The Effect of Group Size Upon Influence and Process in Group Communication[1]

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[1] This thesis expands on Fay, Garrod and Carletta (2000).

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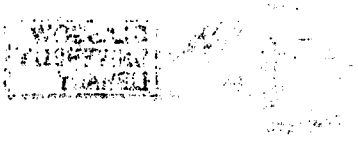

Declaration

I declare that this thesis is my own work carried out under normal terms of supervision.

To my Mother, Margaret

Abstract

Motivated by field work (Chapter 1), this thesis investigates how current models of interpersonal communication, based on dyadic (or pairwise) communication (Chapter 2), apply to different sized discussion groups. Following a pilot study (Chapter 3), a series of five and ten person experimental discussion groups were compared (Chapter 4).

Consistent with the Collaborative Model of communication, in the five person groups participants' understanding of what was agreed in their discussion was influenced by who they spoke with. In the ten person groups, as predicted by Autonomous Models of communication, participants were influenced by the group's dominant speaker. Next, the communication taking place in the different sized discussions was compared (Chapter 5). This revealed that the communication taking place in the five person groups resembled a dialogue, whereas in the ten person groups it resembled a monologue. Finally, the difference in mode of communication is explained in terms of how speakers in the two sizes of group design their utterances for different audiences (Chapter 6).

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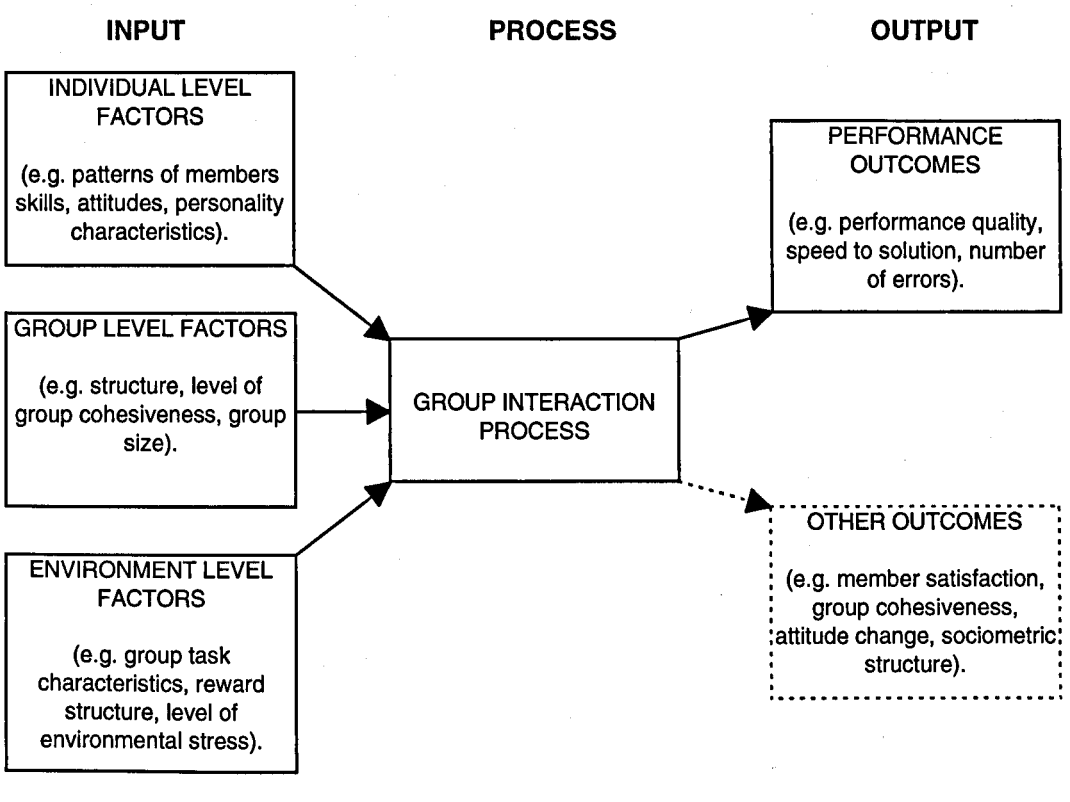
Executive Summary

Everyday communication commonly takes place in groups. Whether in the workplace or at home, many, if not most, complex decisions are made through such group discussions (Dunbar, 1996).

Yet, group discussion does not automatically lead to high quality decisions. Several other factors have been shown to influence the group outcome. However, like Hackman and Morris (1975) I believe that group communication, or interaction, is the mediating factor between a broad spectrum of 'input' factors and the group's outcome. Figure 1 illustrates the role of the interaction process as the mediator between several input factors and the group outcome.

Figure 1. The Input-Process-Performance Relationship.



(from Hackman & Morris, 1975, p. 50)

Realising the importance of communication to the success of the group, ICL (International computers Limited) established the Senior Executive Programme (SEP). The SEP is used by company officials to discuss the problems that face their organisations. ICL also provide a professional facilitator to guide the discussion. The facilitator ensures that the input factors affecting the group are combined in such a way that the group reaches the desired outcome.

Sponsorship, provided jointly by ICL and ESRC (Economic and Social Research Council), allowed me to undertake a course of research which would illuminate an aspect of the communication, or interaction process. The particular problem investigated in this thesis is how group size affects the communication process.

The thesis begins (Chapter 1) with a description of the SEP and the leadership role adopted by the facilitator. When compared with the more traditional chairing style of group leadership, facilitated discussions are more interactive (Carletta, Garrod, & FraserKrauss, 1998). However, observation of a series of discussions held on the SEP illustrated that they were less interactive than anticipated. This I attributed to the large size of the discussion groups (8 - 12 participants) used on the SEP. The group size literature supports this view.

It is this group size observation which shapes the experimental work presented in this thesis. Thus, the experimental work is motivated by observations made in the field.

To attain an understanding of the communication process a review of the current models of interpersonal communication was undertaken (Chapter 2). This review covers four models of interpersonal communication. These are the Encoder/Decoder Model, Intentionalist Model, Perspective-Taking Model and the Dialogic Model. The reader should note that each of these models are based upon observations made of dyadic (or pairwise) communication. There is no existing model of group communication.

A distinction can be drawn between these models on the basis of where they locate meaning in the communication process. Encoder/Decoder, Intentionalist, and Perspective-Taking models, although different, all assume that meaning is to be found within the content of the message transmitted. On account of the autonomous role of speaking and understanding these models attribute to the speaker and addressee, they are referred to as 'autonomous models'.

In contrast, the Collaborative Model (the best developed Dialogic model) states that the transfer of meaning is a product of the interaction process engaged in by the speaker and addressee. Furthermore, this interaction process is addressee-specific, and for this reason overhearers understand less of what is communicated when compared with addressees (Schober & Clark, 1989).

These opposing standpoints led to the generation of two experimental hypotheses. If meaning is encompassed within the message transmitted, as suggested by the **autonomous models**, then the group's dominant speaker - the person transmitting the most information - will be the most influential. Alternatively, if meaning is a product of the interaction process, as suggested by the **collaborative model**, then group members will be influenced by those they interact with in their discussion. This prediction emerges on account of the addressee-specific nature of the interaction process.

Following a pilot study (Chapter 3), the predictions of the autonomous and collaborative models were tested in the group context (Chapter 4). Two sizes of discussion group were compared. Five person groups were used on account of this being the optimal size of discussion group (Hare, 1981). Ten person groups were used as this was the most common size of group used on the SEP. Each group discussed a case of student plagiarism, after which their view of what had been agreed in the discussion was assessed.

Results demonstrated that the collaborative model was applicable to the five person discussion groups, whereas the autonomous models were applicable to the ten person discussion groups. In the five person discussions participants were

influenced by the persons they interacted with most often in the discussion. In the ten person discussions participants were influenced by the dominant speaker.

To understand why the collaborative model was applicable to the five person groups and the autonomous model to the ten person groups, the communication taking place in the different sized discussions was compared (Chapter 5). Communication in the five person discussions was found to be more interactive than in ten person discussions. The five person discussions were more dialogue-like, characterised by higher incidence of pairwise-conversations, interruptions, and shorter speaking turns. In contrast, communication in the ten person groups resembled a monologue, being both more disjointed and formal when compared with the five person discussions.

On account of the more elaborate, monologue-like utterances produced in the larger groups I hypothesised that participants are better able to understand the utterances produced by speakers in the ten person groups. This **speaker-based account** attributes the overhearer deficit found in the five person groups to the speakers, and what has been termed 'audience design' (Clark & Murphy, 1982). However, an alternative explanation exists. It is possible that the participants in the five person discussions were less attentive than those in the ten person discussions to the conversations they do not take part in. This **listener-based account** is advocated by Sacks, Schegloff and Jefferson (1974).

The speaker and listener based accounts were tested by comparing genuine overhearers (i.e. persons who listen to the tape recorded experimental discussions) understanding of what was agreed in the five and ten person discussions. Genuine overhearers attained a better understanding of what was agreed in larger ten person discussion groups. Thus, as predicted by the speaker-based account, the utterances produced in the larger discussions were more informative than those produced in smaller discussions.

To conclude, this thesis points to two different modes of face-to-face communication which take place in small and large discussion groups. In small five person groups communication is a bilateral process of establishing consensus among pairs of participants. In large ten person groups it is a unilateral process of broadcasting information to the group as a whole. This difference in mode of communication is explained in terms of how speakers design their utterances for different audiences. Speakers in the five person groups are sensitive only to their current conversational partner, whereas speakers in the ten person groups consider their broader audience.

Chapter 1. Group Communication

This thesis investigates the effect of group size on multiparty communication. More specifically, it assesses how current models of interpersonal communication apply to different sized discussion groups.

The research was conducted under a CASE studentship, funded jointly by ICL (International Computers Limited) and the ESRC (Economic and Social Research Council). ICL's interest in group communication stemmed from their Senior Executive Programme (SEP). The SEP was established to provide a platform where senior company officials could meet to discuss the challenges and opportunities facing their respective organisations. Thus, ICL are interested in how to maximise meeting effectiveness.

The structure of this thesis is comprised of two components. The first concerns the observations made while a guest on the SEP. It is these observations which essentially drive the research. The second component relates to the experiments designed to explore the outcome of these 'real-life' observations within a controlled, laboratory environment.

Next a description of the SEP is provided. Following this I outline the purpose and organisation of the rest of this chapter.

1.1 ICL Senior Executive Programme

The Senior Executive Programme (SEP) was set up to provide a relaxed environment in which senior company officials can come together to discuss common organisational issues. Usually ten to twelve executives from various powerful organisations are invited to participate. It is hoped that their collaboration will lead to the cross-fertilisation of ideas on shared problems.

Each 'event' which takes place on the SEP follows a general formula. An event is composed of a series of discussions which are professionally facilitated by an ICL Programme Director. A 'key note speaker' is also present, whose purpose is to simulate the group's discussion.

Pre-meeting preparation involves the Programme Director liaising with each of the invited parties in order to establish which issues they would like to cover in their future discussions. The feedback provided by the prospective group members enables the Programme Director to formulate an appropriate discussion agenda. Once constructed, the discussion agenda is posted out to each of the participants who will take part in the meetings.

The event itself takes place over twenty-four hours within Hedsor House, a scenic country mansion situated in the countryside of Maidenhead, West of London. On arrival at Hedsor House the participants meet each other and the first discussion of the series ensues. The group members are then taken to dinner, which gives a further, less formal opportunity for debate. The previous night's debate paves the way for the discussions which begin the next morning and continue into the afternoon.

On completion of the event the facilitator beings the meeting to a close and gathers general feedback regarding the quality of the discussion.

1.2 Chapter Organisation

The purpose of the rest of the chapter is to illuminate the role of the facilitator and his/her effect upon multiparty communication. To do so the facilitation of group communication is treated as a leadership issue.

In the next section I highlight the role of the facilitator by contrasting it with the traditional chairing form of group mediation. Next I relate the research which suggests that greater task effectiveness occurs as a consequence of facilitated as

opposed to chaired group communication. Following this the observations made while a guest on ICL's Senior Executive Programme are reported.

The observed discussions were found to be less interactive than expected and it seems that this is due to the size of the groups used on the SEP. For this reason the chapter is brought to its conclusion with a discussion of how group size affects communication. This observation is pivotal to the later experimental work.

1.3 The Facilitation of Group Communication

Since the pioneering work of White and Lippit (1953, 1960) a considerable amount of research has assessed the influence of the group leader upon group functioning. A review of the literature indicates that there are several ways to enhance the effectiveness of groups of individuals engaged in collaborative tasks.

Ensuring the group focus on the problem before attempting to formulate a solution (Hirokawa, 1983), adopt an appropriate method (Hirokawa & Pace, 1983; Larson, 1969) and engage in substantive, issue related conflict (Gibb, 1961) all improve task performance. For a summary of the various intervention strategies used to improve task effectiveness see the reviews by Warburton (1987) and Hirokawa and Gouran (1989).

These intervention strategies are associated with effective leadership in general. To differentiate between the chairing and facilitative form of leadership I have cited the work of Clawson, Bostrom, and Anson (1993). The authors generated a typology of behaviours specifically associated with the role of the facilitator. Three dimensions were identified which distinguish facilitated leadership from the more traditional chairing style. These are;

- Promotes ownership and responsibility of ideas and meeting outcomes while remaining neutral to the content of the meeting.
- Creates an open and positive environment by encouraging equal participation. This is achieved through the encouragement of quiet people to participate while ensuring no one is allowed to dominate.
- Builds rapport and relationships among group members by way of demonstrating respect for people and promoting social interaction between group members.

(adapted from Clawson, Bostrom & Anson, 1993, p. 556)

Unlike chairpersons, facilitators have no vested interest in the topic under discussion. This allows the facilitator to remain neutral to the content of the discussion. Indeed, what is often found is that the facilitator is external to the company holding the meeting. In contrast, the chairperson more commonly holds a senior position within the company. Perhaps as a consequence of their interest in the meeting's outcome, chairpersons are found to adopt a more active role in the discussion.

Whatever the reason, facilitated discussions are found to be less dominated by any single group member, exhibit more equal member participation and demonstrate freer member interaction when compared with chaired, or managed group discussions (Carletta, Garrod & Fraser-Krauss, 1998).

To demonstrate the more interactive nature of facilitated meetings consider the pattern of interaction in one of the chaired (Figure 2) and one of the facilitated meetings (Figure 3) observed by Carletta et al. (1998). In each figure group members are represented by squares labelled with a letter. The heaviness of the line connecting any two group members reflects how often they interacted relative to the other pairs of group members involved in the discussion. In general the more equal the lines of the entire diagram, the more diverse the interactions which took place.

Figure 2. Chaired Group Discussion.

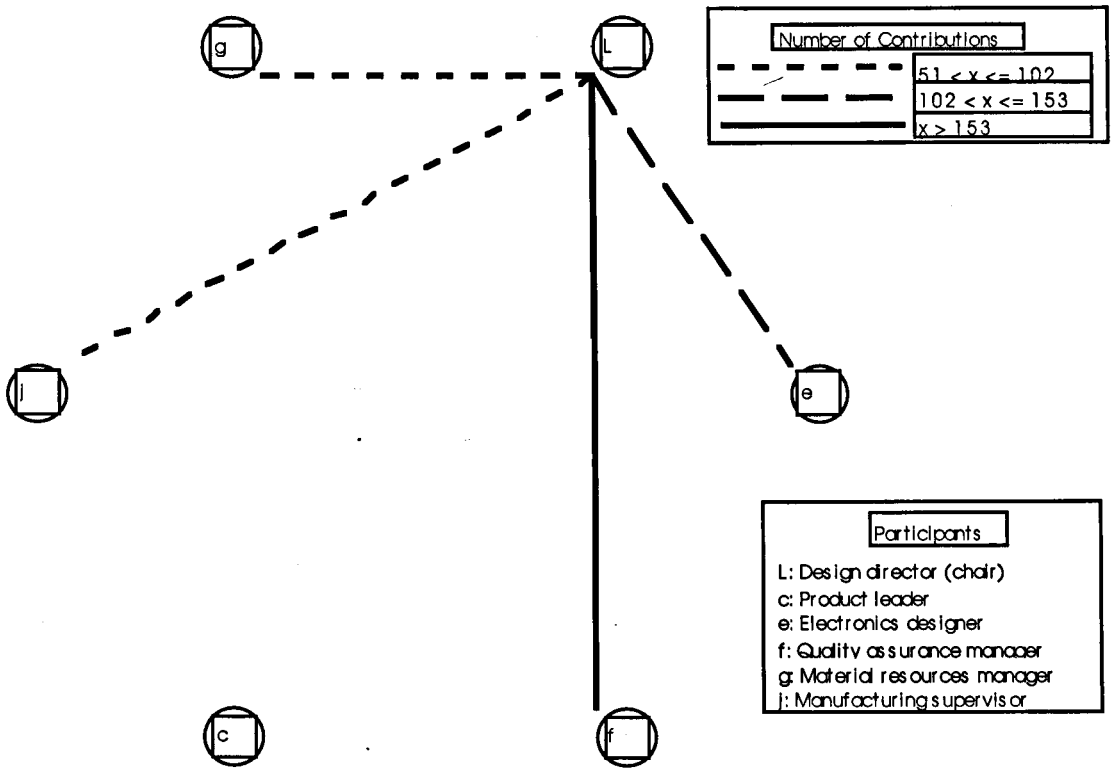
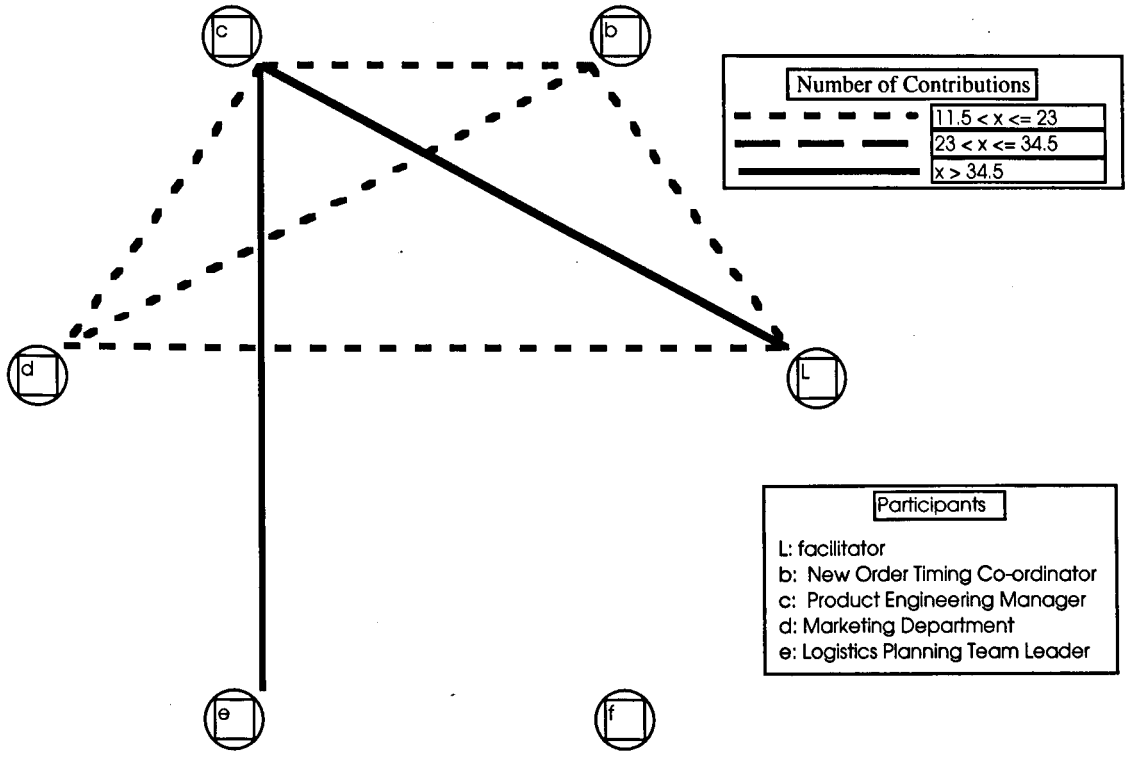


Figure 3. Facilitated Group Discussion.



