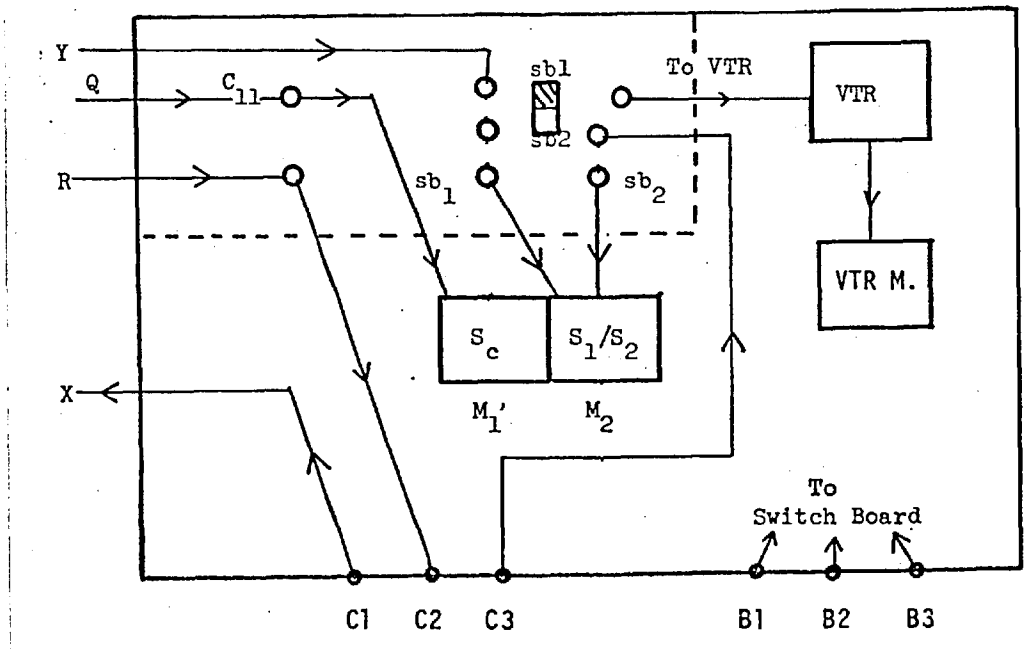




Phase IV : 'Single - Chairman'



Observation Unit



Appendix 3 :

DISCUSSION TOPICS FOR THE TELECONFERENCING SESSIONS

List of Discussion Topics for the Teleconferencing Experiments

(A Selection of 10 out of 28 are listed)

The Utopia University

A Design of an Afloat University - one of the Recommendations of the Utopia University Steering Group

Feasibility Discussion of Relocating Departmental Stores to Shopping Malls

Monthly Departmental Meeting of the 'Imperial Telecommunication Corporation'

Continuation of a Sales Promotion

Designing Uniforms for Staff of a New Restaurant

A Think - Tank Meeting on Energy Conservation

A UNESCO Committee Meeting - The Role of Western Technologies in Developing Countries

Design of a Continuous Education Program for Young Engineers

Town Planning Project : Abandon Private Transport in Town

Appendix 4 :

DATA COLLECTION 1

Observations Record of the Experimental Procedures

SESSION : _____ DATE : _____

TASK : _____

QUESTIONNAIRE :

PARTICIPANTS		DATE		QUESTIONNAIRE		REMARKS
Name	Studio	Arrg.	Pret.	Given	Returned	
1.						
2.						
3.						
4.						
5.						
6.						

7.

8.

9.

10.