(from Carletta, Garrod & Fraser-Kruass, 1998, pp. 540-541)

Comparison of Figures 2 and 3 clearly differentiate the two leadership styles. In the chaired meeting all the communication takes place between the chairperson (person L) and the other members of the group. Notice also that one of the group members (person c) is relatively isolated in the meeting. In contrast, the facilitated group discussion is characterised by communicative exchanges which take place between a much greater number of the group's members. Again, one group member (person f) appears to be isolated from the group's discussion. These diagrams clearly demonstrate the more equal participation and interaction apparent in the facilitated as opposed to the chaired group discussions.

Thus, chaired and facilitated meetings result in very different patterns of communication. In the section which follows I provide evidence suggesting that the communication apparent in facilitated discussions leads to greater task effectiveness when compared with chaired meetings.

1.4 Effectiveness of Different Leadership Styles

Evidence that facilitated group discussions lead to greater task effectiveness is derived from three research areas. The first concerns early work which directly assessed the impact of different *leadership styles.* The second relates to *communication network research.* The third and final area of reviewed research identifies *communication variables* which differentiate high from low achieving groups.

White and Lippit (1953, 1960) examined the influence of autocratic, democratic and laissez-faire styles of leadership upon group productivity and member satisfaction. Authoritarian leaders were those instructed to assume a directive role within the group. Democratic leaders were less directive. In this condition decisions were taken as a group and interaction among the group's members was promoted. Lastly, the laissez-faire category of leaders were characterised by their non-participative role, demonstrated by their minimal level of involvement in the discussion.

Comparison of the different forms of leadership indicated that the democratic style was superior to the others in a number of respects. This included level of group cohesiveness and member satisfaction. However, no consistent differences among the three leadership styles were observed with regard to group productivity. This led White and Lippit to conclude that although non-directive leadership styles (that is, those that encourage group member participation and structuring of their own activities) foster greater levels of member satisfaction than directive styles, this does not translate into a higher level of productivity.

Although the terminology has changed since the work of White and Lippit the distinction between the different leadership styles remains. The authoritarian style is representative of chaired leadership, whereas the democratic style is representative of facilitated leadership. If one accepts this analogy then it can be concluded that facilitated meetings are superior to chaired meetings only in that group members prefer less directive leaders.

While White and Lippit were unable to differentiate the different leadership styles in terms of their effect on task outcome, others have suggested that more open communication leads to more effective group performance. The first source of evidence comes from work carried out on communication networks.

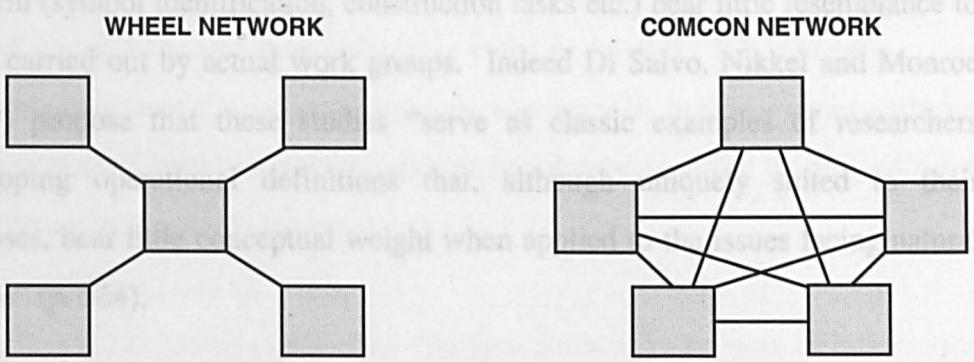
According to Shaw (1964), "The free flow of information (factual knowledge, ideas, technical know-how, feelings) among various members of a group determines to a large extent the efficiency of a group and the satisfaction of its members" (p. 112).

Communication network research assesses the effect of various imposed network structures upon the functioning of groups working on collaborative tasks. Typically researchers have compared the communicative effectiveness of centralised and decentralised network structures. In centralised network structures, typified by the wheel network, only the central member is able to communicate with the others in the group. Unlike this, in decentralised

networks, typified by the comcon (completely connected) network, all the group's members are able to communicate with one another.

An illustration of the wheel and comcon network is provided in Figure 4. In networks such as these, group members are placed in cubicles (represented by squares) which are interconnected by slots in the wall where messages can be exchanged.

Figure 4. Communication Network Structures.



Contrasting results emerged when the centralised and decentralised networks were compared. When the task is simple, centralised networks are found to be more efficient than decentralised networks: the problem is solved quicker, fewer mistakes are made and less time is required (Leavitt, 1951). For complex tasks decentralised network structures are more effective (Shaw, 1954, 1964). Regardless of task complexity, member satisfaction is higher in the decentralised network structures.

These findings demonstrate that the pattern of communication occurring in a group is an important determinant of task effectiveness.

If one were to draw parallels between the reviewed network research and the communication patterns prevalent in chaired and facilitated meetings, then one would conclude that the communication in chaired meetings conforms to the centralised network structure, whereas communication in facilitated meetings is

more like that of the decentralised network structure. Thus, chaired meetings should be more effective when the task is simple and facilitated meetings should be more effective when the task is complex.

With most of the problems encountered by 'real-life' groups being of a complex nature, this suggests that communication in facilitated group discussions should be more conducive to effective task performance. However, the credibility of this analogy becomes suspect when one considers the external validity of communication network research. For example, the tasks the groups are asked to perform (symbol identification, construction tasks etc.) bear little resemblance to those carried out by actual work groups. Indeed Di Salvo, Nikkel and Monroe (1989) propose that these studies "serve as classic examples of researchers developing operational definitions that, although uniquely suited to their purposes, bear little conceptual weight when applied to the issues facing natural groups" (p. 564).

More recently, investigators have studied the effects of group communication upon task performance in what may be considered a more realistic context (Gouran, Brown, & Henry, 1978; Harper & Askling, 1980). For example, in the Harper and Askling (1980) study the outcome of the student group's multimedia production task was assessed by members of an actual client organisation.

Both studies uncovered several communication characteristics which were related to the quality of the group outcome. In both, high achieving groups were found to contain better leadership, more open communication and a higher proportion of active participants when compared with low achieving groups. These studies illustrate that open, participative group communication leads to a higher quality of task outcome.

It is for this reason that I conclude, although tentatively, that the decentralised communication promoted by facilitators will lead to more effective group functioning when compared to the centralised communication characteristic of chaired meetings.

1.5 ICL Observations

The particular set of meetings observed were connected with the European Monetary Union (EMU), more specifically, the impact a single European currency would have upon banking institutions. So they included the discussion of topics such as, would auto tellers issue both the country's particular currency and the ECU, or would they issue only the ECU if adopted?

Senior Directors from several international clearing banks were present. These included Hambros, Lloyds and Barclays Banks. Thus, the meetings participants were of equal status and were unfamiliar with one another. ICL's interest in this area stemmed from the potential upgrade necessary in both computer software and hardware if bank autotellers were to be adapted in order to deal with the introduction of a second currency.

The nature of the meetings was such that they contained a mixture of information transfer and negotiation. Initially, participants would inform one another of the latest developments in the area under discussion (i.e. the information transfer aspect of the discussion). Following this, they would discuss what implications these developments would have for banking institutions (i.e. the negotiation aspect of the discussion). Each meeting was composed of cyclic phases of information transfer and negotiation as the participants covered the different points arising in the discussion.

However, as a consequence of the confidential nature of the discussions I was not permitted to either audio or video record the group's discussion. It is for this reason that the analysis of the facilitated discussions consists of an investigation of speaker sequencing. Like Parker (1984) it was based on pencil and paper recordings of who followed whom in the discussion. By counting the number of times each person followed another in the discussion I was able to gauge how often any pair of participants interacted in a particular meeting.

A graphical representation of the interaction patterns is provided. Figures 5, 6, 7 and 8 refer to the first, second, third and fourth respective group discussions. Group members are represented by squares labelled with a lower case letter. The Facilitator is denoted by the capital letter L. The heaviness of the line connecting any pair of participants reflects how often they interacted in the meeting relative to the other pairs of participants.

Eight group members (excluding myself who did not participate in any of the discussions) were involved in meeting one, two and three, and seven in meeting four. Each meeting lasted between 1.5 and 2 hours.

The communication pattern prevalent in the first meeting (Figure 5) suggests a relatively non-interactive discussion. Among the eight group members present two did not participate at all in the discussion (persons e and g). Furthermore, with the exception of the interaction observed between persons a and b, the majority of the communication took place between person c and four other group members.

In the second meeting (Figure 6) person c appeared to exercise total control over the discussion proceedings. Indeed while person c interacted with the majority of the group's members, including the facilitator, there was little to no interaction between the other members of the group.

Although everyone participated in the third meeting (Figure 7), I observed what appeared to be the formation of a coalition between several of the group's members. The coalition is apparent from the communication pattern exhibited between the participants on the leftmost side of Figure 7. Here persons a, c, d and to a lesser extent person b, were found to regularly interact. While the other members of the group did participate in this discussion, the little they contributed was directed toward the observed subgroup.

Figure 5. Participant Interaction in Meeting 1 of EMU Discussion.

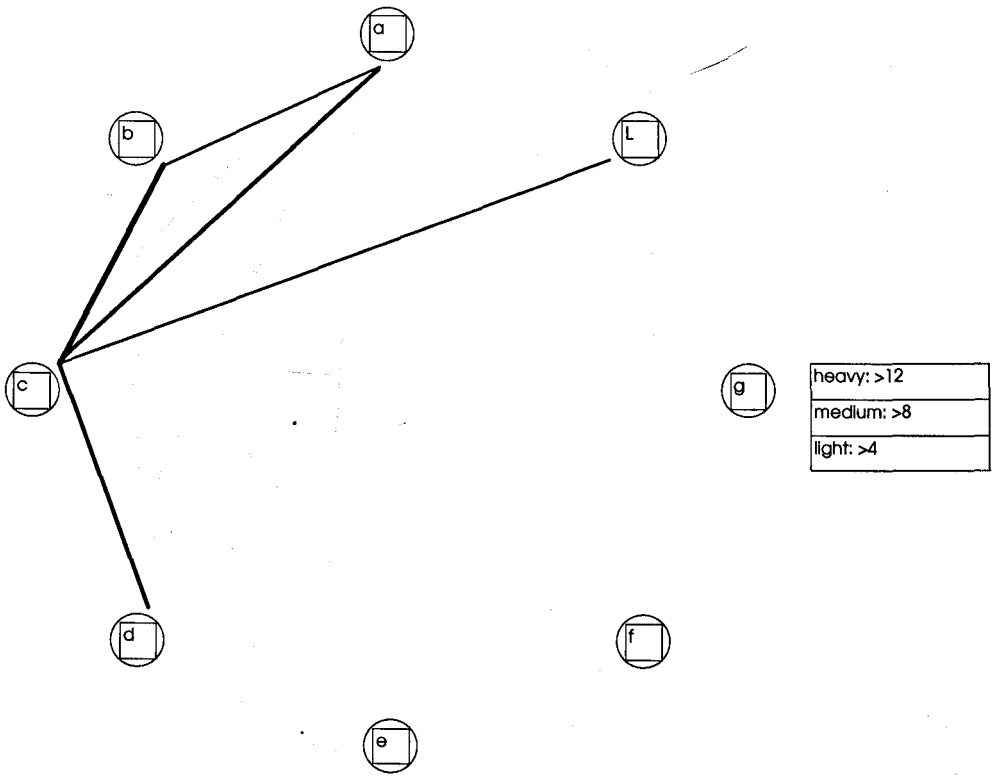


Figure 6. Participant Interaction in Meeting 2 of EMU Discussion.

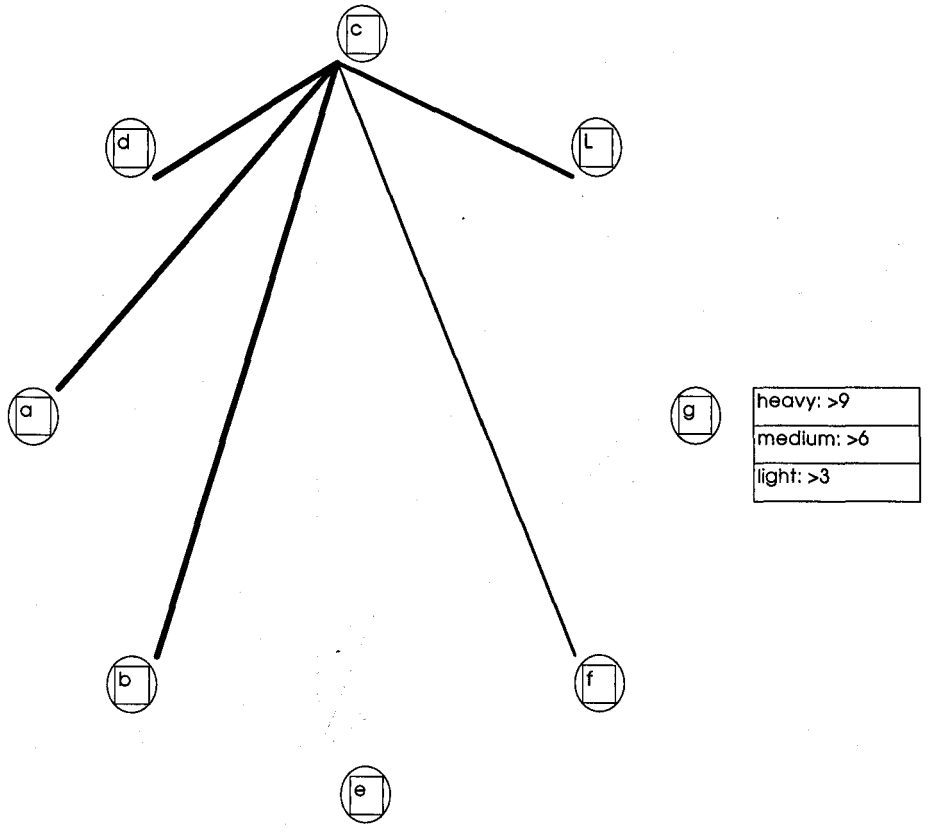


Figure 7. Participant Interaction in Meeting 3 of EMU Discussion.

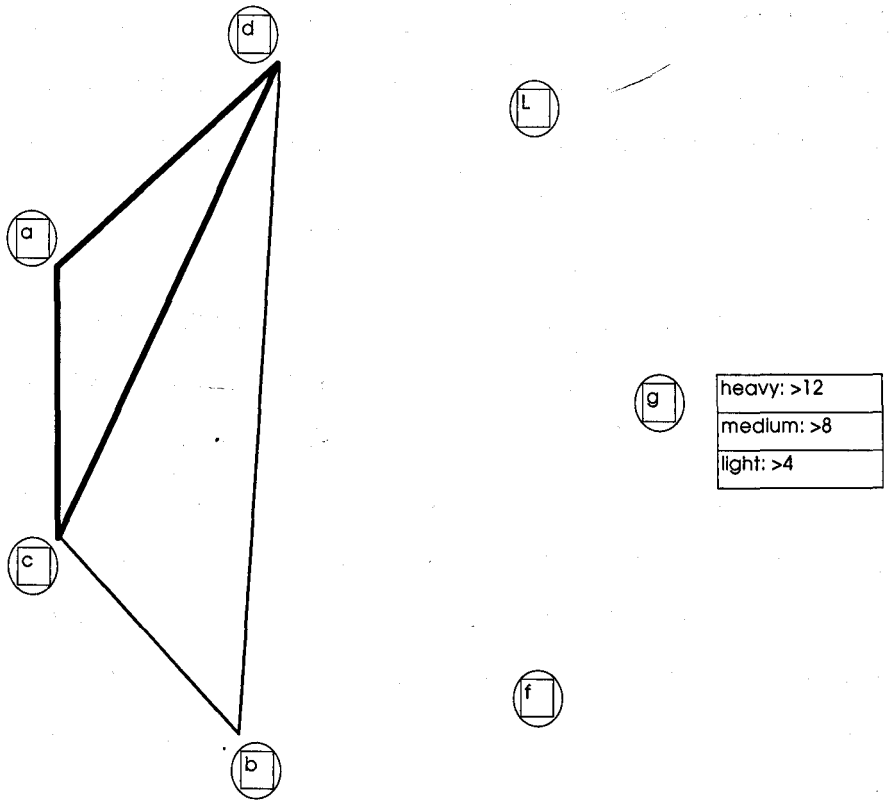
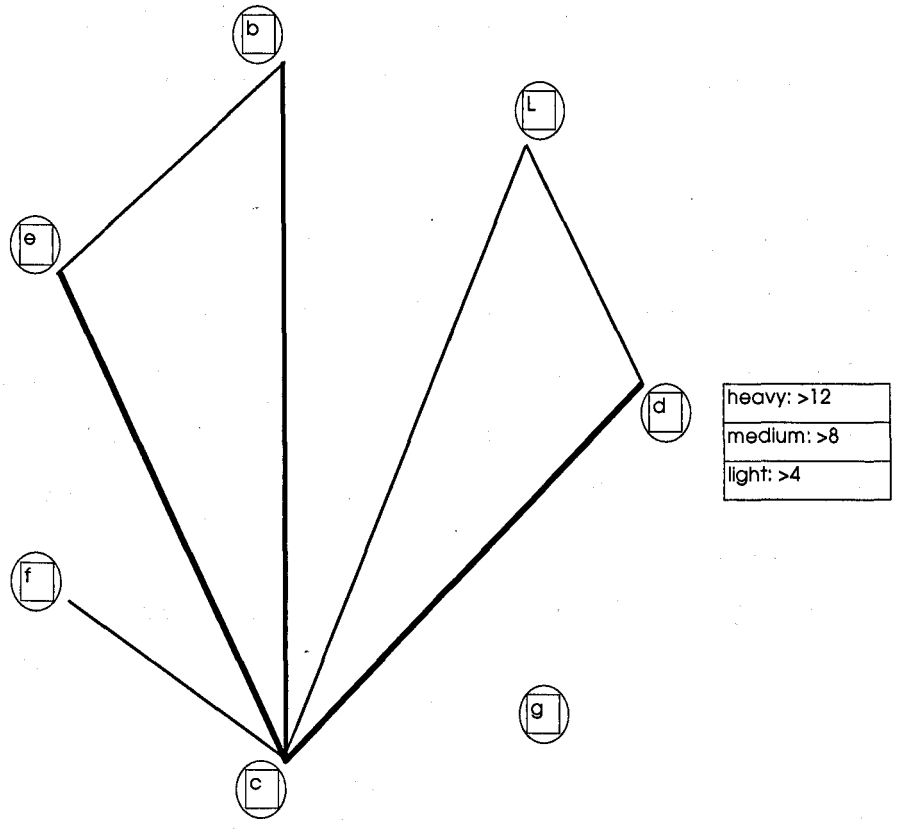


Figure 8. Participant Interaction in Meeting 4 of EMU Discussion.



The final meeting (Figure 8) appeared to be relatively interactive, with six of the seven group members regularly participating in the discussion, although reference to Figure 8 suggests that person c once again held a central role within the meeting. The more interactive nature of meeting four was also apparent from the fact that more of the group's members interacted with one another when compared with the preceding three discussions.

In conclusion, although the measures taken were of a rather informal nature, these non-content related measures provide an overall picture of the structure of the facilitated group discussions. While one of the group discussions appeared to be of a relatively interactive nature, the other three were not. Indeed, in the second meeting person c was observed to completely dominate the proceedings to the extent that no other member of the group interacted with anyone other than person c. This very centralised communication structure is reminiscent of the wheel network and the chaired meeting documented earlier.

Although useful for descriptive purposes, the simple measures used were insufficient to perform an extensive analysis of group functioning. What these measures do demonstrate is that although the role of the facilitator is to encourage equal participation (Clawson et al., 1993), this did not always occur in the SEP meetings.

An important contrast between the facilitated discussions studied by Carletta et al. (1998) and those studied here is group size. The facilitated group discussions observed by Carletta et al. (1998) contained, on average, five group members, whereas there were eight group members present in the EMU discussions described. What's more, as mentioned earlier, the most common size of group taking part on the SEP contained between ten and twelve members. Perhaps it is this contrast in group size that leads to the different communication patterns.

1.6 Group Size

As illustrated in Figure 1 (Executive Summary), group size is an input factor which affects the interaction process and subsequent task outcome. The question of whether a large group will outperform a small group has no simple answer. Research has indicated that large groups are often more successful than small groups, but there is also evidence that they often do not outperform their smaller counterparts.

Steiner (1972) addressed the question of how the size of the group affects its performance. According to Steiner a group's outcome is equal to its potential productivity, the highest level of task effectiveness attainable when member resources are combined in the most advantageous manner, less the process losses which are an inevitable consequence of group interaction.

For example, when a single person performs a task there are no process losses incurred as a result of the co-ordination of activities and integration of interpersonal relationships. Thus, the attainment of potential productivity is achievable as long as the monad works to the best of his/her ability. Where two persons collaborate on a task, all the complexities of one person working on the task are further complicated by the interpersonal and co-ordination problems added by the second person. Here process losses have the potential to lower the group outcome, although these losses may be counteracted by the extra resources brought to the task by the second group member. Therefore, potential productivity is increased along with the potential increase in process losses.

With the addition of a third member, the group's resources are further improved, again accompanied by the increased co-ordination problems added by the extra group member. Of course when the task is divisible, and therefore does not require close temporal or spatial co-ordination, the increase in process losses brought by the third group member may be inconsequential. In contrast, when the task is unitary, and therefore requires a high degree of interpersonal co-ordination, the picture is very different. With an increase from two to three

members the number of co-ordination links between participants is increased from one to three. This causes a situation where the potential for process losses is increased significantly. Furthermore, as group size is increased beyond three members the number of dyadic relationships increases exponentially.

In other words, as group size is increased there is a trade off between the increase in resources brought to the group and the increase in process losses. Eventually the extra resources generated by the continued addition of group members is offset by the greater increase in process losses. As a consequence, actual productivity begins to lag behind potential productivity by greater and greater margins.

This concept is illustrated in the Ringlemann study (see Dashiel, 1935) which investigated the force exerted by different sized groups of individuals pulling on a rope. It was found that the force exerted by each group was less than equivalent to that expected if each person was pulling to his previously measured maximum potential. The discrepancy between actual and potential productivity was proportional to the number of dyadic relationships between the members of the group. Thus, process losses were found to be a linear function of the number of links along which co-ordination was required.

If process losses are a linear function of the number of dyadic relationships which exist in a group, then one would expect a greater degree of process losses to occur in the larger ICL discussion groups as opposed to those studied by Carletta et al. (1998).

In the five person facilitated groups studied by Carletta et al. the number of dyadic relationships is ten, whereas in the eight person discussion groups observed at ICL it is almost three times that, with 28 potential channels of communication. The increase in dyadic relationships in the ICL groups is probably the reason why less of the existing channels of communication were fulfilled [18% in meeting 1 (5 of 28), 18% in meeting 2 (5 of 28), 18% in

meeting 3 (5 of 28) and 33% in meeting 4 (7 of 21)] when compared with the facilitated groups documented by Carletta et al. [47% in Figure 3 (7 of 15)].

Evidence that available channels receive unequal usage is provided by the laboratory study of Bales, Strodtbeck, Mills and Roseborough (1951) and the fieldwork of Stephan and Mishler (1952). Both authors demonstrated that in groups composed of three or four persons, some pairs of group members communicated less frequently than others. As the size of the group was increased, such inequalities were accentuated, becoming very noticeable when the group contained seven or eight members. Bales et al. (1951) found that as group size was increased, a larger proportion of group members demonstrated participation levels below their equal share, that is under the mean for the group. As a consequence, communication was found to become increasingly polarised as group size was enlarged. Thus, the majority of speech in discussions involving ten or more participants is produced by four or five speakers.

Observation of the communication occurring in the facilitated group discussions at ICL, the work of Bales et al. (1951) and Stephan and Mishler (1952) suggest that as groups become larger, group members are less able to maintain multiple dyadic channels of communication. Indeed, in the ICL discussion groups it was found that the majority of the communication took place between three or four speakers. For example, in the third meeting (Figure 7) there was a strong triangular pattern of interaction between persons a, c and d.

This suggests that in larger groups, as a consequence of the limited number of communication channels a person is able to utilise, sub-groups are formed. This observation is corroborated by Bray, Kerr and Atkin (1978) who concluded that it is not the actual size of the group that is important but the 'functional size'. They noted that as group size is increased, the number of non-participators also increased, resulting in a functional group size that was smaller than the actual group size.

The fragmentation of large groups into subgroups is supported by literature which suggests that no more than seven persons can be directly responsive to one another in a discussion. As a consequence of communication constraints, groups which contain eight or more members tend to divide into three or four person subgroups (Dunbar, Duncan, & Nettle, 1995; Hare, 1962; James, 1951).

Hence, there exists a general consensus among researchers that the optimum size of discussion group contains five members (Hare, 1981). Members of groups with less than five participants complain that the group does not contain enough resources, whereas those containing more than five complain of not having enough opportunities to speak (Hare, 1962; Thomas & Fink, 1963). It is therefore not surprising that group cohesion and satisfaction are found to be at their highest when the group contains five members (Hare, 1962; Slater, 1958).

In conclusion, the observations made of the facilitated discussions held on ICL's SEP coincide with those documented in the group literature. Comparison of ICL's eight person groups with the five person groups studied by Carletta et al. (1998) illustrate the more radial, centralised patterns of communication observed in the larger ICL discussions. The reviewed literature suggests that these communication patterns are a result of the larger size of the group discussions held on the SEP.

1.7 Summary

The chapter begins with a description of the Senior Executive Programme (SEP) run by ICL. Each 'event' on the SEP is comprised of a set of professionally facilitated group discussions. A number of attributes specific to the facilitated style of leadership were identified.

Facilitators encourage equal participation and promote social interaction in discussions. This is apparent in the communication patterns prevalent in facilitated group discussions. When compared with the traditional chaired style of leadership, facilitated discussions are found to be more interactive.

Furthermore, a review of past group literature suggests that the open communication promoted by facilitators leads to a more effective task outcome.

However, the facilitated group discussions observed while a guest on ICL's SEP were less interactive than anticipated. This I attributed to the large size of the groups used on the SEP. The group size literature supports this view.

The rest of this thesis explores the effect of group size on influence and process in group communication. Before it is possible to comment upon the implications of group size, it is necessary to review the theoretical models of interpersonal communication.

In the next chapter a review of the current models of interpersonal communication is provided. The implications of these models when applied in the context of group or multiparty communication is discussed.

Chapter 2. A Review of the Current Models of Interpersonal Communication

In Chapter 1 it was shown that group size affects the patterns of communication taking place in discussion groups. The larger group discussions observed at ICL were less interactive than those documented by Carletta et al. (1998).

To understand the implications of these differing patterns of communication this chapter reviews the current models of interpersonal communication. It should be noted that this review is based largely upon that provided by Krauss and Fussell (1996). Like all existing models of communication, those reviewed are based upon observations made of dyadic communication. To my knowledge no theoretical model of group communication exists.

After reviewing each model, a number of experimental hypotheses are constructed. These are based on the predictions made by two general classes of model when applied to multiparty communication.

2.1 Introduction to Communication and Chapter Organisation

Sperber and Wilson (1986) describe communication as "a process involving two information processing devices. One device modifies the physical environment of the other. As a result, the second device constructs representations similar to the representations already stored in the first device" (p. 1).

While this definition focuses upon the role of internal representations in communication, it leaves open the question of precisely how these representations which are stored in one device come to be constructed within a second device. The following discussion shall focus upon four social psychological models of interpersonal communication and the way they characterise this process. These are the Encoder/Decoder Models, Intentionalist Models, Perspective-Taking Models and Dialogic Models of communication.

The four models differ on a variety of dimensions which shall be elucidated in the following sections of this chapter. One fundamental respect in which they differ is where they locate meaning. For Encoder/Decoder models meaning is a property of the message, for Intentionalist models it is to be found within the intentions of the speaker, whereas for Perspective-Taking models meaning is derived from the speaker's representation of the addressee's point of view. In Dialogic models meaning is an emergent property of the participants' joint communicative activity.

From these descriptions alone it is possible to draw a broad distinction between the four models of interpersonal communication. In Encoder/Decoder, Intentionalist, and Perspective-Taking Models message production and comprehension occur in isolation. These individualistic approaches to discourse have been referred to as 'autonomous' models (Schober & Clark, 1989) on account of the autonomous role adopted by the speaker and addressee.

In contrast, Dialogic models have been referred to as 'collaborative' models of interpersonal communication (Schober & Clark, 1989). These interactionalist approaches to communication assume that speakers and addressees go beyond any autonomous actions, and collaborate with each other, moment by moment, to ensure that what is said is mutually understood.

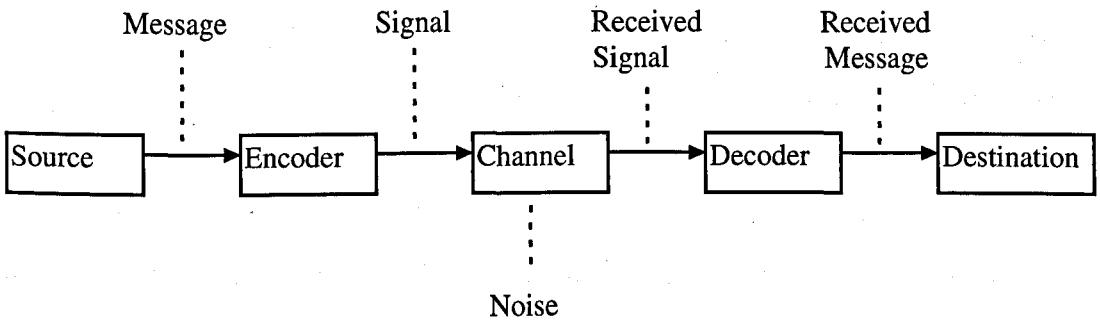
Next I provide an outline of each of the four models of interpersonal communication. For each model a review of the supporting experimental literature is provided. This is followed by a description of the limitations of the particular account. The chapter ends with the presentation of the experimental hypotheses generated by reference to the autonomous and collaborative models when applied to multiparty communication.

2.2 Encoder/Decoder Model

The Encoder/Decoder model provides the most simplistic conceptualisation of interpersonal communication. This theory of communication was originally constructed by Cherry (1956) to characterise message transmission across communication media. The premise behind the Encoder/Decoder model is apparent from its name. It is based on the assumption that communication works by way of a code which maps signals onto meaning. Morse code is a familiar example of such a system. In Morse code the sender taps out a series of pulses, whose differing pattern relates to specific letters or numbers which are identifiable, and comprehensible, by the receiver.

Encoder/Decoder models operate in the same way. They view communication as a process in which an internal representation is encoded (i.e. transformed into code) by one information processing device (the source), and transmitted over a channel to a second information processing device (the destination) where it is decoded into a representation. The process is illustrated schematically in Figure 9.

Figure 9. Encoder/Decoder Conceptualisation of the Communication Process.



(from Krauss & Fussell, 1996, p. 660)

In speech communication the source and encoder are contained within the speaker (or sender), while the decoder and destination relate to the addressee (listener, hearer or receiver). To transmit the message that I want Paul to close the door I would first have to transform this mental representation of wanting the door closed into a verbal, or linguistic representation by means of my linguistic encoder. Having constructed my signal, saying for example "Paul would you mind closing the door", Paul has to now decode this linguistic representation in order to construct a mental representation that corresponds, at least in some respects, to my mental representation of wanting the door closed.

Of course, a mental representation belonging to myself and that of my addressee may differ for many reasons e.g. due to different understandings of terms used in the linguistic representation, or the inadequate supply of information essential to accurately recreate the speaker's mental representation of the message. It is in this respect that Encoder/Decoder models of communication can be seen to exemplify the application of principles of information theory. Within information theory the function of signals transmitted from source to destination is the reduction of uncertainty. The more informative and better constructed my message of wanting the door closed, the better equipped my addressee (Paul) will be to accurately form a mental representation of my message, which in effect reduces uncertainty.

Literature supporting the assumptions made by the Encoder/Decoder model when applied to verbal communication have been scant. Indeed, experiments measuring codability show that several factors, other than the physical properties of the stimulus, determine how it is coded. Colour coding studies reveal that who the message is addressed to (Innes, 1976; Krauss, Vivekananthan, & Weinheimer, 1968), the purpose of naming the colour (Danks, 1970) and whether naming occurred as part of a dialogue or monologue (Krauss & Weinheimer, 1967) all determine how a colour is coded. Such studies illustrate that the determinants of a colour's codability are based not only on the physical qualities of the stimulus, but also upon the function that the coding serves.

These colour codability studies illustrate that the coding of an object is not a direct consequence of the object's characteristics. Rather, speakers consider several factors when coding objects. The finding that speakers also consider, for example, their addressee when constructing their message demonstrates that a simple Encoder/Decoder model does not adequately explain human communication.

2.2.1 Limitations of Encoder/Decoder Model

In summary, two features of Encoder/Decoder models were highlighted. One is implicit in the very notion of a code. Viewing communication as the simple exchange of codes implies that the meaning of a message is fully specified by its elements. The second predominant feature is that communication consists of two autonomous processes - encoding and decoding. While language can, in certain respects be regarded as a code, and that both encoding and decoding processes are involved in communication, encoding and decoding do not fully describe what occurs in communication.

For example, the same message can be (correctly) understood to mean different things in different circumstances. Perhaps the clearest example of this is messages which can be understood to mean something other than their literal meaning. The phrase "I'm coming out" means different things in different contexts (e.g. as a declaration that one is coming out of a car, or as a declaration of a closet homosexual making public their sexual orientation).

Without making the relevant context part of the code, a model that conceptualises communication as simply coding and decoding will have difficulty explaining how the same message can be understood to mean different things at different times. Moreover, even when the context is held constant, the same message can mean different things to different addressees. Indeed, there is considerable evidence to suggest that speakers design messages with their eventual destination in mind (Clark & Murphy, 1982).

2.3 Intentionalist Models

Unlike Encoder/Decoder models of interpersonal communication - where meaning is a property of the message - Intentionalist models view communication as the exchange of communicative intentions. These models operate through speakers selecting word strings which most clearly convey their intentions. For the hearer to understand a message they must not only decode the literal meaning of the message (as in Encoder/Decoder models), but they must also infer the speaker's communicative intentions. Thus, within Intentionalist models, the more fully a speaker's intentions are understood the more successful the communication will be.

For Intentionalist models the social construction of meaning is accomplished by a set of inferential rules. Speakers refer to these rules when formulating utterances which convey their intentions. Addresses refer to the same set of rules in order to identify these intentions. These rules are based on Grice's co-operative principle and Searle's theory of speech acts.

Central to the Intentionalist position is the idea that words and their intended effects on the listener do not bear a fixed relationship. For example, if I say to a colleague "thanks for the computer virus", I expect my addressee to understand my communicative intention as being that of sarcasm (speaker meaning - intended sentence meaning) rather than sincerity (sentence meaning - literal meaning). According to Grice (1957, 1969) sentence meaning provides the basis from which speaker meaning is derived. He argues that the listener evaluates the literal meaning of an utterance in light of the context of the conversation, and from this is able to gauge the speaker's intended meaning.

A similar distinction is made by Searle (1969, 1979). Like Grice's speaker and sentence meaning distinction, Searle distinguishes between an utterance's intended meaning (indirect speech act) and its conventional illocutionary meaning (direct speech act). Searle argues that the intended meaning of an utterance often differs from its conventional meaning. For example, when asking

someone to close a door we generally do not order that the door be closed, as in "Paul close the door", a direct speech act. We more often make our request indirectly, as in "Paul would you mind closing the door". When uttering, "Paul would you mind closing the door" we expect our addressee to realise our intention (a request that the door be closed) rather than the literal meaning of our utterance (a question as to whether Paul would mind closing the door).

According to Grice, addressees are able to grasp the speaker meaning of an utterance by reference to the four conversational maxims which compose the 'co-operative principle' - that conversation is a co-operative endeavour. These conversational maxims are as follows; (1) *Quantity* - messages should contain no more or less information than is required, (2) *Quality* - messages should be truthful, (3) *Relation* - messages should be relevant to the discussion and (4) *Manner* - messages should be orderly, brief and unambiguous.

Although many utterances violate one or more of these maxims Grice assumed that the co-operative principle held, and argued that it was the violations themselves which provoked addressees to seek alternative, speaker meaning interpretations of utterances. For example, the remark discussed earlier, "thanks for the computer virus", clearly violates the maxim of quality. The indirect speech act "Paul would you mind closing the door" violates the maxim of quantity. Through the violation of these maxims addressees are able to correctly infer the speaker's intentions, which is that of sarcasm when being thanked for the computer virus and a request that the door be closed.

Like most Intentionalist theorising Grice and Searle incorporate context within their interpretation of how addressees come to understand speaker meaning. According to Searle (1975), to understand indirect speech acts listeners draw on their knowledge of speech acts, Gricean principles of co-operative conversation and the context of the conversation.

Three areas of research encourage us to view interpersonal communication from the Intentionalist standpoint. These are psycholinguistic research on the comprehension of indirect speech acts, research on the role of social psychological variables on language production, and how the maxims associated with the co-operative principle affect subjects' responses to questionnaires.

Psycholinguists assume that there are three stages involved in the processing of indirect speech acts; assessment of the literal meaning of the utterance, assessment of the appropriateness of the literal meaning in terms of Grice's conversational maxims, and finally the identification of the intended meaning on the basis of the previous two stages. This characterisation of how people infer intentions from indirect speech acts has led to several hypotheses. Most prominent is that indirect speech acts will take longer to process than direct speech acts, and that the comprehension of indirect meaning should be facilitated through the appropriate contextual cues.

Although empirical support for these predictions has been mixed, overall studies in this area support the hypotheses outlined above. People are found to consider the intended meaning of utterances through assessing the conventional meaning of the message, the context in which the message is framed and the common ground (mutual knowledge and beliefs) shared between the speaker and addressee.

Related work has set out to identify the effect of social psychological variables on utterance comprehension. Typically, researchers in this area have investigated the factors which affect the politeness of utterances, where politeness is thought to increase in accordance with the less direct nature of the utterance. For example, the direct request "Paul shut the door" is thought to be less polite when compared with the indirect request of "Paul would you mind closing the door". The findings of work in this area suggest that social dimensions of the conversational context influence the interpretation of speech acts.

Brown and Levinson (1987) identified three social factors which, when combined, determine the directness of a request. These factors concern the size of the request, the power of the addressee over the speaker (e.g. boss or friend) and the social distance between the speaker and addressee (e.g. friend or stranger). Brown and Levinson suggest that as any of these factors are increased the request made becomes increasingly less direct. Later research indicates that models of this sort have been formulated too broadly and suggests that there are other variables which are involved in the interpretation of indirect speech acts (Holtgraves, 1994).

The last area of research which adds credence to the Intentionalist model explores the factors which influence the way people infer intentions in experimental and questionnaire research. The premise underlying this work is that interactions between experimenter and subject can be viewed as conversations to which Grice's maxims apply. For example, determining what a survey question means requires, as in a conversational context, inferring the experimenter's communicative intentions.

Experimental studies have assessed how the violation of Grice's conversational maxims can result in what have traditionally been viewed as reasoning errors in a variety of domains; the base rate fallacy, the conjunction error and the fundamental attribution error.

In the base rate fallacy (Kahneman & Taversky, 1973), when asked which profession exemplars fell into, subjects would base their answer on the person's personality profile rather than simple probabilities e.g. 70% of sample are lawyers and 30% engineers. The results were interpreted as being caused by a representative heuristic, which motivated subjects to base their decision on how representative the personality profile was to the particular profession. An alternative explanation is offered by Intentionalist theorists. They believe that subjects base their decision on the personality profile on account of this being the inferred intention of the experimenter.