1 SHOWS SOLIDARITY, raises other's status, give help, reward																					
2 SHOWS TENSION RELEASE, jokes, laughs, show satisfaction																					
3 AGREES, shows passive acceptance, understands, concurs, complies																					
4 GIVES SUGGESTION, direction, implying autonomy for other																					
5 GIVES OPINION, evaluation, analysis, expresses feeling, wish																					
6 GIVES ORIENTATION, information, repetition, confirmation					*							*								*	
7 ASKS FOR ORIENTATION, information, repetition, confirmation																					
8 ASKS FOR OPINION, evaluation, analysis, expression of feeling																					
9 ASKS FOR SUGGESTION? direction, possible ways of action																					
10 DISAGREES, shows passive rejection, formality, withholds help																					
11 SHOWS TENSION, asks for help, withdraws 'Out of Field"																					
12 SHOWS ANTAGONISM, deflates other's status, defends or asserts																					

SESSION : TASK : DATE :

SYMLOG RECORD

Observer : _____ Group : _____ Date : _____ Page : _____

WHAT TIME	WHO ACTS	TOWARD WHOM	ACT/NON	DIREC: Act/Non	What Image Presented (Comment on Behavior)	PRO/CON	DIREC. OF ELEMENT	in SELF, OTH, GRP, SIT, SOC, FAN

Appendix 5 :

DATA COLLECTION 2

9 Sets of Teleconferencing Questionnaire

tq/1/pc

TELECONFERENCING EXPERIMENT QUESTIONNAIRE

Session : _____

Date : _____

The following statements are some general descriptions of your opinions on the teleconferencing experience just now.

Please indicate how strongly you agree/disagree with them as follows :

If you strongly agree	put 5	in the end of the statement
If you agree	put 4	in the end of the statement
If you neither agree/disagree	put 3	in the end of the statement
If you disagree	put 2	in the end of the statement
If you strongly disagree	put 1	in the end of the statement

1.	I get no real impression of personal contact with the people at the other end of the link.	1. _____
2.	It is very straightforward and easy to use	2. _____
3.	The system gives me a feeling of 'confrontation' with the people the other end of this link.	3. _____
4.	It was just as though we were all in the same room.	4. _____
5.	I can easily assess the other people's reactions to what has been said.	5. _____
6.	I think that I would find it a bit of a strain to use the system regularly.	6. _____
7.	I would be reluctant to use the system for discussing 'sensitive' or 'personal' matters.	7. _____
8.	It is difficult to talk to people at my end.	8. _____
9.	People at the other end do not seem 'real'.	9. _____
10.	It isn't at all like holding a face-to-face meeting.	10. _____

tq/l/pc

cont.

11.	The system enables me to feel that the meeting is being held in private.	11. _____
12.	It provides a great sense of realism.	12. _____
13.	The television picture distracts me from the onging conversation.	13. _____
14.	Using the system tends to make meetings shorter.	14. _____
15.	I get a good 'feel' for people the other end.	15. _____
16.	I get the feeling that the people are 'looking in' on the conversation.	16. _____
17.	I believe that using the system would reduce the number of arguments and disagreements at meetings.	17. _____
18.	I do not get a good enough idea of how people at the other end are reacting.	18. _____

tq/2/pc

TELECONFERENCING EXPERIMENT QUESTIONNAIRE

Session : _____

Date : _____

The following statements are some general descriptions of your feelings toward the atmosphere of the teleconferencing discussion.

Please indicate how strongly you agree/disagree with them as follows :

If you strongly agree	put 5	at the end of the statement
If you agree	put 4	at the end of the statement
If you neither agree/ disagree	put 3	at the end of the statement
If you disagree	put 2	at the end of the statement
If you strongly disagree	put 1	at the end of the statement

1. I feel that this is a friendly teleconferencing discussion. 1._____
2. I feel that this is a cautious teleconferencing discussion. 2._____
3. I feel that this is a business like teleconferencing discussion. 3._____
4. I feel that this is an emotional teleconferencing discussion. 4._____
5. I feel that this is an informal teleconferencing discussion. 5._____
6. I feel that this is a competitive teleconferencing discussion. 6._____
7. I feel that this is a serious teleconferencing discussion. 7._____
8. I feel that this is a cordial teleconferencing discussion. 8._____
9. I feel that this is an antagonistic teleconferencing discussion. 9._____
10. I feel that this is a heated teleconferencing discussion. 10._____
11. I feel that this is a lively teleconferencing discussion. 11._____
12. I feel that this is a hostile teleconferencing discussion. 12._____

tq/2/pc

cont.