Indeed, subjects' error rate was greatly reduced when Kahneman and Tversky's instructions were reworded in order to reduce the *relevance* of the personality profiles (Schwarz, Strack, Hilton, & Naderer, 1991). When the credibility of the source was increased (e.g. palm reader, psychologist etc.), thus manipulating the maxim of *quality*, judgement errors were found to increase (Ginossar & Trope, 1987). Similar findings emerged when the conjunction error and fundamental attribution error were reassessed in light of Grice's conversational maxims.

In questionnaire studies, subjects faced with ambiguity are found to look at the context of the question in order to identify the researcher's intended meaning. For example, in a study by Strack, Schwarz and Wanke (1991) two groups of subjects were asked to describe their attitude toward an 'educational contribution'. One group had this question preceded by a question concerning payment from students while the other had a question relating to payments to students. As expected, the group in the latter condition were more favourably inclined towards the ambiguous question concerning an 'educational contribution'.

The research outlined in this section illustrates the superiority of Intentionalist models over the simpler Encoder/Decoder models. The studies discussed demonstrate that when communicating it is intentions and not simply messages which are exchanged. More specifically, they show that for communication to be successful, the intentions understood by the addressee must match those of the speaker.

2.3.1 Limitations of Intentionalist Model

Although the Intentionalist model of interpersonal communication does represent a marked improvement over the account offered by the Encoder/Decoder model, there still remain many issues which are problematic to the Intentionalist standpoint. The primary limitation of the Intentionalist model concerns its inability to account for the social nature of communication.

Several studies suggest that social information, such as knowledge of the speaker and particularly the speaker's relationship to the addressee, affect message construction and interpretation.

Knowledge of the speaker has been shown by Hilton (1995) to affect the hearer's perception of the message transmitted. Hilton found that dispositional attributes (e.g. personal characteristics, social category memberships etc.) associated with the speaker can affect how Gricean conversational maxims are applied in message interpretation. For example, suspicions about the credibility of a court witness would influence how we apply the maxim of quality when interpreting their testimony.

Further to this, most formulations of the co-operative principle fail to consider the cultural and individual differences in background knowledge that can affect the way utterances are constructed and interpreted. For example, one would expect a conversation about house construction between someone from Greenland and someone from the UK to involve two completely different sets of maxims concerning quality.

Finally, Francik and Clark (1985) discovered that subjects construct indirect requests which consider the potential obstacles that their addressees may confront when trying to fulfil their request (e.g. access to information, memory for information etc.). The idea that people design their utterances with their eventual destination in mind is discussed in the next section of this chapter.

2.4 Perspective-Taking Models

Perspective-Taking models of interpersonal communication assume that individuals experience the world from different vantage points, and for this reason speakers must consider the vantage point of their addressee in order to ensure effective communication. Thus, unlike Intentionalist models, where the addressee must consider the intentions of the speaker to determine the meaning of an utterance, the Perspective-Taking account assumes that it is the speaker

who must consider the perspective of their addressee to ensure the successful transfer of meaning. The general idea that communicators tailor their speech to their addressee has been widely accepted (Krauss & Fussell, 1996).

Perspective-Taking models focus upon the way in which people's assumptions about other's perspectives constitute an integral part of a message's interpretative context. For such models the social construction of meaning is derived from the speakers' implicit theories about what their partners know, feel, think and believe. Indeed, most studies in the Perspective-Taking tradition have focused upon communicators' attempts to affect message comprehensibility by adjusting the content of their message to be in accordance with their addressee's point of view.

Research in this area has typically used referential communication tasks. These tasks involve a speaker and a matcher (addressee). The speaker describes an item from an array and the matcher attempts to identify that item. Investigation of the speaker's referring expressions have allowed researchers to assess how speakers incorporate their addressee's perspective in their utterance.

Two types of stimuli have been used in referential communication tasks, those with pre-existing names (e.g. architectural landmarks such as the Statue of Liberty) and those without pre-existing names (e.g. abstract geometrical shapes). Stimuli with pre-existing names allow investigators to explore how the speaker's perception of their addresses' background knowledge affects their referring expression. Those without a pre-existing name enable the study of the process by which communicators come to establish a joint perspective in relation to the referred to item.

The research which has been conducted within the Perspective-Taking framework has used either a non-conversational or conversational paradigm. In the non-conversational context the speaker's inferences are based solely on the information provided by the experimenter. Using a conversational paradigm

allows the speaker's perspective of their addressee to be modified through addressee feedback.

Both research areas are reviewed. The studies conducted using the non-conversational paradigm are considered first.

Work carried out in non-conversational settings has investigated how subjects consider their addressee's visual field when referring to objects. For example, Schober (1993) had subjects refer to one of two identical circles in different locations in their visual field in such a way that would allow an imaginary addressee to identify the intended referent. The results of this study demonstrate that although subjects found egocentric descriptions (e.g. in front of me) of circle positions easier to produce, they more frequently used addressee based descriptions (e.g. in front of you). Furthermore, Hupet, Seron and Chantraine (1991) found that the harder a stimulus was to classify the more information the subject would provide for their addressee.

These findings illustrate that speakers anticipate their addressee's potential problems in identifying referents. Other research demonstrates that speakers not only consider relatively simple aspects of other's point of view, but that they incorporate their personal mental representation of other's knowledge, beliefs and so on in their message.

Fussell and Krauss (1989a) investigated how utterances constructed for one's own use differ from those constructed for others. They found that speakers' descriptions of nonsense figures constructed for their own reference were half the length of those constructed for others. In addition, referring expressions constructed for oneself were found to be more personal (e.g. looks like my coffee machine) than those constructed for others. As a consequence of the more elaborate, less personalised nature of utterances produced for others, matchers were better able to identify the intended referent when the message was constructed for someone else than when constructed for oneself.

Other researchers have gone beyond the self/other distinction and assessed how inclusion in various social categories (e.g. psychologist, sports fan, Glaswegian) affects message construction. Kingsbury (1968) found that longer, more detailed directions were provided by respondents when their addressee was thought to be an 'out of towner' in contrast to when he/she was thought to be from the area in which the directions were requested. Even more specifically, researchers have demonstrated that speakers incorporate personal knowledge of their addressees within their referring expressions. Fussell and Krauss (1989b) found that referring expressions addressed to a specific friend were more effectively understood by that friend when compared with randomly selected recipients.

Later research assessed how referring expressions change as individuals build a more elaborate conceptualisation of their addressee. Hupet and Chantraine (1992) had subjects describe tanagram figures (Chinese geometrical shapes) from an array, in writing, over a number of successive trials. They found that when speakers believed they were addressing the same person, as opposed to different persons over trials, they were more likely to use definite reference (indicative of being given) and to introduce one word labels for items. However, this did not affect identification accuracy. Only when addressee feedback is provided is there an improvement in identification rate across successive trials (Traxler & Gernsbacher, 1992; Traxler & Gernsbacher, 1993). Thus, it appears that speakers require feedback if they are to fully appreciate the perspective of their addressee.

In summary, virtually all the studies assessing the Perspective-Taking model within non-conversational settings support the notion that communicators consider their addressee's perspective when constructing their utterance. The drawback of these studies concerns their generalisability to our most commonly used communicative situation, conversation. Studies conducted within the conversational paradigm are reviewed next.

Unlike communication in non-conversational settings, in conversation communicators can draw on information from a variety of sources e.g. overt questions and comments, vocal backchannel responses (e.g. uh-huh, um) and non-vocal back channels e.g. smiles, gaze, head nods etc. (Kendon, 1967; Schegloff, 1982; Yngve, 1970) and through the appropriateness of their addressee's response.

The availability of feedback has several effects on communication, two of which are specifically important to perspective-taking. First, feedback reduces the pressure on a speaker to create a fully communicative message from the outset. The reason for this being that additional talk can be added to clarify misunderstandings between the speaker and addressee (Clark & Wilkes-Gibbs, 1986). Second, feedback allows the accumulation of common ground between the speaker and addressee. Increases in common ground, through interaction, allow speakers to continually improve their understanding of their addressee's perspective. This in turn allows speakers to refine their referring expressions.

To assess these assumptions researchers have employed an interactive version of the referential communication task. Here speakers are allowed to directly converse with their addressee in order to identify target referents.

Comparing the first message made in a conversational setting with that made in a non-conversational setting, Schober (1992) assessed the proposition that feedback reduces the need for speakers to produce a fully communicative message from the outset. It was found that referring expressions made in the non-conversational context were more likely to consider the addressees' perspective than those made in the conversational context. Schober concluded that this effect emerged on account of participants being able to remedy any misunderstanding, via feedback, only in the conversational condition.

To assess the effect the accumulation of common ground has on referring expressions, investigators have examined the development of referring expressions over time. Krauss and Weinheimer (1964, 1966) found that over

successive trials referring expressions become shorter. For example, a nonsense figure was initially referred to as 'the upside down Martini glass on a wire stand'. Over trials this description was abbreviated to 'the inverted Martini glass' and eventually 'the Martini'. This effect was only found to occur when feedback was provided. When subjects were asked to describe the nonsense items into a tape recorder for some future listener, there was much less shortening with repeated reference.

The tendency for referring expressions to become shorter over repeated reference has been cited as support for the Perspective-Taking account. It suggests that conversational partners construct a shared perspective of the referent which they use for subsequent communication. Thus, in contrast to non-conversational settings, where speakers' utterances are coloured by their beliefs regarding their addressee, in conversation speakers use feedback to continually update their understanding of their addressee's perspective.

This is not to say that participants in conversational settings do not make use of preconceived beliefs regarding their addressee. Where no feedback has been received (as is the case with the first referential message) speakers have nothing but their beliefs to refer to when constructing their message. Fussell and Krauss (1992) tested this assumption in a conversational referential communication task. They found that speakers' prior beliefs, regarding what their addressee knew, shaped their referring expression. When they did not expect their addressee to know the referent's name, speakers were found to provide additional identifying information. This finding indicates that speakers engaged in conversation do consider the perspective of their addressee in their referring expressions.

Overall, it appears that perspective-taking based on prior beliefs and interactional feedback plays an important role in communication. In non-conversational contexts there is more emphasis placed on the addressee's prior beliefs than in conversational settings. The reason for this being that in non-conversational settings speakers are unable to revise their messages through the feedback provided by their addressee.

2.4.1 Limitations of Perspective-Taking Model

Although the studies outlined in this section do present convincing evidence in favour of the Perspective-Taking account, this model has a number of shortcomings. Most notable are the homogeneity of subjects used, the tasks used, and the lack of research carried out on multiparty communication.

Like most research on interpersonal communication, studies which support the Perspective-Taking model are of limited generalisability due to their exclusively student subject pool. Indeed, within group differences have been uncovered by Kogan and Jordan (1989) who reported that messages created by elderly adults are less informative than those produced by middle-aged adults. Others, such as Hupet and Chantraine (1992), have identified the existence of individual differences in perspective-taking ability.

While referential communication tasks have illuminated many complex factors involved in the communication process, the exclusive use of this task, and the narrow range of stimuli used, limit the generalisability of their findings. For example, using only concrete things and nonsense figures does not allow investigators to explore abstract concepts such as love.

Finally, an area which presents a considerable challenge for the Perspective-Taking model are situations in which more than one addressee is present. As stated earlier, multiparty communication has not been studied empirically. In the group context there are many perspectives which the speaker must consider. It is unclear whether the Perspective-Taking model would expect speakers to consider the perspective of each group member, or whether they would generalise across the group as a whole.

2.5 Dialogic Models

Each of the models discussed thus far constitute individualistic approaches to interpersonal communication. Encoder/Decoder, Intentionalist and Perspective-Taking models all explain communication in terms of individual message production and comprehension. In essence, these models view the transfer of meaning as something which involves two autonomous processors, namely the speaker and addressee. Dialogic models represent a marked digression from this standpoint. They view communication as the accomplishment of a joint activity between the speaker and addressee, who collaborate to ensure that what has been communicated has been understood.

The most fully specified model of interpersonal communication derived from the dialogic perspective is the Collaborative model (Clark & Wilkes-Gibbs, 1986). Central to the collaborative model is the notion of co-ordination. Co-ordination, according to Clark (1985) is necessary in almost any social activity. Shaking hands for example requires that both participants co-ordinate their extending of the hands, shaking of the hands, and withdrawal of the hands (Clark, 1996). In relation to language, co-ordination concerns what a speaker means and what his/her addressee understands him/her to mean.

Collaborative communication, according to Clark and Wilkes-Gibbs (1986), involves two phases, a presentation phase and an acceptance phase. In the presentation phase the utterance is produced. In the acceptance phase interaction between the speaker and addressee is undertaken to ensure that the meaning of the utterance produced is mutually agreed. This process, where the meaning of an utterance is negotiated between the speaker and addressee, is known as 'grounding' (Clark & Schaefer, 1987).

How quickly an utterance is grounded is dependent upon the listener's comprehension of the message transmitted. More complex messages therefore generally require a greater degree of grounding. According to the collaborative model, regardless of the number of turns required, communicators will try to

establish that mutual understanding has occurred, although they will do so in the manner which requires the least collaborative effort - thus not violating Grice's maxim of *quantity* discussed earlier.

Empirical support for the collaborative model has been gained using various forms of the interactive referential communication task. The rest of this section provides a summary of the research findings uncovered using this conversational paradigm.

Garrod and Anderson (1987) investigated how conversational partners come to create a joint perspective for spatial reference. In this study pairs of subjects played a computerised maze game which required them to refer to specific locations on the maze. Analysis of the referring expressions used revealed a correlation between partners spatial description strategies. This finding was interpreted as evidence that the dyads had developed a joint spatial perspective of the maze. No correlation was evident across partners over successive trials of the game. Taken together these findings were thought to represent communicators use of a local 'input-output co-ordination' strategy, whereby speakers formulate their message on the basis of the previously used referring expression.

Other research has employed more complex referential communication tasks. In these communicators must construct both a mutual understanding of the object of reference, and its location in space.

Using stimuli without a pre-existing name, Chinese tanagram figures, Clark and Wilkes-Gibbs (1986) found that referring expressions became shorter and simpler across trials of the task. This finding, which is also consistent with the Perspective-Taking model, indicates the development of the speaker's perspective of his/her addressee. In addition, the addressees' co-ordinating strategies were found to change over trails - expansion of information was requested less often over successive trials. The fact that both the speakers' and addressees' co-ordinating strategies were adapted across successive trials

indicates the collaborative development of a shared perspective, facilitated by both the speaker and the addressee.

Expanding upon these findings, Hupet et al. (1991) found that as stimulus discriminability and codability decreased, more interaction between the speaker and addressee was undertaken to successfully identify the intended referent. However, on reaching the sixth trial subjects were found to be equally proficient at identifying the intended referent regardless of its distinctiveness. This finding suggests that once a joint perspective is established it is relatively easy to maintain.

Referential communication tasks using objects which have pre-existing names demonstrate that people still have to co-ordinate their activities in terms how they are going to refer to a particular item e.g. whether they will use names, descriptions, or a combination of the two. The collaborative process in these situations is simple when the interlocutors share a similar background knowledge, but becomes more difficult when inequalities in their common ground exist.

Isaacs and Clark (1987) demonstrated that not only do knowledgeable speakers tailor their messages to their addressee (as predicted by perspective-taking models), but they also collaborate with their addressee to ensure that the information they present has been adequately grounded.

In this study speakers with a greater expertise of New York City landmarks would begin by both naming and describing the to-be-referred-to landmark to their addressee. Over repeated reference speakers were found to eliminate the descriptive references associated with each landmark. Speakers were also found to modify their referring expressions to their addressees' needs within trials. Furthermore, when the addressee was more knowledgeable than the speaker, they were observed to facilitate the discussion by introducing the name of the referred to landmark.

These findings not only illustrate that speakers tailor their messages to their addressees, but also that addressees are capable of affecting the messages provided by the speaker.

Finally, collaborative models predict that the common ground participants develop during a conversation will be tailored to their own needs and may not be understood by others. The last area of research reviewed provides support for this prediction, illuminating the addressee-specific nature of the grounding process.

Perhaps the clearest example of addressee-specific acts of reference is provided by Schober and Clark (1989). In their study a speaker, addressee and overhearer took part in a referential communication task. The speaker and addressee were asked to order a series of tanagram figures, unaware of the participant overhearing their conversation. Two overhearer conditions existed, one where subjects overheard the entire discussion and the other where they overheard only the second half of the discussion. Comparison of the number of items correctly identified demonstrated that addressees better understood the speakers' referring expressions when compared with the overhearers. This was the case even when the overhearers heard every word of the conversation.

Schober and Clark propose that overhearers' poorer comprehension of referring expressions is a consequence of them not being involved in the grounding process. Participating dyads are able to ground each utterance to an agreed, acceptable level, the problem for overhearers being that this level may be inadequate for their own grounding purposes. According to Schober and Clark, when an utterance is not adequately grounded incomprehension of the referring expression occurs.

Of the experimental literature reviewed thus far it is this finding, that listeners who participate in a discussion understand more than those simply overhearing the discussion, which lends the greatest amount of support to the Collaborative model. If understanding in conversation were an autonomous process then there

should be no such difference. Schober and Clark therefore conclude that understanding is part of a collaborative process.

2.5.1 Limitations of Dialogic Model of Communication

The studies outlined in this section provide strong support for the Collaborative model of interpersonal communication. The Collaborative model provides the most social explanation of human communication, where meaning is negotiated between the speaker and addressee within their interaction. Although the literature reviewed provides strong empirical support for the Collaborative model, one can apply the same criticisms that have been voiced with regard to the Perspective-Taking model. These concern the homogeneity of subjects, the exclusive use of the referential communication task, and the lack of research carried out on multiparty communication.

It is to the latter criticism which I shall now focus.

2.6 Hypothesis Generation

In this chapter I reviewed four models of interpersonal communication, Encoder/Decoder, Intentionalist, Perspective-Taking and Dialogic models. Each of these models share two characteristics. Firstly, each model presupposes a certain amount of common ground between the participants involved in a conversation. This common ground concerns the participants' presuppositions about their interlocutor e.g. English speaking male. Secondly, all the models described posit that the common ground shared between the participants accumulates as the conversation proceeds e.g. English speaking male, Scottish, Celtic football team supporter.

A distinction between these models concerns where they locate meaning, and therefore the accumulation of common ground. According to Encoder/Decoder, Intentionalist and Perspective-Taking Models meaning is found within the content of the message transmitted. These individualistic accounts of

interpersonal communication shall be referred to as 'autonomous' models, on account of the autonomous process of speaking and understanding they attribute to the speaker and addressee.

The most fully developed Dialogic model, the Collaborative model, suggests that meaning is a consequence of the interaction which takes place between the speaker and addressee. According to this account, the speaker and addressee co-ordinate their activities in order to achieve a mutual understanding of the message transmitted. Significantly, collaborative communication is addressee-specific, and for this reason overhearers are found to understand less of what was communicated when compared with addressees (Schober & Clark, 1989). I shall refer to this conceptualisation of interpersonal communication as the 'collaborative' model.

Of interest to the current thesis is the predictions these models make when applied to multiparty communication. A further variable of interest to the proposed research is the effect group size will have on the predictions of the autonomous and collaborative models.

The first hypothesis concerns the predictions of the autonomous model when applied in the group context. If meaning is encompassed within the message transmitted, then those overhearing the interaction of others will understand what has been communicated as well as the speaker and addressee. If one accepts this conceptualisation of the autonomous model, then it follows that the group member who transmits the most messages (dominant speaker) - and therefore the most information to the group - will be most influential in the discussion. This shall be referred to as the **autonomous model hypothesis.**

On the other hand, the collaborative model's characterisation of interpersonal communication posits that the transfer of meaning is a product of the interaction taking place between the speaker and addressee. With this interaction being addressee-specific, the collaborative model predicts that group members will share a more co-ordinated understanding of their discussion with those they

interact with most often in their meeting. This shall be referred to as the **collaborative model hypothesis.**

The final hypothesis generated, following the review of the social psychological models of interpersonal communication, concerns the predictions of the autonomous and collaborative models when the size of the group is altered. Reference to Chapter 1 indicates that as group size is enlarged fewer channels of communication are utilised (Bales et al., 1951; Stephan & Mishler, 1952) and fewer group members take part in the discussion (Bray et al., 1978).