13. I feel that this is a constructive teleconferencing discussion. 13._____

14. I feel that this is an aggressive teleconferencing discussion. 14._____

15. I feel that this is a defensive teleconferencing discussion. 15._____

tq/3.1/pc

Questions: Session : _____

The questions that follow make it possible to describe objectively certain characteristics of the group. The items simply describe characteristics of the past 30 minutes or so; they do not judge whether the characteristic is desirable or undesirable. Therefore, in no way are the questions to be considered a 'test' either of the group or of the person answering the questions. We simply want an objective description of what the group is like.

1. A member has to think twice before speaking in the group's meeting.
2. The group is made up of individuals who do not know each other well.
3. The opinions of all members are considered as equal.
4. There are frequent intervals of laughter during the discussion.
5. Membership in the group may serve as an aid to vocational advancement.
6. Certain members appear to be 'incapable' of 'working' as part of the group.
7. The group is directed toward one particular goal.
8. Each member of the group has a clear idea of the group's goals.
9. Most members of the group do not know what they are doing at the meeting.
10. The group keeps a list of names of members.

Questions: Session : _____

The questions that follow make it possible to describe objectively certain characteristics of the group. The items simply describe characteristics of the past 30 minutes or so; they do not judge whether the characteristic is desirable or undesirable. Therefore, in no way are the questions to be considered a 'test' either of the group or of the person answering the questions. We simply want an objective description of what the group is like.

1. Members fear to express their real opinions.
2. Each member of the group knows all other members by their first names.
3. Every member of the group enjoys the same group privileges.
4. Certain members of the group are responsible for petty quarrels and some apathy shown on other members.
5. Members are not rewarded for effort put out for the group.
6. The group's meetings are not planned or organized.
7. The chance of speaking is well divided among members.
8. No explanation shall need be given by a member wishing to be absent from the group.
9. Members address each other by their first names.
10. The group divides its efforts among several purposes.

tq/3.3/pc

Questions: Session : _____

The questions that follow make it possible to describe objectively certain characteristics of the group. The items simply describe characteristics of the past 30 minutes or so; they do not judge whether the characteristic is desirable or undesirable. Therefore, in no way are the questions to be considered a 'test' either of the group or of the person answering the questions. We simply want an objective description of what the group is like.

1. There is a high degree of participation on the part of members during the discussion.
2. A member may leave the group (terminate one's presence of the whole series of discussion) at any time one wishes.
3. A member has the chance to get to know all other members of the group.
4. Experienced members are in charge of the group.
5. Certain members of the group are considered uncooperative.
6. Certain members have more influence on the group than others.
7. The group does its work with no great vim, vigor, or pleasure.
8. There is an undercurrent of feeling among members that tends to pull the group apart.
9. Members of the group do small favors for one another.
10. Each member would lose his self-respect if the group should be 'unsuccessful'.
11. The group is very informal.
12. The group has only one main purpose.
13. The group knows exactly what it has to get done.

tq/3.4/pc

Questions: Session : _____

The questions that follow make it possible to describe objectively certain characteristics of the group. The items simply describe characteristics of the past 30 minutes or so; they do not judge whether the characteristic is desirable or undesirable. Therefore, in no way are the questions to be considered a 'test' either of the group or of the person answering the questions. We simply want an objective description of what the group is like.

1. The group is working toward many different goals.
2. Members are interested in the group but not all of them join-in the discussion enthusiastically.
3. The group is controlled by the actions of a few members.
4. Only certain kinds of ideas may be expressed freely within the group.
5. 'Failure' of the discussion would mean little to individual members.
6. There are two or three members of the group who generally take the same side on any group issue.
7. There is a constant tendency toward conniving against one another among parts of the group.
8. Personal dissatisfaction with the group is too small to be brought up.
9. The group operates with sets of conflicting plans.
10. The group meets at any place that happens to be handy.
11. All members know each other very well.
12. There are long periods of silence.

tq/3.5/pc

Questions: Session : _____

The questions that follow make it possible to describe objectively certain characteristics of the group. The items simply describe characteristics of the past 30 minutes or so; they do not judge whether the characteristic is desirable or undesirable. Therefore, in no way are the questions to be considered a 'test' either of the group or of the person answering the questions. We simply want an objective description of what the group is like.