If meaning is a property of the message, as advocated by the autonomous model, then an increase in group size will have no effect on participants' understanding of what was discussed and agreed in their meeting. In contrast, if the collaborative model holds then increasing the size of the group will lower the overall level of understanding of it's members. This will occur as a result of the greater number of group members overhearing the addressee-specific conversations of others. Thus, the autonomous models predicts that group size will have no effect upon participants' mutual understanding of their meeting. Alternatively, the collaborative predicts that members of larger discussion groups will demonstrate a lower overall level of understanding regarding what was discussed and agreed in their meeting. These opposing predictions shall be referred to in the **group size hypothesis.**

In the next chapter a pilot study is presented which assesses the collaborative model hypothesis when applied to a five person discussion group. A comprehensive review of the problems associated with the transcription of multiparty communication is also provided, along with the coding scheme adopted in order to overcome these problems.

Chapter 3. Pilot Study, Including Transcription and Coding of Group Communication

The collaborative model of interpersonal communication characterises the transfer of meaning as a joint activity between the speaker and addressee, who interact to ensure that what is communicated is mutually understood. The interaction process, or grounding process, has been described as addressee-specific, and as a consequence overhearers are found to understand less of what is communicated when compared with addressees (Schober & Clark, 1989).

If the collaborative model holds when applied to multiparty communication then frequently interacting pairs of participants will demonstrate a more co-ordinated understanding of what was discussed, and agreed in their meeting, when compared with less frequently interacting participants. This prediction, referred to in Chapter 2 as the **collaborative model hypothesis**, is made on account of the participants' inability to fully understand the overheard, addressee-specific conversations of others.

Before I proceed further, it is important to point out that in group conversation participants who are not being addressed are not technically overhearers. Rather, they are 'side-participants' (Clark & Carlson, 1982). Unlike the overhearers, or eavesdroppers, studied by Schober and Clark (1989), in the group context speakers and addressees are aware of the side-participants. Indeed, Clark and Carlson (1982) believe that they have a responsibility to ensure that these overhearing side-participants are kept informed. This is in stark contrast to overhearers, whose understanding of their conversation speakers and addressees have no responsibility for. Empirical support for the distinction between overhearers and side-participants is provided by Wilkes-Gibbs and Clark (1992).

This distinction between overhearers and side-participants does not, however, affect the predictions of the collaborative model when applied to multiparty communication. While speakers do assume a responsibility to satisfy their side-participants' understanding of what they say, their addressee's understanding takes priority (Clark & Wilkes-Gibbs, 1982). This was corroborated by Kraut, Lewis and Swezey (1982) who showed that participating addressees' understanding of movie descriptions were more accurate than those of non-participating side-participants. Thus it remains, according to the collaborative model, that frequently interacting dyads should attain a more co-ordinated understanding of their discussion when compared with less frequently interacting dyads.

The pilot study was designed to test the collaborative model hypothesis in the context of a five person discussion group. To do so I correlated the number of times each pair of participants interacted in the discussion with their understanding of what had been discussed and agreed. If the collaborative model hypothesis is upheld then there would be a positive linear relationship between the amount each dyad interacted, and their subsequent level of co-ordinated understanding.

Also discussed in this chapter is the transcription and coding scheme used to characterise group communication. Without this it would have been impossible to reliably test either the collaborative model hypothesis, or the autonomous model hypothesis.

3.1 Method

3.1.1 Subjects

Five psychology undergraduates who had enrolled on a communication elective took part in the experiment. The group was composed of three males and two females, all of whom were in their early twenties. The data generated from their participation in the study were used by the participants in their research project.

3.1.2 Procedure

The experiment began with the participants being taken to a pre-determined room where they were seated at a round table. Once seated each group member was asked to read a one page description of a hypothetical scenario. This involved a student who had been caught plagiarising in the final year of his undergraduate honours degree (see Appendix 1). The scenario was used both to set the scene for the experiment, and to illuminate the role the experimental group was to adopt in the discussion section of the experiment. Within the scenario the role of the experimental group was promoted as being that of a committee, whose purpose was to discuss the importance of the issues which would be involved in such a plagiarism case.

After each group member had read the scenario they were given an A4 sheet of paper on which they were asked to individually make note of the issues they believed should be considered in such a case. They were also asked to rank these issues in terms of their importance, where a rank of one represented the most important issue. Ten minutes were required to complete this task.

This part of the experiment represents Task 1. Task 1 was conducted for a number of reasons. The main aim of the exercise was to ascertain the participants' pre-discussion level of agreement. It also ensured that the subjects had thought about the problem before the discussion, making the discussion more fluent and ensuring that each group member had something to say regarding the plagiarism case.

On completion of Task 1 the experimental materials were collected and the subjects were informed that the discussion section of the experiment was about to begin.

Members of the pilot group were asked to discuss the plagiarism issues and make recommendations concerning their importance to the particular case. To emphasise that the group was not being asked to discuss the plagiarist's

punishment, they were told that their recommendations would be considered by a second committee whose job was to decide the appropriate punishment.

Participants were informed that the experimenter would be leaving the room (in order to promote a natural discussion), and that on the satisfactory completion of their discussion someone was to knock on the door of the discussion room where the experimenter would be waiting outside. The discussion lasted approximately twenty minutes.

Like the recordings made of 'real-life' discussion groups (Carletta et al., 1998), the pilot discussion was recorded using two PZM microphones linked to different channels of a high quality tape recorder. The microphones were placed far enough apart so as to maximise channel differentiation, but to be unobtrusive enough that the group members would not move them. A single video camera was positioned in the corner of the room in order to record the movements of as many of the group members as possible. The video record was made in order to help identify speakers during transcription.

On completion of the discussion, the participants were provided with a second sheet of A4 paper and asked to make note of the issues discussed, and to rank them in terms of how important they had been agreed to have been by the group. The group members were informed that like Task 1, this second task (Task 2) was to be carried out individually. Again, the participants were reminded that a rank of one represented the most important issue.

Having each group member rank the issues in terms of their importance, as agreed by the group, it was possible to gauge participants' mutual understanding of what had been discussed and agreed. Correlating the rankings made by each pair of group members provided a measure of interpersonal 'co-ordination'. Calculating how often pairs of group members interacted in their discussion turned out to be more problematic.

Like previous investigators (Carletta et al., 1998; Dabbs & Ruback, 1987; Parker, 1988; Sacks, Schegloff & Jefferson, 1974; Stasser & Taylor, 1991) my intention was to calculate dyadic interaction on the basis of how often group members follow one another on adjacent turns in their discussion. This involves not only the transcription of the group discussion, but also the identification of utterances which constitute speaking turns, and those that do not.

Accurately transcribing the group discussions is essential in order to provide a valid test of the experimental hypotheses outlined in Chapter 2. Although one may think this is a straightforward task, I agree with Edelsky (1981) that, "transcribing data is at once problematic, intuition producing and fraught with often unreported yet important decisions" (p. 189). For example, when several people speak simultaneously in a discussion who should be identified as the turn holder?

The transcription and coding scheme constructed in order to accurately characterise speaker sequencing in multiparty communication is described next.

3.2 Transcription and Coding

The method used to transcribe the pilot group's discussion was based on observations made of multiparty communication occurring in both the pilot study group itself, and that occurring in the discussion groups investigated in Experiment 1 (Chapter 4). Thus, many of the examples used to illuminate each coding category are based on the Experiment 1 discussion groups.

As mentioned in the procedure section, the group discussions were audio and video recorded. Each group discussion was transcribed at the word level on the basis of the audio tapes. When difficulty arose in discerning speaker identity the video record was consulted.

The rest of this section is devoted to the practical and theoretical bases of the dialogue coding scheme. I shall begin with the practical steps taken to ensure the accurate transcription of each group discussion.

3.2.1 Practical

Once complete, each group discussion was transcribed onto a table created in Microsoft Word. The table was composed of four columns, where the first was used for speaker identification, the second for what the speaker said, the third for speaker sequencing and the fourth for coding purposes (the concepts of speaker sequencing and coding will be elaborated upon in the next section). A new row was allocated to each new speaker. For this reason no speaker was able to follow him/herself in the discussion.

Throughout the transcription speaker identity remained anonymous. Each speaker was identified via a number, assigned arbitrarily according to the order in which they first entered the discussion.

A number of practical difficulties arose when transcribing the group discussions. Since only one video camera was used, it was not possible to see the faces of all the group members. For this reason some of the utterances remain unidentified, denoted by the letter 'U'. Furthermore, it was not always possible to identify each word contributed by each speaker. In these circumstances an asterisk '*' was used to identify each unknown word.

Within column two the initiation of overlapping speech was signalled by a forward slash and the number of the person intruding in the current contribution e.g. /6 or /U when the intruding speaker was unknown.

An illustration of the notation described is provided in Example 1.

Example 1. Notation used in the transcription of group discussions.

3	If you /6 imagine if /U you come to an exam that would be the only case when he's * * * *		
6	It's really very difficult though		
U	Yeah		
6	I think that that's most important. I think you should take into consideration how he's done in his exams because /5 that's the best indication.		

3.2.2 Theoretical

The basis for determining turns in the discussions comes from Sacks, Schegloff and Jefferson (1974). Sacks et. al. argue that there are conventions which govern turn-taking in communication. These conventions account for what they believe to be an apparent fact, that "overwhelmingly, one party talks at a time" (p. 699).

The mechanics of this theory of turn-taking are as follows. Turn-taking is thought to be organised by a turn constructional unit and a turn allocation component. The turn constructional unit represents the content of the current speaking turn until a turn completion point is reached, at which time the next speaker is determined. Sacks et al. use the term 'transition-relevance place' rather than turn completion point. At a 'transition-relevance place' two outcomes are possible. The turn allocation component predicts that either the current speaker selects the next speaker, or a listener selects themselves as the next speaker.

According to Sacks et. al., often the current speaker selects the next speaker by addressing the first part of an 'adjacency pair' (Schegloff & Sacks, 1973) - the question part of a question answer pair e.g. "What do you think Paul?" - to the listener. This allows the current speaker to identify who will follow him/her on the next turn. Self-selection, on the other hand, is accomplished by a listener initiating their utterance at the next transition-relevance place. Instances where neither the current speaker selects the next speaker, and no listener self-selects themselves, result in the current speaker self-selecting him/herself. When this

happens the process continues in a circular fashion until speaker transfer takes place.

Although this characterisation of conversation is plausible - indeed if conversation did not proceed 'one-at-a-time' then it would be incomprehensible to the listener - it has several shortcomings. First, many of the sources on which this theory is based, and supported, have drawn their findings from data generated solely from dyadic communication (Duncan, 1972; Duncan, 1973; Duncan & Niederehe, 1974; Kendon, 1967; Meltzer, Morris, & Hayes, 1971; Shapiro, 1976; Yngve, 1970). In addition, many of these studies represent formal communication contexts (e.g. therapy sessions, classes, experimenter requested conversations between strangers), rather than what one might term 'conversations'.

On transcribing the experimental group discussions it became apparent that ordering speaker interchange using the method proposed by Sacks et al. (1974) would not accurately capture turn-taking in these groups. Rather than finding an orderly one-at-a-time sequence of speaker interchange, the experimental discussions were frequently characterised by instances where several people spoke simultaneously.

To accommodate the special problems of group discussion I constructed a turn coding system which would more efficiently characterise the dialogue prevalent within multiparty communication. Eight categories of communicative acts were identified. These are displayed overleaf. The first five categories represent contributions which constitute speaking turns in the discussion whereas the final three categories do not.

- Speaking Turn
- Simultaneous Conversations
- Simultaneous Responses
- Irrelevant Talk
- Successful Interruptions
- Unsuccessful Interruptions
- Backchannel Responses
- Collaborative Contributions

Below I discuss each of these contribution types, using examples from the experimental group discussions.

- Speaking Turn

In the literature the most commonly used definition of a turn is the technical definition. This definition is based on chronography (Burke, 1979). Chronography defines a turn as solo talk, beginning the instant one person starts to talk and ending prior to the instant someone else begins to talk alone. This method of turn coding can be performed solely by machine and requires no researcher interpretation. Such a characterisation of the turn was adopted by Allwood and Hagman (1993) who operationalise a turn as "sound emitted by one speaker bounded by silence or the utterance of another speaker" (p. 02).

The problem with this definition of the turn, based simply on on/off vocalisations, is that it does not capture "the participant's sense of what constitutes a turn or the intention of the turn taker" (Edelsky 1981, p.203). This definition of turn, when applied to group communication, misses the fact that some instances of simultaneous talk are not intended to take the floor.

To accommodate this, a turn within my corpus of group discussions was identified intuitively, where the turn holder was deemed to be the 'focus of attention' within the group. Thus, for a person to control the floor at any given moment, in the coder's eyes they would have to be the group's 'focus of attention'. This interpretation is also technical, as it asserts that only one person can occupy a speaking turn at any time. It is for the reason that my definition of the speaking turn follows the 'one-at-a-time' rule for conversation advocated by Sacks et al. (1974).

To maintain this 'one-at-a-time' rule of conversation it was necessary to stipulate that if a speaker was not deemed to be the turn holder, then any simultaneous talk produced by this person was treated as a 'feedback message' (Edelsky, 1981). An utterance was not considered a speaking turn when it was perceived as not constituting a new focus of attention. Therefore, it was possible for a group member to make a contribution without necessarily taking a turn in the discussion. Example 2 illustrates the speaking turn.

Example 2. A speaking turn.

2	It depends really what's in the policy like /3 /1 If it says like /U whatever's /3, Whatever the university policy is they should just follow it really cause there's no point like making /7 /9 Exceptions or anything is there, it's like	2	turn
3	I know		
1	Yeah		
U	Yeah		
3	It depends on a lot of		
7	Yeah		
9	Exceptions		
7	The policies probably might, might be that, that this group decides on the recommendations that are the group of choices /8 Cause I mean if there was a set down, well this is the way it's gonna go, if you're caught doing this then this happens then there wouldn't be any point having a, a group /2 /1 Sitting together to discuss what the appropriate punishments would be	7	turn

At the beginning of this excerpt it is apparent that person 2 is the turn holder. It is clear from the transcript (and more so when listening to the taped discussion) that although persons 3, 1, U, 7 and 9 contributed within the turn held by person 2, at no time did they either of these group members become the group's focus of attention. It is only when person 7 begins his utterance "The policies....." that the speaking turn has been exchanged.

The number of the speaker was entered in column three only when their contribution constituted a speaking turn. Column three therefore provided the data for speaker sequencing. The coding in column four, 'turn', indicates that the person identified was a turn-taker in the discussion.

- Simultaneous Conversations

In one of the larger discussion groups studied in Experiment 1 there were several instances where more than one conversation took place simultaneously. This infrequent occurrence (it occurred 11 times in one discussion only) was in stark contrast to the 'one-at-a-time' turn taking rule advocated by Sacks et al. (1974).

In Example 3 persons 4 and 6 were having a conversation independently of, and simultaneous to, that between persons 9 and 8 (highlighted in grey).

Example 3. Simultaneous conversation.

4	You can't, maybe you can't show favouritism, /6 even though you like him	4	turn
6	But you can't take that, you can't take that into consideration positively, you can't say oh well he done this and he /3 done that because how do you know /9 unless you're really examining all that as we	6	turn
3	Yeah		
9	How is he going to be being treated	9	turn
8	I don't know	8	turn
9	Mmm	9	turn
2	Did anyone think he should have had to be punished more severely because it's journalism he's doing?	2	turn

From Example 3 it is apparent that persons 9 and 8 were interacting in isolation and therefore did not follow the speaking turn of person 6. Also clear (more so from listening to the audio recording of the meeting) is that it was person 2 who followed the speaking turn held by person 6. The contribution made by person 2 constitutes an attempt to remedy this apparent breakdown in communication by reuniting the group through his question directed toward the group as a whole 'Did anyone think...'.

For sequencing purposes the interaction between persons 9 and 8 (989) was counted in isolation and the conversation was allowed to follow the sequence of person 2 following person 6 and onwards (462.....).

- Simultaneous Responses

Although Sacks et al. (1974) suggest that conversation is characterised by one party speaking at a time, they concede that cases of more than one person speaking at a time are a common, although brief occurrence. Sacks et al. term these instances 'simultaneous starts', and suggest that they are the result of more than one person self-selecting themselves as the next speaker at a transition-relevance place. The brevity of simultaneous starts is explained by a bias, wherein the first person to self-select themselves as the next speaker assumes a turn attaining advantage.

The next category of speaking turn is a modified version of that identified by Sacks et al. which I have termed the 'simultaneous response'. I use the term 'response' because I believe that utterances of this nature reflect instances where several people attempt to respond to the utterance of the current speaker, and not to each other.

Example 4 provides an illustration of a series of simultaneous responses which followed a turn occurring in one the larger discussion groups studied in Experiment 1. In column four 'sresponse' is used as an abbreviation for the simultaneous response category of contribution.

Example 4. Simultaneous responses.

2	Did anyone think he should have had to be punished more severely because it's journalism he's doing?	2	turn
3	Yeah		sresponse
1	No		sresponse
6	No		sresponse
5	It doesn't matter does it really, does it though	5	sresponse
2	I've got that bottom	2	turn

In the discussion excerpt illustrated in Example 4, persons 3, 1, 6 and 5 can be seen to be responding to the utterance of person 2 and not to each other. Transcribing this piece of dialogue from a technical perspective of speaker interchange would order the speaker sequence as 231652, an ordering which does not accurately represent this dialogue. What actually occurs is that the question presented by person 2 is replied to by persons 3, 1, 6 and 5, where person 5 attains control of the next speaking turn.

My characterisation of this section of dialogue could be sequenced in two ways; either counting only the successful speaker turn (person 5), or by also incorporating the replies made by the other participants (persons 3, 1 and 6), to the initial turn held by person 2. Although previous researchers have tended to use only the turn attaining simultaneous response in their characterisation of speaker sequencing (Carletta et al., 1998; Dabbs & Ruback, 1987; Parker, 1988; Sacks et al., 1974; Stasser & Taylor, 1991) I have incorporated both turn-attaining and non turn-attaining simultaneous responses in the analysis of speaker sequencing.

Using Example 4 as an illustration, counting only turn attaining simultaneous responses as speaking turns, speaker interchange would be characterised as 252. This characterisation of speaker sequencing is not affected when simultaneous responses are counted as interactions in the discussion. Rather, the interaction between each non-turn attaining simultaneous responder and the speaker are treated as a single, isolated interaction. In Example 4, the simultaneous response made by persons 3, 1 and 6 were counted as 23, 21 and 26. Thus, whether each simultaneous response was counted as an interaction with the current speaker or not, the person who assumed the new 'focus of attention' was the person who gained control of the next speaking turn.

Counting, and not counting, non-turn attaining simultaneous responses as interactions with the speaker provides two different and distinct ways to measure dyadic interaction.

- Irrelevant Talk

Irrelevant talk was defined as talk which was not relevant to the task at hand, essentially talk not concerned with the issues relating to the plagiarism case. In Example 5 an excerpt of irrelevant talk is provided. In this dialogue the group was approaching the end of their discussion. The participants deliberated as to whether or not their discussion was finished, and who should inform the experimenter that they were in fact finished.

Example 5. Irrelevant talk.

2	Right is anyone gonna chap the door	2	irrelevant
1	So is that us, that was quite good eh	1	irrelevant
5	If he copied his work and then he became more famous because he copied it	5	irrelevant
1	I know, and you didn't you were /3 you sere	1	irrelevant
3	Maybe he is the little known American writer like in disguise	3	irrelevant
2	He might be, if he's that little known	2	irrelevant
3	Yeah, he's trying to get himself publicity or something	3	irrelevant
5	Maybe it's his twin /2 and	5	irrelevant
2	Maybe it's his dad	2	irrelevant
1	This is sounding more like neighbours by the minute	1	irrelevant
2	Eh is that us finished	2	irrelevant
1	Yeah , I think so, right go for it Alison	1	irrelevant
2	I'll bet, I'll bet this was all about like seeing if we started talking about other stuff /1 so what did you do at /1 the weekend	2	irrelevant
1	I know		irrelevant
1	Hi mom	1	irrelevant
2	Go and chap a door, which one did he go to	2	irrelevant
1	I'm not saying it's that wee one that looks like the kind of closet where you go like they take you and punish you if you're not doing honours psychology /2, like that zzzz	1	irrelevant
2	Spikes on the walls		irrelevant
1	You know /3		irrelevant
3	That's where Martin is waiting on his punishment	3	irrelevant
1	I know, are you doing honours psychology, no, zzz wrong answer ssssh	1	irrelevant

Talk such as that illustrated in Example 5 was thought to be blatantly irrelevant to the task at hand, and for this reason was omitted from the analyses based on speaker sequencing. When the observed talk was irrelevant it was coded as such in column four.

Within this category there is a problem of where to draw the line between relevant and irrelevant talk. For example, many groups talked about what punishment would be fitting for the plagiarist. Although at face value this is irrelevant to the discussion task set by the experimenter - each group's

communication should be concerned only with the relative importance of the plagiarism issues - discussion of punishment was frequently found to clarify other important issues involved in the case. Example 6 represents such a situation, where issue related contributions are highlighted in grey.

Example 6. Irrelevant talk.

5	I don't think he should be like chucked out the university and not given a degree or anything like that	5	turn
1	He should probably I mean /5 probably /3 /4 in that sort of case he should be given a, a warning and you know /2 have to resit /5 it do his thesis again so	1	turn
5	It depends what the university policy is		
3	You can make him redo it		
4	Have to do it again yeah, have to do it again		
2	I mean it depends on what		
5	He'd have to do it again		
5	I think he should have to do it /2 again	5	turn
2	What his entire thesis again	2	turn
5	Well /1 he's got to have some kind of punishment /1 if he just has to re-write the bit he plagiarised it's not a exactly a very good punishment is it	5	turn
1	Well		
1	It's his fault		
2	But that's the bit that he /1 didn't do himself	2	turn
1	Whose to		
1	Whose to say that other /5 things haven't been plagiarised from other books	1	turn
5	I know but he		
2	If that bit was discounted then, if the, if that entire chunk was discounted then maybe that wouldn't be so bad	2	turn

After careful thought and deliberation I decided to omit only the very obvious instances of irrelevant talk. There are two reasons for this. First, the highly subjective nature of identifying relevant and irrelevant talk could prove detrimental to the validity of the analyses. Second, scrapping participants' data could only reduce the power of the proposed analyses.

- Successful and Unsuccessful Interruptions

Like Ng, Brooke and Dunne (1995), interruptions are viewed as instances of simultaneous speech where the current speaker is disrupted by another speaker (the interrupter). In the current corpus, interruptions were coded as either successful 'sinterruption', or unsuccessful 'uinterruption'. An interruption was coded as successful when it prevented the current turn holder from completing his/her turn to a natural completion point. This resulted in the 'focus of attention' switching from the interrupted speaker to the interrupter. Unsuccessful interruptions are instances where the interrupter was not successful in their attempt to shift the 'focus of attention' from the current speaker to him/herself.

Example 7 provides an example of one successful and two unsuccessful interruptions.

Example 7. Successful and Unsuccessful interruptions.

1	It should be the same for everybody like you know everybody should be treated as equal but /4 they're not /3 They're obviously not in this case /4 you know he's obviously well known sort of smart kind of guy who does this that and the other thing and /2	1	turn
4	Yeah but you can't have like on this guy		uinterruption
3	But you can't		uinterruption
4	Aye yeah		
2	It's not in his character to do that	2	sinterruption
1	Yeah not in his character to do it so therefore they probably will end up looking on him more leniently and like you say somebody using their feelings	1	turn

In Example 7 person 2 successfully interrupted the utterance of person 1 with her contribution regarding the plagiarist's character. It was apparent that this was a successful interruption for two reasons. First, person two's speaking turn did not occur at a natural completion point (person one was in mid-speech). Second, it was evident from the audio recording that on the presentation of her contribution person 2 became the focus of attention within the group (illustrated by the fact

that she was able to complete her utterance without anyone talking over her). A secondary indicator was the acknowledgement of the interruption by person 1, when he resumed his utterance, saying "yeah", and the actual incorporation of person two's contribution in the formation of his new turn, "not in his character".

Successful interruptions were counted as speaking turns. For this reason the speaker number allocated to the successful interrupter was entered in column three and incorporated in the sequencing analyses.

Two instances where interruption attempts failed are illustrated by the contributions made by person four (first of his two contributions) and person three. In both cases persons 4 and 3 were not able to complete their contribution. Moreover, from listening to the audio recording it was apparent that both persons' contributions were spoken over by the current speaker. These observations indicate that neither interruption attempt became the group's focus of attention.

With unsuccessful interruptions not constituting speaking turns, they were not included in the sequencing analyses.

- Backchannel Responses

Backchannel responses, originally identified by Yngve (1970), have been described by Boyle, Anderson and Newlands (1994) as, "brief responses by the listener signalling agreement, attention or understanding. They are a sign to the current speaker to carry on with his turn, and they indicate that the listener is content with his/her role for the moment and is following what his/her partner is saying" (p. 10).

Example 8 illustrates several instances where backchannel responses occurred in one of the experimental group discussions. Backchannel contributions were abbreviated to 'bc' for coding purposes.

Example 8. Backchannel responses.

10	I also think his, eh one of the items that was on my sheet and I think it was on everybody else's is his reaction /7 O.k. I think that's /2 nice I think that's nice to know, I think that's you know. I think that will say a lot /2 about that person as an individual, but again I don't think that's a consideration in the overall eh the overall punishment. I do believe that him being three some, or three plus years into the programme /1 versus first semester /1 I think that does deserve some weight. O.k. /3 eh, but again the profession this person's going into mm y'know /2 wow	10	turn
7	Yeah		bc
2	He got caught anyway		bc
2	His person		
1	Mmm		bc
1	I think that's right		bc
3	Yeah		bc
2	So you put that quite high up /10 then? The fact it's a journalism degree as opposed to a /10 computing science	2	turn

Throughout the speaking turn held by person 10 several contributions were made by the other members of the group (up until the contribution made by person 2 beginning "So you put that quite high……."). These contributions all had one thing in common, none of them were attempts to shift the focus of attention away from the current speaker (person 10). Rather, as suggested by Boyle et al. (1994), they were used by the listeners to signal attention to the turn held by the current speaker.

With backchannel responses representing short contributions which are not intended to take the floor (Schegloff, 1982), they were not counted as speaking turns.

- Collaborative Contributions

The final contribution type was derived from the work of Coates (1990) who observed that "talk is often jointly produced by speakers" (p. 60). Collaborative contributions are similar to the previously described backchannel responses. Both constitute instances of simultaneous talk where the contributor does not attempt to establish themselves as the new turn holder. Like backchannel responses, collaborative contributions indicate continued attention to the turn held by the current speaker. In addition, collaborative contributions aid the current speaker in the construction of his/her utterance.

Example 9 provides an illustration of a collaborative contribution made in a group discussion. Collaborative contributions were coded as 'collaborative' in column four.

Example 9. Collaborative contribution.

5	But if they don't punish him then everyone's gonna laugh, /1 well everyone does it and /2 nothing happens if they do it and you get	5	turn
1	Think they can get away with it		collaborative
2	I'm saying, I'm saying definitely punish him but I'm just saying that I think /3 it's quite important	2	turn

Example 9 highlights an instance of overlapping speech where person 1 was observed to contribute to the speaking turn of person 5. The overlapping speech of person 1 could not be regarded as an interruption as an interruption is a strategy for attaining control of the speaking turn. On inspection of this excerpt on the audio tape what one experiences is a joint activity, where person 1 actively participates in the speaking turn held by person 5. Rather than attempting to shift the 'focus of attention' to himself, person 1 was observed to help person 5 in the construction of her contribution.

Collaborative contributions represent communication of a highly co-ordinated nature as a person must share a high level of understanding with the current speaker if they are able to aid the speaker in the construction of their turn. Like backchannel responses, collaborative contributions were not counted as speaking turns.

3.2.3 Summary of Contribution Categories

Table 1 provides a summary of the eight contribution categories described in the section on transcription and coding.. It also provides a brief definition of each of the contribution categories, and signals whether or not they were used to measure dyadic interaction.

A fully coded transcript of a five and ten person discussion is provided in the Appendix (Appendix 2 and 3 respectively).

Table 1. Summary of Eight Contribution Categories.

CONTRIBUTION CATEGORY	DEFINITION	USED TO CALCULATE DYADIC INTERACTION
Speaking Turn	Instances where the contribution made by the current speaker is deemed as being the group's 'focus of attention'.	YES
Simultaneous Conversations	Situations where two or more conversations occur simultaneously.	YES
Simultaneous Responses	Instances where more than one group member replies to the turn held by the current speaker.	YES/NO[2]
Irrelevant Talk	Talk not related to the discussion task.	NO
Successful Interruption	An interruption attempt which is successful in switching the speaking turn from the turn holder to the interrupter.	YES
Unsuccessful Interruption	An interruption attempt which is not successful in switching the speaking turn from the turn holder to the interrupter.	NO
Backchannel Response	Contributions designed to signal attention to the current speaker which occur within the current speaker's turn.	NO
Collaborative Contribution	Contributions which signal understanding by aiding the current speaker in the construction of his/her turn.	NO

[2] As discussed in the section devoted to simultaneous responses, one measure of dyadic interaction counted only the turn attaining simultaneous responses as interactions. The other treated all simultaneous responses as interactions with the speaker.

3.3 Data Analysis

Before the collaborative model hypothesis could be tested it was necessary to determine the participants' pre-discussion agreement with regard to the importance of the plagiarism issues (Task 1). Calculation of each dyad's baseline level of agreement was required to ensure that frequently interacting dyads did not already agree more about the relative importance of the issues discussed.

Unfortunately, few plagiarism issues were commonly reported by the members of the pilot group when tested at Task 1. Furthermore, as a consequence of a lack of uniformity in issue reporting, it was difficult to ascertain whether an issue reported by one group member was the same as that reported by another. For example, person 1 reported the 'seriousness of plagiarism' whereas person 2 reported the 'how literally the work was plagiarised'. By the 'seriousness of the plagiarism' it is difficult to know whether person 1 was referring to the seriousness of plagiarism itself, or like person 2, to how much the work had been plagiarised. For these reasons it was impossible to determine participants' pre-discussion agreement.

Of the issues reported at Task 2 testing, four were reported by all five group members. Six issues were reported by four of the five group members (persons 1, 2, 3 and 4). Rather than discard the two extra issues reported by the majority, these two issues were ranked as joint 5^{th} and 6^{th} and added to the four issues reported by person 5. This procedure was carried out in order to increase the power of the analyses used to determine dyadic co-ordination.

Dyadic co-ordination was measured by inter-correlating the rankings made by each group member at Task 2, using Spearman's coefficient of correlation for ranked data. The correlation coefficients returned (R) illustrated how similar each pair of participants' views were with regard to what had been discussed and agreed in their meeting. To test the collaborative model hypothesis the amount each pair of participants interacted in the discussion was correlated with their level of Task 2 co-ordination. If the collaborative model was upheld, and

understanding is a consequence of participating in the grounding of each utterance, then I expected to find a positive linear relationship between dyadic interaction and Task 2 co-ordination.

3.4 Results

A total of 26 plagiarism issues were identified from the pilot group's discussion. The issues identified ranged from the university policy on plagiarism to the plagiarist's reasons for cheating.

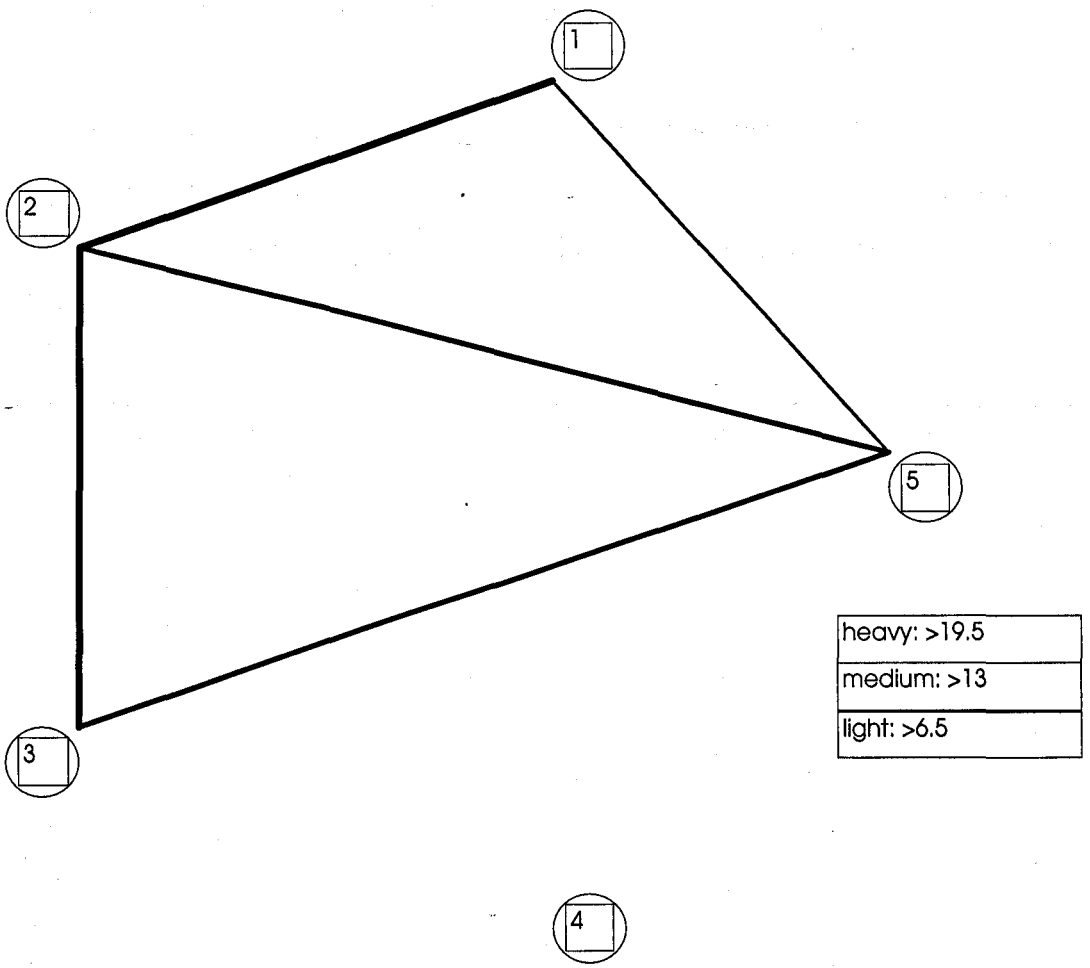
In terms of the transcription and coding of the discussion, there were no contributions left unidentified and there were no instances where more than one conversation occurred simultaneously. In total 147 contributions were made in the discussion. Of these 100 constituted speaking turns (91 were unhindered speaking turns, 4 were turn-attaining simultaneous responses, 5 were successful interruptions and 0 were irrelevant contributions), whereas the other 47 contributions did not constitute speaking turns (4 were non turn-attaining simultaneous responses, 5 were unsuccessful interruptions, 38 were backchannel responses and 0 were collaborative contributions).

For the purpose of the pilot study, dyadic interaction was measured using only the contributions which constituted speaking turns. This being the preferred method of calculating dyadic interaction in the literature (Carletta et al., 1998; Dabbs & Ruback, 1987; Parker, 1988; Sacks et al., 1974; Stasser & Taylor, 1991), this measure was thought to suffice for this small scale study.

The ten dyadic channels of communication which composed the five person discussion group did not receive equal usage. Figure 10 clearly illustrates this observation, where it can be seen that most of the group's discussion took place between person 2 and three other members of the group. It can be seen that Person 4 was isolated from the group's discussion. Analysis of who-followed-whom in the discussion indicates that persons 2 and 3 interacted most often, following each other on 26 adjacent speaking turns, whereas person 4 did not

interact at all with persons 1, 2 and 3. Indeed, across the entire discussion, person 4 was involved in a total of three interactions, all of which were with person 5.

Figure 10. Participant Interaction in Pilot Discussion Group.

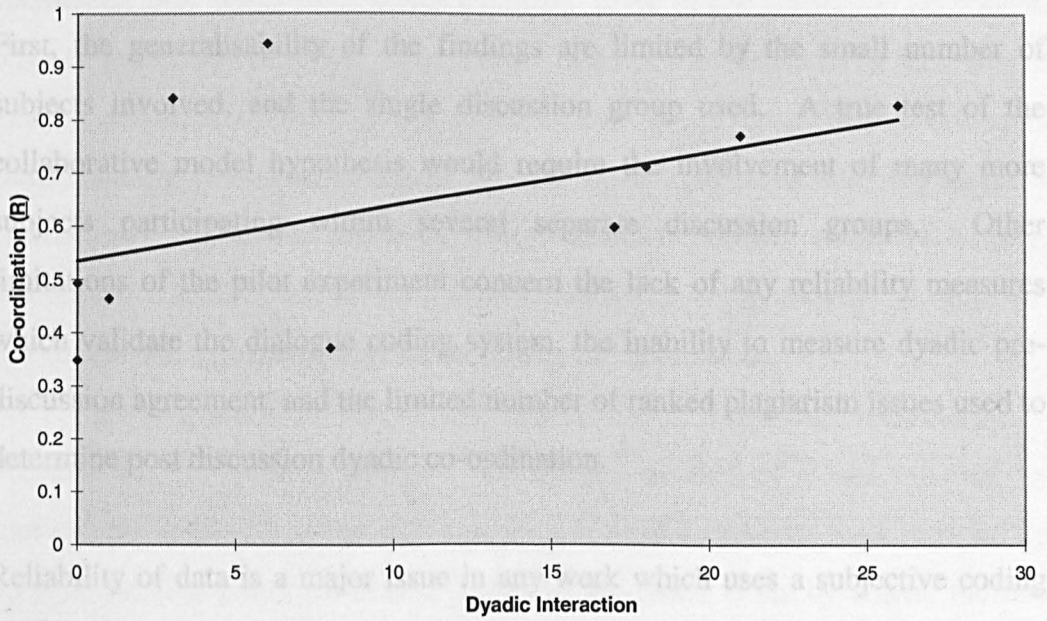


There was also a large degree of variation in the correlation coefficients used to measure Task 2 co-ordination. The highest level of dyadic co-ordination regarding what had been discussed and agreed was between persons 1 and 3, where an R value of 0.94 was returned. The lowest level of agreement was between persons 1 and 4 whose correlation of issue rankings produced an R value of 0.35.

Next, a scattergram was generated in order to illuminate the relationship between dyadic interaction and co-ordination (Figure 11). The trend line inserted in Figure 11 illustrates the existence of a positive linear relationship between how often each pair of participants interacted, and their subsequent level of Task 2 co-ordination. When tested using Spearman's coefficient of correlation, the relationship between dyadic interaction and Task 2 co-ordination was marginal (Spearman $r_s = 0.46$, $n = 10$, $p = .09$, one-tailed).

This finding, although marginal, supports the collaborative model hypothesis. It suggests that the grounding process is addressee-specific, as participants who interacted more often in the discussion attained a greater mutual understanding of what had been discussed and agreed.

Figure 11. Relationship Between Dyadic Interaction and Task 2 Co-ordination.



3.5 Discussion

The results documented thus far provide tentative support for the collaborative model when applied to multiparty communication. The leaderless pilot group used to test the **collaborative model hypothesis** demonstrated, as predicted, that dyads who interact more often in a discussion tend toward a more co-ordinated understanding of what was discussed and agreed in their meeting. According to the collaborative model this finding is a consequence of the addressee-specific nature of communication. Hence, participants who are actively engaged in the grounding of each utterance achieve a better understanding of what was communicated when compared with the side-participants who overhear their conversation.