1. The group has major purposes which in some degree are in conflict.
2. Certain problems are discussed only among a small minority.
3. Members of the group work under close supervision.
4. Certain members are hostile to other members.
5. Members continually grumble about the discussion (s).
6. The members allow nothing to interfere with the progress of the group.
7. There is a recognized 'right' or 'wrong' way of going about group activities.
8. There are tensions among subgroups that tend to interfere with the group's activities.
9. Members are in daily contact either outside or within the group.
10. Certain members discuss personal affairs among themselves (during/outside the group discussion).
11. A mistake by one member of the group might result in hardship for all.
12. Discussion is carried on to those who are considered most 'capable' for it.

Questions: Session : _____

The questions that follow make it possible to describe objectively certain characteristics of the group. The items simply describe characteristics of the past 30 minutes or so; they do not judge whether the characteristic is desirable or undesirable. Therefore, in no way are the questions to be considered a 'test' either of the group or of the person answering the questions. We simply want an objective description of what the group is like.

1. The objectives of the group have never been clearly recognized.
2. Most matters and ideas that come up before the group are enthusiastically discussed.
3. An individual's standing in the group is determined by how much he involves in the discussion.
4. The only way a member may leave the group is to be expelled.
5. Members are not in close enough contact to develop likes or dislikes for one another.
6. There is constant bickering among members of the group.
7. Members know that each one looks out for the other one as well as for himself.
8. A feeling of failure and boredom prevails in the group.
9. Failure of the group would lead to embarrassment for members.
10. The group does many things that are not directly related to its main purpose.
11. The members of the group vary in amount of ambition.
12. Members of the group know the family backgrounds of other members of the group.

Questions: Session : _____

The questions that follow make it possible to describe objectively certain characteristics of the group. The items simply describe characteristics of the past 30 minutes or so; they do not judge whether the characteristic is desirable or undesirable. Therefore, in no way are the questions to be considered a 'test' either of the group or of the person answering the questions. We simply want an objective description of what the group is like.

1. The objective of the group is specific.
2. Members of the group work together as a team.
3. The work of the group is frequently interrupted by having nothing to do.
4. Each member of the group has as much power as any other member.
5. Each member's personality is known to other members of the group.
6. Certain members of the group have no respect for other members.
7. Some members of the group become personal friends.
8. The group has meetings at regularly scheduled times.
9. The group has both specified and unspecified rules to guide its activities.
10. Failure of the group would mean nothing to most members.
11. The group has well understood but unwritten rules concerning member conduct at discussions.
12. Certain members meet for one thing and others for a different thing.

ANSWER SHEET :

SESSION : _____

Date : _____

	Definitely True	Mostly True	Undecided	Mostly False	Definitely False	(Office only)
1.	A	B	C	D	E	_____
2.	A	B	C	D	E	_____
3.	A	B	C	D	E	_____
4.	A	B	C	D	E	_____
5.	A	B	C	D	E	_____
6.	A	B	C	D	E	_____
7.	A	B	C	D	E	_____
8.	A	B	C	D	E	_____
9.	A	B	C	D	E	_____
10.	A	B	C	D	E	_____
11.	A	B	C	D	E	_____
12.	A	B	C	D	E	_____
13.	A	B	C	D	E	_____
14.	A	B	C	D	E	_____
15.	A	B	C	D	E	_____

QUESTIONNAIRES ALLOCATION

DATE FROM : _____

NAME	QUESTIONNAIRES					
	tq/1/pc	tq/2/pc	tq/3.1/pc	tq/3.2/pc	tq/3.3/pc	tq/3.4/pc

contd. QUESTIONNAIRES ALLOCATION . DATE FROM : _____

NAME	QUESTIONNAIRES			
	tq/3.5/pc	tq/3.6/pc	tq/3.7/pc	

Appendix 6 :

Data Collection 3 :

PARTICIPANTS' DATA-BASE

ARTICIPANT DATA FORM

AME : _____ SEX : _____ BACKGROUND : _____

SESSION	DATE	TASK	TQ / PC	TOTAL NO.	R_1	%	R_2	%	LOC.