Although the findings of this small scale study support the collaborative model hypothesis, there are a number of practical shortcomings apparent within the experimental design.

First, the generalisability of the findings are limited by the small number of subjects involved, and the single discussion group used. A true test of the collaborative model hypothesis would require the involvement of many more subjects participating within several separate discussion groups. Other limitations of the pilot experiment concern the lack of any reliability measures which validate the dialogue coding system, the inability to measure dyadic pre-discussion agreement, and the limited number of ranked plagiarism issues used to determine post discussion dyadic co-ordination.

Reliability of data is a major issue in any work which uses a subjective coding scheme. If different people cannot agree on how to apply a coding scheme then any analyses based on the coding scheme become questionable (Carletta, 1996). All parts of my surface structure coding scheme are subjective, including simple judgements such as which person said what.

This reliability concern is easily overcome. By having another person independently code several group dialogues, one is able to assess inter-judge agreement using the Kappa statistic (K) (Cohen, 1960). The Kappa statistic is particularly useful as it provides a percentage measure of agreement which is chance-corrected. According to Krippendorff (1980), a K greater than 0.80 represents an acceptable level of reliability.

The inability to measure pre-discussion agreement among the group's members clearly limits the findings of the pilot study. As discussed earlier, not only was there a negligible number of issues commonly reported by subjects at Task 1, but as a consequence of the different manner in which the issues were reported, it was difficult to know whether an issue reported by one person was the same as that reported by another. This inability to determine pre-discussion agreement leaves open an alternative interpretation of the findings outlined in this study.

Rather than inter-speaker co-ordination resulting from dyadic interaction, dyadic interaction may result from group members' level of pre-discussion agreement. That is, group members may interact more often as a consequence of their shared conceptualisation of issue importance. If this is the case then co-ordinated understanding is not an emergent product of dyadic interaction, but rather a consequence of reinforcing what group members already mutually believe. Therefore, to realistically assess the collaborative model hypothesis participants' pre-discussion agreement must be measured and controlled.

Another design problem concerns the limited number of issues reported by participants in Task 2 of the pilot study. A total of four issues were reported by each of the five group members. This was increased to six by adding the two extra issues reported by four of the five group members, to the four issues reported by person 5. Having so few shared issues reduces the power of the test, as many of the high correlations could be accounted for by chance factors.

To overcome both the inability to assess participants' pre-discussion agreement and to increase the power of the Task 2 dyadic correlations, the following step was taken. From the 26 plagiarism issues identified by the pilot group, 13 were selected which were thought to be independent of one another and discussion provoking. Having subjects rank these pre-programmed issues at Task 1 provides a reliable measure of dyadic pre-discussion agreement. Similarly, having subjects discuss and then rank these issues at Task 2 allows a measure of co-ordination. Furthermore, the use of 13 plagiarism issues provides a more powerful measure of dyadic agreement/co-ordination

In Experiment 1, reported next, this is exactly what was done. The list of 13 plagiarism related issues used in Experiment 1 can be found in Appendix 4.

Chapter 4. Experiment 1. Assessment of Dyadic Models of Communication Applied in the Group Context

In Chapter 2 a broad distinction was drawn between autonomous and collaborative models of interpersonal communication. This distinction was made on the basis of where the models locate meaning in communication.

According to the autonomous model, an utterance's meaning is contained within the message transmitted. In contrast, the collaborative model views the transfer of meaning to be a product of the interaction which takes place between the speaker and addressee. This interaction process, or grounding process, is addressee-specific, and for this reason overhearers are found to understand less of what is communicated when compared with addressees (Schober & Clark, 1989).

These differing conceptualisations of the communicative process led to the formation of three experimental hypotheses when applied to multiparty communication. These are the **autonomous model hypothesis**, the **collaborative model hypothesis** and the **group size hypothesis** (see Chapter 2 for both a review of the empirical literature supporting each account, and the thinking which led to the generation of the experimental hypothesis).

If meaning is encompassed within the message transmitted, as proposed by the autonomous model, then those overhearing the conversations of others will understand what has been communicated no differently from the speaker and addressee. Furthermore, the person transmitting the greatest amount of information to the group will be the most influential. Therefore, the autonomous model hypothesis predicts that group members views will be influenced more by the dominant speakers, those who say the most, as opposed to the non-dominant speakers, who say little in the discussion.

An alternative prediction is made by the collaborative model. If the interaction process is addressee-specific, participants' understanding of what was agreed in their discussion will be influenced by who they speak with in their meeting. For this reason, the collaborative model hypothesis predicts that group members will share a more co-ordinated understanding of their meeting with those they interact with most often. Tentative support for the collaborative model hypothesis was provided by the pilot study documented in Chapter 3.

The group size hypothesis contains two opposing predictions. If the autonomous model is correct, and meaning is contained within the message transmitted, then the size of the group will have no bearing on participants' understanding of their discussion. On the other hand, if communication is addressee-specific then members of the larger groups will share a less co-ordinated understanding of what was agreed in their discussion. This prediction is made on account of the greater number of side-participants who overhear the conversations of others in the larger discussion groups. Thus, according to the collaborative model, smaller groups will attain a greater overall understanding of what was discussed and agreed in their meeting.

Experiment 1 was designed to test each of these experimental hypotheses. This was accomplished by having two sets of different sized groups engage in a discussion task of the kind outlined in the pilot study. The small groups used in Experiment 1 contained five members, on account of this being the optimum group size (Hare, 1981). The larger groups contained ten members as this was the most frequent size of group used on ICL's Senior Executive Programme.

4.1 Method

4.1.1 Subjects

One hundred and fifty undergraduate students took part in Experiment 1. Like the criteria adopted by Hirokawa (1983), the subjects (1) had received no prior training, or instruction in small-group discussion and (2) were not familiar with the task employed in the data gathering meetings.

Subjects were randomly assigned to either a five (n = 50) or ten (n = 100) person discussion group, each of which represented zero-history groupings. Thus, there were ten five person groups and ten ten person groups. Groups were controlled for with regard to age and gender composition. The mean age of participants in the five person groups was 20.7 (2.06) years, compared to 20.94 (2.81) years in the ten person groups. Standard deviations are provided in brackets. The five person groups contained 64% females on average. The ten person groups were comparable, containing 62% females on average.

4.1.2 Procedure

The experimental procedure adopted in Experiment 1 differed in several ways from that used in the pilot study. For this reason the experimental procedure followed in Experiment 1 is related in full.

All 20 groups were presented with each experimental task in a step-by-step manner (they were only told of the immediate task at hand and not of any future tasks), and each received identical presentation of background information.

After being escorted to the room where the experiment would take place, the participants were randomly seated at an elongated circular table. The members of each five person group occupied the bottom half of the table, whereas the whole table was required by the members of each ten person group.

Once seated, each subject was issued with an A4 sheet containing the plagiarism scenario (see Appendix 1) which they were asked to read. Having read the scenario, each group member was provided with a list of 13 issues which related to the plagiarism case (see Appendix 4). The 13 plagiarism issues were identified from the pilot study on account of their discussion provoking potential. While all the issues were independent of one another, some were more relevant to the plagiarism case than others. For example, the extent of the plagiarism was more relevant to the case than the university's responsibility to the plagiarist.

Next the subjects were asked to rank the plagiarism issues in order of importance. This constituted Task 1 of the experiment. The verbal instructions given at Task 1, like the other tasks in the experiment, were also visually relayed using an overhead projector.

The Task 1 instructions are illustrated below;

> Take 5-10 minutes individually to rank the issues provided in the order you believe to be most important (where 1 is most important and 13 is least important).

Inter-correlating the Task 1 issue rankings provided a measure of the participants' pre-discussion agreement.

On completion of Task 1, the experimental materials were collected and the participants were informed that the discussion section of the experiment was about to commence. Members of each group were asked to assume the role of a committee, whose purpose is to discuss the importance of each of the plagiarism issues presented in Task 1. The following instructions were also projected;

> In the group, discuss the issues you believe should be given the most consideration before the select committee takes the final decision as to the appropriate punishment for this individual.

Subjects were informed that their discussion could last as long as they wished, although it was pointed out that previous experimental discussions had taken no longer than thirty minutes. This was said in order to allow the discussion to be as natural as possible, but to still provide loose discussion boundaries. Subjects were then told that the experimenter would be leaving the room (again to promote a natural discussion), and that on satisfactory completion of the discussion someone was knock on the door of the room. Like the pilot discussion, each experimental group discussion was video and audio recorded.

The pilot test of this task indicated that it (1) generated high levels of interest and motivation among group members, (2) required joint group effort in order to be successfully completed and (3) could be completed within 30 minutes.

Using the criteria proposed by Hirokawa (1990) the discussion task was characterised as follows;

1. complex (low goal clarity; low goal-path clarity; high goal-path mechanics and high goal-path obstacles).
2. unequivocal (multiple acceptable choices; non obvious criteria; objective non verifiability)
3. means-interdependent information (unequal distribution of critical information; high information processing demand)[3]

[3] Note. Point 3 was not completely satisfied as there was an equal distribution of information among the members of each discussion group. The reason it is classified as such is because although the information was equally distributed, the information itself was of a highly ambiguous nature and therefore relied upon individual interpretation.

According to Hirokawa (1990), each of these task characteristics heighten the importance of group interaction and communication for successful task completion.

On completion of the discussion each group member was provided with a second list of the plagiarism issues. They were then given the following instructions;

> Individually rank the issues provided in terms of what you believe the group felt were most important (again, where 1 is most important and 13 is least important).

This constituted Task 2 of the Experiment. When Task 2 was complete the experimental materials were collected. By inter-correlating the rankings made at Task 2 it was possible to assess the participants' mutual understanding of what had been discussed and agreed in their meeting.

After two weeks had passed the subjects were asked to complete Task 3 of the experiment. They were again provided with the list of plagiarism issues, and given the following instructions;

> Individually rank the issues in order of what you believe to be most important (again, 1 being most important and 13 being least important).

The addition of Task 3 to Experiment 1 enabled an investigation of how the participants' attitude had changed following their involvement in the discussion. This post-discussion agreement index differed from the Task 2 measure which assessed the participants' understanding/memory of the discussion. The reason for the two week interval between Tasks 2 and 3 was to ensure that the subjects did not either simply re-iterate the rankings made at Task 2, or become confused as to the request made at Task 3.

Across and within each ranking task the order of the plagiarism issues was randomised. This precaution was taken for two reasons. First, it minimised any order effects which might have otherwise occurred. Second, it aggravated anyone intent on copying the rankings made by another participant.

4.2 Transcription and Coding

The procedure followed to transcribe and code each of the Experiment 1 discussions is outlined in the transcription and coding section of the pilot study (Chapter 3).

To assess the validity of the transcription and coding scheme eight group dialogues were independently coded. These consisted of four five person group discussions and four ten person group discussions chosen randomly.

There was strong agreement between the coders for both speaker identity ($K = 0.89$, $k = 2$, $N = 1413$), and contribution type ($K = 0.84$, $k = 2$, $N = 2580$). The speaker identity codings were based solely on contributions which were used to measure dyadic interaction (speaking turn, simultaneous conversations, simultaneous responses and successful interruptions). For the other contribution types, such as the backchannel, speaker identity was irrelevant to the analyses.

4.3 Inclusion Criteria

Following the transcription and coding of the group discussions it became apparent that some of the groups more closely followed the discussion task set than others. Although this was expected, examination of the group discussions revealed that several groups strayed badly from the task. To ensure the discussion groups were comparable an inclusion criteria was adopted. If a group's data was to be used in the study they would have to have discussed at least ten of the thirteen plagiarism issues.

To gauge how many plagiarism issues each group discussed, each speaking turn was coded in terms of the issue it concerned. In total 14 contribution categories were identified, one relating to each of the 13 plagiarism issues and one which coded non-issue related contributions. See the section entitled 'Topic Transition' (Chapter 5) for a detailed analysis of the issue coding system used.

The reliability of the issue coding scheme was assessed by having four group dialogues independently coded. These consisted of two five and two ten person group discussions chosen randomly. Inter-coder reliability was acceptable ($K = 0.78$, $k = 2$, $N = 603$).

Three discussion groups did not meet the inclusion criteria (two five and one ten person group), and were therefore excluded from the study. Three more experimental groups were run, all of whom satisfied the inclusion criteria.

4.4 Data Analysis

This section outlines the procedure used to organise the data and test each of the experimental hypotheses. First I illustrate the data analysis procedure followed to test the group size hypothesis, then the collaborative model hypothesis, and finally the autonomous model hypothesis.

4.4.1 Group Size Hypothesis

Two opposing predictions are contained within the group size hypothesis. The autonomous model predicts that members of the five and ten person discussion groups will demonstrate a comparable understanding of what was agreed in their meetings. This prediction is made on the grounds that each utterance's meaning is contained within the message transmitted. In contrast, the collaborative model predicts the members of the five person groups will attain a better understanding of what was discussed and agreed in their meetings. This prediction is made on

account of the greater number of side-participants who overhear addressee-specific conversations in the ten person condition.

The group size hypothesis was tested by comparing the members of the five and ten person groups in terms of their collective understanding of what was agreed in their meetings.

To determine the participants' understanding of their meeting each group member's Task 2 issue rankings were inter-correlated, using Spearman's R, with the other members of their group. With the distribution of R values being non-normal (R values tend to cluster around ± 1), it is necessary to transform the R values in order to allow their comparison. The R values were transformed, using Fisher's (1921) formula, to yield a set of normally distributed r prime (r') scores (r' distribution ranges from -2.6 to +2.6). These r' scores were used in the parametric analyses reported.

The r' values were entered into an Analysis of Variance (ANOVA) where group size (five / ten) was treated as a between subject factor. Although no prediction was made regarding the participants' pre-discussion (Task 1) and post-discussion (Task 3) agreement scores, these were also compared across the different sized groups.

4.4.2 Collaborative Model Hypothesis

The collaborative model hypothesis predicts that participants will share a more co-ordinated understanding of their meeting with those they interact with most often. Two measures were therefore required to test the collaborative model hypothesis. The first required attaining a measure of how often each pair of participants interacted in their discussion. The second involved measuring how co-ordinated each pair of group members' understanding of their meeting was.

Dyadic interaction was measured in two ways. One measure was based upon how often group members followed each other on adjacent turns in their group's discussion. As discussed in Chapter 3, this is the preferred measure of dyadic interaction in the literature. The second measure of dyadic interaction involved also counting the non-turn attaining simultaneous responses as interactions with the speaker.

Participants' understanding of their discussion was determined by inter-correlating their Task 2 issue rankings. The $\underline{R}$ values returned were then transformed into $\underline{r}$' scores. Although no prediction was made regarding the participants' pre-discussion and post-discussion agreement scores, the same procedure was followed using the issue rankings made at Task 1 and 3.

Comparing the five and ten person groups in terms of the linear relationship between dyadic interaction and Task 2 co-ordination was not appropriate. This was a consequence of the fewer dyadic relationships prevalent among members of the smaller five person discussion groups - 10 dyadic relationships in the five person groups as opposed to 45 in the ten person groups. With the likelihood of a linear relationship between two variables decreasing as the number of data points are increased, the five person groups would clearly have been given an unfair advantage.

To overcome this problem the interactions of each group member were divided into two categories which represent high and low dyadic interaction. High dyadic interaction data represents the mean Task 1, 2 and 3 agreement $\underline{r}$' scores between the persons each group member interacted most often with in their meeting. Low dyadic interaction data consists of the mean level of agreement shared between the persons each group member interacted least often with in their meeting.

The calculation of each subject's mean high and low dyadic interaction score was simple in the five person groups. With each member of the five person groups having four dyadic channels of communication available to them, these were

divided 50/50 into the high and low category of dyadic interaction. The mean Task 1, 2 and 3 r' score for each dyadic interaction category was then calculated.

With each member of the ten person discussion groups having nine available dyadic channels of communication a 50/50 split of the data was not possible. For this reason the channel which demonstrated the median level of dyadic interaction was excluded from the analyses. Thus, each person was now represented by eight dyadic channels of communication. This enabled an even split of the data, with the four highest interacting dyads composing the high interaction category, and the four lowest composing the low interaction category. Again, the mean Task 1, 2 and 3 agreement r' scores associated with each category of dyadic interaction was calculated.

Categorising dyadic interaction into two categories (high and low) allowed an unbiased comparison of the effect of dyadic interaction across the different sized discussion groups. For each person, regardless of the size of their group, I obtained two measures of agreement. These correspond to the persons they interacted most often with, and least often with in their discussion.

Each participant's r' scores were entered into a 2X2 Mixed Design ANOVA, treating dyadic interaction (high / low) as a within subject factor and group size as a between factor. In the Task 2 and 3 analyses the ANOVA design was complemented with an Analysis of Covariance (ANCOVA). In the ANCOVA participants' pre-discussion agreement r' scores (Task 1) were entered as co-variates. The ANCOVA design ensured that participants' co-ordinated understanding (Task 2) and post-discussion agreement (Task 3) was a consequence of who they interacted with, rather than who they agreed with prior to the discussion (Task 1).

These analyses were also re-run treating group as a random factor. This extra set of analyses were undertaken to ensure that the findings were consistent across the experimental discussion groups.

4.4.3 Autonomous Model Hypothesis

The autonomous model hypothesis predicts that dominant speakers will influence the group members' understanding of what was agreed in their discussion more than the non-dominant speakers. Two measures were therefore required to test the autonomous model hypothesis. First, it was necessary to identify each group's dominant and non-dominant speaker. Second, the influence of the dominant and non-dominant speaker was measured.

Dominant and non-dominant speakers were identified on the basis of the number of words they contributed to their group's discussion. Words contributed represents the most precise measure of how much information a group member transmits. The dominant speaker was identified as the person contributing the most words in their discussion. The matching non-dominant speaker was the person contributing the fewest words to the discussion. Thus, each group discussion was partitioned into one dominant speaker, one non-dominant speaker, and the rest.

The influence of the dominant and non-dominant speakers was determined by inter-correlating their Task 2 issue rankings with those made by the other members of their group. In the five person groups the dominant and non-dominant speakers' issue rankings were correlated with the three other members of their group. The same procedure was followed in the ten person groups, only with the eight remaining members of the group. The $\underline{R}$ values returned were again transformed into $\underline{r}$' scores. Thus, for the dominant and non-dominant speaker in each five person group there were three matching influence scores. For each ten person group there were eight matching influence scores.

Although no prediction was made, the same procedure was followed using the participant's Task 1 and Task 3 issue rankings.

The participants' $\underline{r}$' scores were entered into a 2X2 Mixed Design ANOVA, treating dominance (dominant / non-dominant) as a within subject factor and group size as between. Task 2 and 3 analyses were complemented with an

ANCOVA, where participants' pre-discussion agreement r' scores (Task 1) were entered as co-variates. The ANCOVA ensured that the influence of the dominant and non-dominant speakers, at Task 2 and 3 testing, was a consequence of the information they transmitted rather than their pre-discussion agreement (Task 1) with the other members of their group.

To ensure that the results of these analyses were consistent across the experimental groups, the data was reanalysed treating group as a random factor.

4.5 Results

The tests of group size hypothesis, the collaborative model hypothesis and the autonomous model hypothesis are reported next. For ease of interpretation, the ANOVA and ANCOVA results are tabled where appropriate. All Fs reported are reliable at $p < .05$ where marginal effects are reported when $.05 < p < .10$.

Before proceeding with the analyses it was necessary to ensure that the corrected r' scores were normally distributed. The normality of the r' scores were determined across Task 1, 2 and 3 in both the five and ten person groups. A Kolmogorov-Smirnov Test was used to compare the distribution of the r' scores with that of a theoretical normal distribution.

Table 2 presents the results of these tests. The Kolmogorov-Smirnov Z is provided (K-S Z) along with the significance of the p value.

Table 2. Results of Kolmogorov-Smirnov Test.