Appendix 7 :

COMPUTER PROGRAM AND FUNCTIONS FOR PLOTTING
THE GROUP PERFORMANCE PROFILES OF TELECONFERENCING

```
      )LIB
PLOTWS  WS    3546
GRAPHWS WS    3090
PROFILE WS    5933
```

PROFILE

```
      )LOAD PROFILE
PROFILE 76/11/08 12:48:29

      OBJECTS

WORKSPACE: PROFILE

 **FUNCTIONS**
 AUTOPLOT CAL COLUMN CUMMULATE GPROFILE HELP INPUT LIST LISTALL MATRIX NATUREPLOT
      OBJECTS OFF PLOT RESETAB ΔFMT

 **VARS**
 CR FORMAT FORMTAB FORMTAB0 STAB TAB TASK TITLE TITLE0 DX DY FS


      ▽LISTALL[□]▽

      ▽LISTALL
[1]    ' '      :
[2]    LIST'AUTOPLOT'
[3]    LIST'CAL'
[4]    LIST'COLUMN'
[5]    LIST'CUMMULATE'
[6]    LIST'FIGURE'
[7]    LIST'GPROFILE'
[8]    LIST'HELP'
[9]    LIST'INPUT'
[10]   LIST'MATRIX'
[11]   LIST'NATUREPLOT'
[12]   LIST'OFF'
[13]   LIST'PLOT'
[14]   LIST'RESETAB'
[15]   ' '
      ▽
```

A LISTING OF WORKSPACE ** PROFILE **

```
      LISTALL
```

```
      ∇AUTOPLOT;TIT1;TIT2;SCALE
[1]    2 1⍴⎕CR
[2]    'PLEASE ENTER SESSION AND DURATION:'
[3]    TIT1←⍞
[4]    TIT1←' [ ',TIT1,' ]'
[5]    'PLEASE ENTER ** GROUP PROFILE ** TITLE:'
[6]    TIT2←⍞
[7]    TIT2←'          ',TIT2,'  -- GROUP PROFILE'
[8]    'SCALE OF PLOT PLEASE :'
[9]    SCALE←⍞
[10]   4 1⍴⎕CR
[11]   '          COMPARISON OF : RELATIVE SIDE-TALK(*ST) AND CROSS-TALK(*CT)'
[12]   ⎕CR
[13]   '              *  RELATIVE SIDE-TALK'
[14]   '              +  RELATIVE CROSS-TALK'
[15]   ⎕CR
[16]   SCALE PLOT COLUMN 2 5
[17]   5 1⍴⎕CR
[18]   '          COMPARISON : SIDE-TALK RATIO(*ST/SUM) AND CROSS-TALK RATIO(*CT/SU
       M)'
[19]   ⎕CR
[20]   '            *  SIDE-TALK RATIO '
[21]   '            +  CROSS-TALK RATIO'
[22]   ⎕CR
[23]   SCALE PLOT COLUMN 3 6
[24]   5 1⍴⎕CR
[25]   '       COMPARISON OF : RATIO OF SIDETALK(*ST/T) AND CROSSTALK(*CT/T)'
[26]   '                       TO EACH NATURE'
[27]   ⎕CR
[28]   '              *  RATIO OF SIDETALK TO NATURE'
[29]   '              +  RATIO OF CROSSTALK TO NATURE'
[30]   ⎕CR
[31]   SCALE PLOT COLUMN 8 9
[32]   5 1⍴⎕CR
[33]   '            NATURE PROFILE (*T/SUM)     ',TIT1
[34]   ⎕CR
[35]   SCALE PLOT COLUMN 10
[36]   5 1⍴⎕CR
[37]   '         ',TIT2
[38]   ⎕CR
[39]   '            *  RELATIVE SIDE-TALK(*ST)'
[40]   '            +  SIDETALK RATIO (*ST/SUM)'
[41]   '            =  RELATIVE CROSS-TALK(*CT)'
[42]   '            ,  CROSSTALK RATIO(*CT/SUM)'
[43]   '            X  SIDETALK TO NATURE RATIO(*ST/T)'
[44]   '            O  CROSSTALK TO NATURE RATIO(*CT/T)'
[45]   '            S  NATURE PROFILE(*T/SUM)'
[46]   ⎕CR
[47]   SCALE PLOT COLUMN 2 3 5 6 8 9 10
[48]   4 1⍴⎕CR
      ∇
```

```
      ⍝ LISTING OF WORKSPACE  ** PROFILE **

      LISTALL
```

```
      ∇AUTOPLOT;TIT1;TIT2;SCALE
[1]    2 1⍴CR
[26]   '8   ASKS FOR OPINION :'
[27]   INPUT
[28]   '9   ASKS FOR SUGGESTION :
[29]   INPUT
[30]   '10  DISAGREES :'
[31]   INPUT
[32]   '11  SHOWS TENSION :'
[33]   INPUT
[34]   '12  SHOWS ANTAGONISM :'
[35]   INPUT
[36]   CR
[37]   TAB←CAL
[38]   2 1⍴CR
[39]   ⍬←LINE←80⍴'*'
[40]   CR
[41]   'SESSION : ';SES
[42]   'TASK    : ';TASK
[43]   'DATE    : ';DATE
[44]   CR
[45]   LINE
[46]   ' '
[47]   TITLE
[48]   CR
[49]   NOS←'I2'⍕FMT 12 1⍴1 2 3 4 5 6 7 8 9 10 11 12
[50]   NOS,FORMTAB ⍕FMT TAB
[51]   CR
[52]   ' ';78⍴'='
[53]   CR
[54]   X1←100×(+/ST)÷TOT
[55]   X2←100×(+/CT)÷TOT
[56]   ' SIDETALK  TOTAL : ';+/ST;'    (PERCENT = ';X1;')'
[57]   ' CROSSTALK TOTAL : ';+/CT;'    (PERCENT = ';X2;')'
[58]   '           TOTAL : ';TOT
[59]   CR
[60]   LINE
[61]   CR
[62]   CR
[63]   '   NOTE :'
[64]   '          * DESIGNATES PERCENTAGE'
[65] RES←CUMMULATE 10
[66]   7 1⍴CR
       ∇
```

CR
'SKIP TABULATION OUTPUT ? (YES/NO)'
→ ('Y' = 1↑⍞)/RES

```
       ∇HELP
[1]    'PLEASE RE-ENTER LAST DATA ITEM'
[2]    X←⍬
[3]    CR
[4]    'NOW TYPE :→2'
       ∇

       ∇INPUT;X
[1]    X←⍬
[2]    ST←ST,X[1]
[3]    CT←CT,X[2]
       ∇
```

```
      ∇R←CAL
[1]    R←12 10⍴0
[2]    R[;1]←ST
[3]    R[;4]←CT
[4]    TOT←+/ST+CT
[5]    R[;2]←100×ST÷+/ST
[6]    R[;3]←100×ST÷TOT
[7]    R[;5]←100×CT÷+/CT
[8]    R[;6]←100×CT÷TOT
[9]    R[;7]←ST+CT
[10]   R[;8]←100×ST÷R[;7]
[11]   R[;9]←100×CT÷R[;7]
[12]   R[;10]←100×R[;7]÷+/R[;7]
      ∇


      ∇R←COLUMN X;N;I
[1]    N←1+⍴X←,X
[2]    I←1
[3]    R←(N,12)⍴0
[4]    R[1;]←\12
[5]   REP:→(N<I←I+1)/END
[6]    R[I;]←TAB[;X[I-1]]
[7]    →REP
[8]   END:CR
      ∇


      ∇CUMMULATE X
[1]    STAB←STAB,TAB[;X]
[2]    2 1⍴CR
[3]    '         ** CUMMULATED NATURE PROFILE FOR ',TASK,' **'
      ∇




      ∇GPROFILE;LINE;SES;TASK;DATE;X1;X2;NOS;ST;CT;TOT
[1]    'PLEASE ENTER DATA AS PROMPTED:'
[2]    ' (SIDETALK;CROSSTALK)'
[3]    CR
[4]    'SESSION :'
[5]    SES←⍞
[6]    'TASK    :'
[7]    TASK←⍞
[8]    'DATE    :'
[9]    DATE←⍞
[10]   CR
[11]   ST←CT←\0
[12]   '1   SHOW SOLIDARITY :'
[13]   INPUT
[14]   '2   SHOW TENSION RELEASE :'
[15]   INPUT
[16]   '3   AGREES :'
[17]   INPUT
[18]   '4   GIVES SUGGESTION :'
[19]   INPUT
[20]   '5   GIVES OPINION :'
[21]   INPUT
[22]   '6   GIVES ORIENTATION :'
[23]   INPUT
[24]   '7   ASKS FOR ORIENTATION :'
[25]   INPUT
```

```
      ∇R←MATRIX;N;IN;I;GRAPHTIT
[1]    'TITLE OF GRAPH PLEASE,'
[2]    GRAPHTIT←⍞
[3]    I←2
[4]    'HOW MANY GRAPHS?'
[5]    N←1+⍞
[6]    R←(N,12)⍴0
[7]    R[1;]←⍳12
[8]   REP:'WHICH COLUMN IN TABLE REQUIRES PLOT?'
[9]    →(0=IN←⍞)/END
[10]   R[I;]←TAB[;IN]
[11]   I←I+1
[12]   →REP
[13]  END:5 1 ⍴CR
[14]   GRAPHTIT←'           ',GRAPHTIT
[15]   GRAPHTIT
[16]   CR
[17]   CR
      ∇


      ∇NATUREPLOT;TAB;HEAD;SCALE
[1]    TAB←STAB
[2]    'PLEASE ENTER SESSION AND ID'
[3]    HEAD←⍞
[4]    HEAD←'          ** ',HEAD,' **'
[5]    'PLEASE ENTER SCALE OF PLOT (Y,X) :'
[6]    SCALE←⍞
[7]    5 1⍴CR
[8]    HEAD
[9]    CR
[10]   '          COMPARISON OF NATURE PROFILES :'
[11]   CR
[12]   '          *  30 SEC. INTERVAL'
[13]   '          +  10 SEC. INTERVAL'
[14]   '          =  CONTINUOUS OBSERVATION'
[15]   CR
[16]   SCALE PLOT COLUMN 1 2 3
[17]   5 1⍴CR
      ∇


      ∇OFF
[1]    ' '
[2]    ' ** YOU HAVE REQUESTED TO LOG-OFF **'
[3]    ⍞←')OFF'
      ∇


      ∇A PLOT B;C;D;E;F;G;H;I;J;K;L;M;N;O;P;S;T;U;V;W;X
[1]    N←⍴O←(⍳O)⍴⍳1
[2]    →(∧/1 2≠⍴⍴B)⍴27
[3]    →((1=⍴⍴B)∨(1=1↑⍴B)∧2=⍴⍴B)⍴28
[4]    →(1≠⍴⍴A)⍴27
[5]    →(6=⍴A)⍴30
[6]    →(2≠⍴A)⍴27
[7]    M←9,(K←L0.001+(L←A[O+1])÷10),(⌈/B[O;]),L/B[O;]
[8]    →16
[9]    H←I
[10]   C←D
[11]   M←13,(E←L0.001+(G←A[O])÷5),(⌈/,T),L/,T←B[1+⍳¯1+1↑⍴B;]
[12]   →16
[13]   X←O+L(((,B[O;])+0.5×C÷10)-H)÷C÷10
[14]   T←L((T+0.5×D÷5)-I)÷D÷5
[15]   →39
[16]   S←10 5 2.5
[17]   F←⌈10⍟U←(-/¯2↑M)÷M[O+1]
[18]   V←1.25×U
[19]   S←S×10*F-1
[20]   P←¯1+(S≤V)⍳1
[21]   →((2+O)≥P←P+1)⍴24
[22]   P←O
[23]   S←S÷10
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[24]    D←V-S[P]|V
[25]    →(((I←M[O+3]-S[P]|M[O+3])+DxM[O+1])<M[O+2]-1E¯8xV)ρ21
[26]    →M
[27]    →0,0ρ□←'INVALID ARGUMENT'
[28]    B←(2,U)ρ(⍳U←ρB),B
[29]    →4
[30]    K←L0.001+(L←A[O+3])÷10
[31]    H←A[O+4]
[32]    C←A[O+5]
[33]    E←L0.001+(G←A[O])÷5
[34]    I←A[O+1]
[35]    D←A[O+2]
[36]    T←B[1+⍳¯1+1↑ρB;]
[37]    X←(F←(O≤X)∧X≤L+O)/X←O+L(((,B[O;])+0.5xC÷10)-H)÷C÷10
[38]    T←F/L((T+0.5xD÷5)-I)÷D÷5
[39]    M←P←1+L10⍟|D
[40]    →((A|D+9.9999999999996E¯7xA)<9.9999999999997E¯6xA←10*M)ρ43
[41]    M←M-1
[42]    →40
[43]    J←(P)7)∨M<¯7
[44]    V←(LU÷2)φ((U←1+G-U)ρ'  '),(U←(1+G)↑X/ρDY)ρDY
[45]    →Jρ48
[46]    ⍝FILLER
[47]    S←10,0⌈-M
[48]    P←G
[49]    F←((⍳0)ρ1↑ρT)-N
[50]    B←(1+L)ρ'  '
[51]    B16:B[(T[F;]=P)/X]←''ρDS[O+(ρDS)|F-O]
[52]    →(O≤F←F-1)ρ51
[53]    →(0=5|P)ρ75
[54]    U←V[O+G-P],(10ρ'  '),':',B
[55]    (N+¯1↑(U≠' ')/⍳ρU)↑U
[56]    →(O≤P←P-1)ρ49
[57]    (11ρ' '),'O',(L+1)ρ'+---------'
[58]    V←ρU←''
[59]    M←P←1+L10⍟|C
[60]    →((A|C+9.9999999999996E¯7xA)<9.9999999999997E¯6xA←10*M)ρ63
[61]    M←M-1
[62]    →60
[63]    →((P)7)∨M<¯7)ρ68
[64]    S←10,0⌈-M
[65]    U←U,S+Fx(10*M-1)<|F←H+CxV
[66]    →(K≤V←V+1)ρ65
[67]    →71
[68]    P←10 ¯2+H+CxV
[69]    U←U,(Wρ' '),(-W←+/P[O+7 8 9]=' ')↓P
[70]    →(K≤V←V+1)ρ68
[71]    (3ρ' '),U
[72]    →(0=X/ρDX)ρ0
[73]    ((13+L0.5x¯1⌈L-X/ρDX)ρ' '),DX
[74]    → END
[75]    →Jρ78
[76]    U←V[O+G-P],(S+Fx(10*M-1)<|F←I+DxP÷5),'+',B
[77]    →55
[78]    B19:U←10 ¯2+I+DxP÷5
[79]    U←V[G-P-O],((Wρ' '),(-W←+/U[O+7 8 9]=' ')↓U),'+',B
[80]    →55
[81]    END;5 1ρCR
        ∇


        ∇RESETAB
[1]      STAB←12 0ρ0
        ∇
```