Group Size	Task 1 K-S Z	$p < .05$	Task 2 K-S Z	$p < .05$	Task 3 K-S Z	$p < .05$
Five	0.67	ns.	0.55	ns.	0.72	ns.
Ten	0.91	ns.	0.94	ns.	0.47	ns.

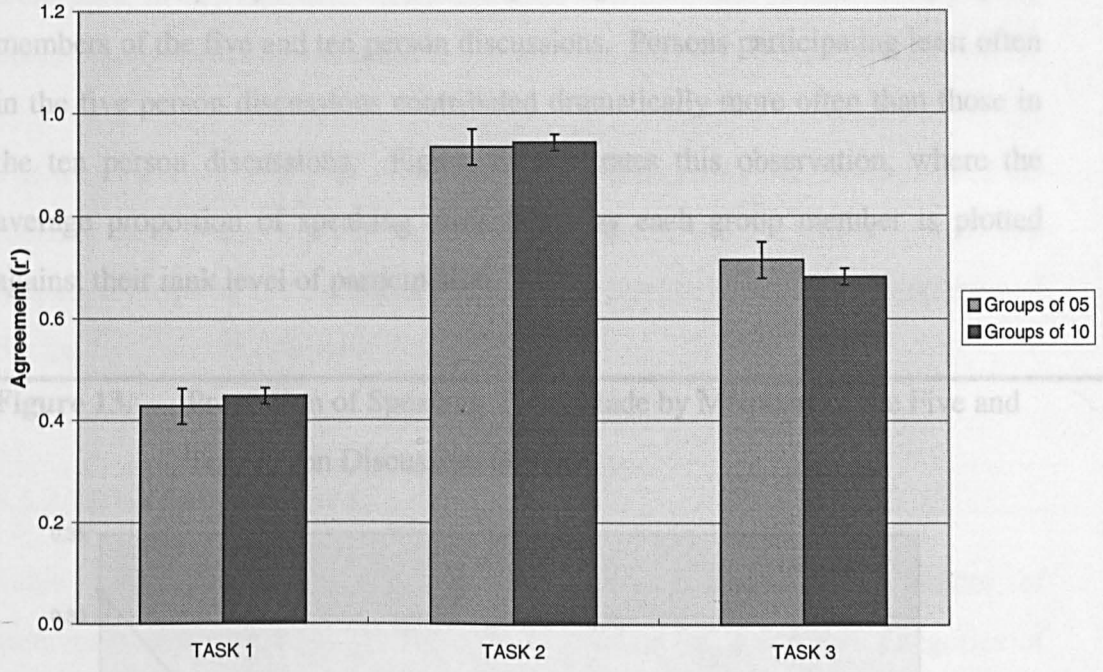
Reference to Table 2 demonstrates that the transformed correlation coefficients were normally distributed. For each group size, at each task, the distribution of the r' scores did not differ reliably from a normal distribution. It was therefore acceptable to use the r' scores in the parametric analyses used to test the group size, collaborative and autonomous model hypotheses.

4.5.1 Group Size Hypothesis

As discussed earlier, two predictions are encompassed within the group size hypothesis. The autonomous model predicts that participants' understanding of their discussion will be comparable across the five and ten person groups. In opposition to this, the collaborative model predicts that the participants in the five person groups will achieve a better understanding of what was agreed in their meetings. The autonomous model's prediction was made on account of meaning being encompassed within the message. The collaborative model's prediction emerged on account of the addressee-specific nature of communication.

The average level of agreement (r') demonstrated by members of the different sized groups is illustrated in Figure 12.

Figure 12. Participant Agreement at Tasks 1, 2 and 3 in the Five and Ten Person Discussion Groups.



It is evident from Figure 12 that the members of the different sized discussion groups demonstrated a similar level of agreement across Tasks 1, 2 and 3. The differences were nonetheless compared using an ANOVA, where group size was treated as a between subject factor. Each analysis revealed a non-significant difference between the five and ten person groups (all $\underline{F}s < 1$).

These findings demonstrate that pre-discussion agreement (Task 1), co-ordination (Task 2) and post discussion agreement (Task 3) did not differ across the five and ten person groups. The comparable level of Task 2 agreement indicates that the collaborative model cannot account for the communication occurring in both sizes of discussion group. This finding provides tentative support for the autonomous model hypothesis.

4.5.2 Collaborative Model Hypothesis

There was a disparity in the number of speaking turns taken by the least dominant members of the five and ten person discussions. Persons participating least often in the five person discussions contributed dramatically more often than those in the ten person discussions. Figure 13 illustrates this observation, where the average proportion of speaking turns taken by each group member is plotted against their rank level of participation.

Figure 13. Proportion of Speaking Turns Made by Members of the Five and Ten Person Discussion Groups.

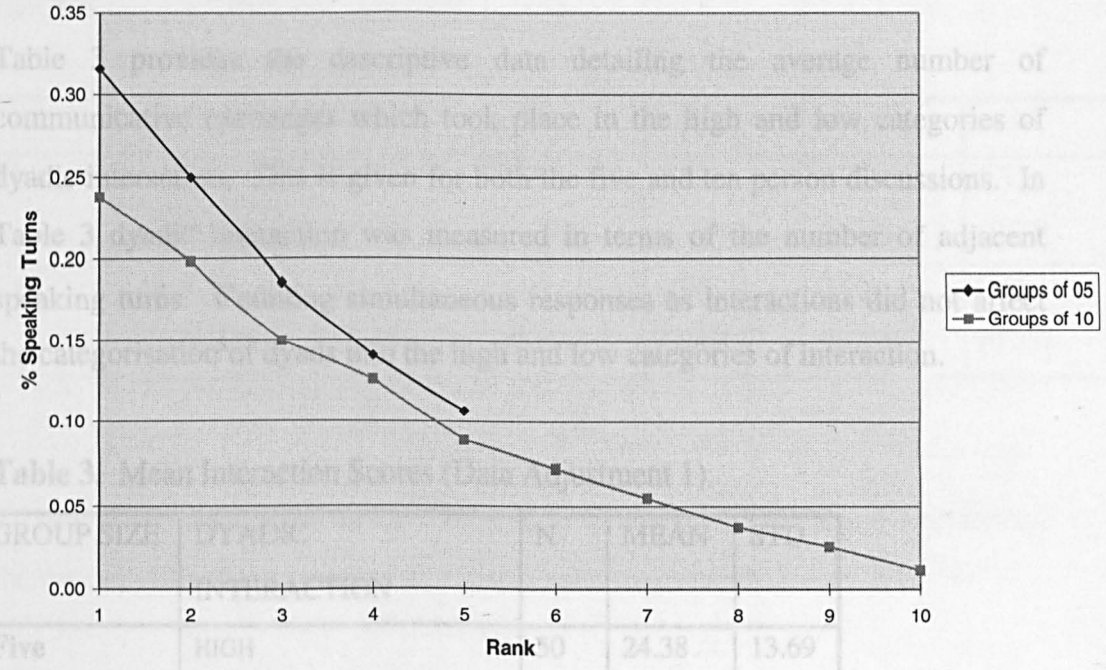


Figure 13 demonstrates the exponential decrease in participation rate exhibited by members of the five and ten person discussion groups. The most striking aspect of Figure 13 is the negligible proportion of speaking turns made by the least dominant speakers in the ten person groups. Indeed, across the ten ten person groups, nine group members did not participate at all in their group's discussion. For these group members one could not differentiate between the categories of high and low dyadic interaction.

To provide a valid test of the collaborative model hypothesis only the data provided by the five highest participators in the ten person discussion groups were used in the analyses. This provides two alternative ways to assess the collaborative model hypothesis.

The first, referred to as Data Adjustment 1, involves using the interactions of the top five participators with all the other members of the discussion group. The second, referred to as Data Adjustment 2, involves using only the interactions of the top five participators with each other.

4.5.2.1 Data Adjustment 1

Table 3 provides the descriptive data detailing the average number of communicative exchanges which took place in the high and low categories of dyadic interaction. This is given for both the five and ten person discussions. In Table 3 dyadic interaction was measured in terms of the number of adjacent speaking turns. Counting simultaneous responses as interactions did not affect the categorisation of dyads into the high and low categories of interaction.

Table 3. Mean Interaction Scores (Data Adjustment 1).

GROUP SIZE	DYADIC INTERACTION	N	MEAN	STD.
Five	HIGH	50	24.38	13.69
	LOW	50	10.00	7.94
Ten	HIGH	50	11.70	5.49
	LOW	50	1.64	1.66

From Table 3 it is apparent that there was more pair-wise communication taking place, in both categories of dyadic interaction, in the five as opposed to the ten person groups. This effect was expected on account of the greater level of competition for speaking turns in the larger discussion groups. As a result, one

witnesses a general dampening of the amount each group member is able to contribute in the larger discussions.

I now proceed to the analyses which investigate the effect of pre-discussion agreement upon dyadic interaction (Task 1), and the effect of dyadic interaction upon co-ordination (Task 2) and post-discussion agreement (Task 3). Table 4 illustrates the mean level of agreement ($\underline{r}$') exhibited among the high and low interacting dyads in the five and ten person discussion groups. Standard deviations are provided in brackets.

Table 4. Mean Agreement Scores (Data Adjustment 1).

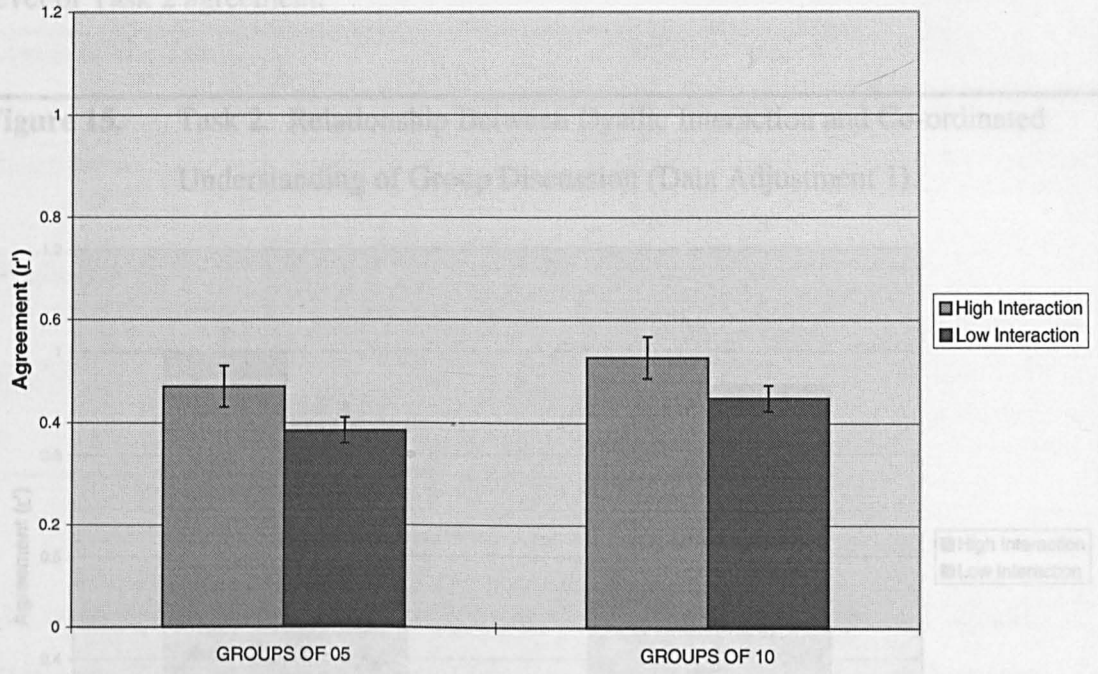
GROUP SIZE	TASK 1		TASK 2		TASK 3	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Five	0.47 (0.31)	0.39 (0.23)	1.00 (0.29)	0.86 (0.27)	0.71 (0.37)	0.72 (0.23)
Ten	0.53 (0.27)	0.45 (0.16)	0.95 (0.36)	0.94 (0.28)	0.73 (0.25)	0.67 (0.22)

To provide the reader with a clear indication of any main effects and interactions the mean $\underline{r}$' values documented in Table 4 are also graphed.

- Task 1

In Figure 14 the effect of pre-discussion agreement (Task 1) upon dyadic interaction is illustrated.

Figure 14. Task 1. Relationship Between Pre-Discussion Agreement and Dyadic Interaction (Data Adjustment 1).



It is clear from Figure 14 that in both the five and ten person groups, participants interacted more regularly with the persons they agreed with prior to the discussion. This observation was qualified in the ANOVA where a main effect of dyadic interaction was found [$F(1, 98) = 7.17$, $MSE = 0.04$]. There was no main effect of group size and no reliable interaction between groups size and dyadic interaction ($Fs < 2.39$).

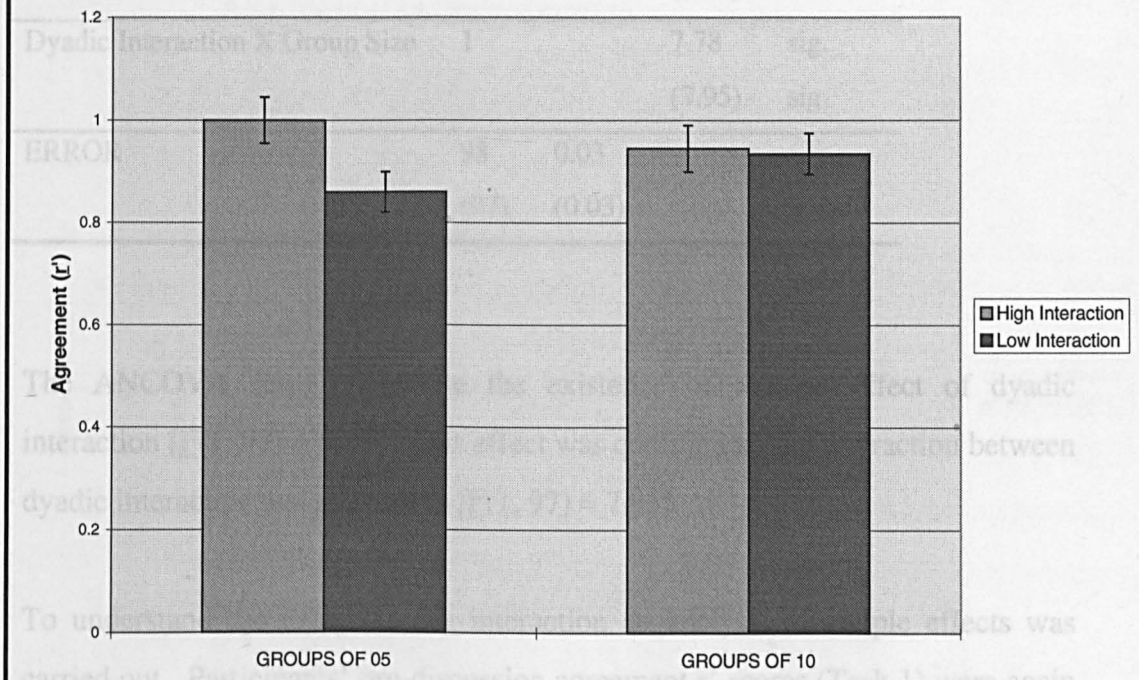
Reanalysis of the Task 1 data treating group as a random factor uncovered no reliable effects (see Appendix 5).

- Task 2

Figure 15 illustrates the effect of dyadic interaction upon participants' shared understanding (Task 2) of their discussion. An interaction between dyadic interaction and group size is apparent from Figure 15. In the five person groups high interacting dyads demonstrate a higher level of Task 2 agreement when

compared with low interacting dyads. This is not the case in the ten person discussion groups, where high and low interacting dyads exhibit a comparable level of Task 2 agreement.

Figure 15. Task 2. Relationship Between Dyadic Interaction and Co-ordinated Understanding of Group Discussion (Data Adjustment 1).



To accurately assess the prediction of the collaborative model hypothesis it was important to control for the participants' pre-discussion agreement (Task 1). This was necessary on account of the bias, wherein participants were found to interact more regularly with those they agreed with prior to the discussion. For this reason, the Task 2 data was analysed using both an ANOVA and ANCOVA design. Table 5 presents the output of these analyses, where the ANCOVA results are given in brackets. The results are discussed in terms of the more thorough ANCOVA, where participants' pre-discussion agreement r' scores (Task 1) were entered as co-variates.

Table 5. ANOVA and ANCOVA Results at Task 2 (Data Adjustment 1).

Source	df	MS	F	p < .05
Dyadic Interaction	1		9.68	sig.
			(6.13)	sig.
Group Size	1		0.03	ns.
			(0.00)	ns.
Dyadic Interaction X Group Size	1		7.78	sig.
			(7.95)	sig.
ERROR	98	0.03		
	(97)	(0.03)		

The ANCOVA results illustrate the existence of a main effect of dyadic interaction [$F(1, 97) = 6.13$]. This effect was qualified by the interaction between dyadic interaction and group size [$F(1, 97) = 7.95$].

To understand the nature of the interaction an analysis of simple effects was carried out. Participants' pre-discussion agreement r' scores (Task 1) were again treated as co-variates. The interaction at Task 2 testing was found to be caused by the effect of dyadic interaction in the five person groups [$F(1, 48) = 11.20$]. There was no effect of dyadic interaction in the ten person groups ($F < 1$).

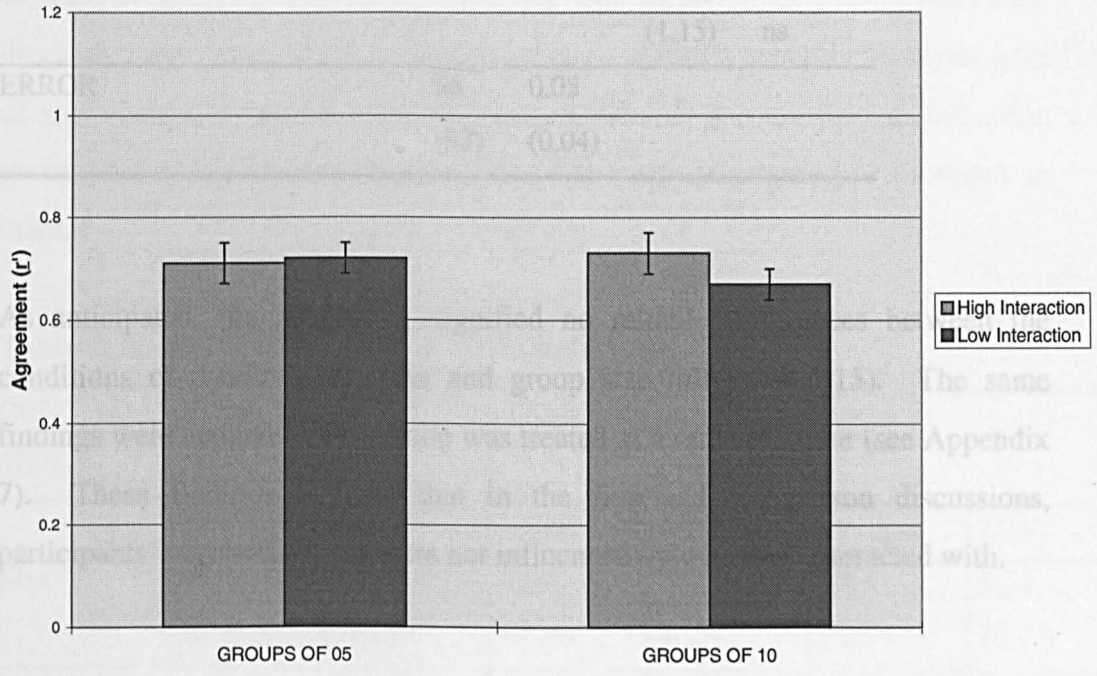
These results show that only in the five person groups is the participants' understanding of their discussion influenced by who they interact with. Thus, the collaborative model hypothesis applies only to the smaller five person discussion groups.

The results returned by the ANOVA/ANCOVA and tests of simple effects were replicated when group was treated as a random factor (see Appendix 6a and 6b).

- Task 3

In Figure 16 the effect of dyadic interaction upon post-discussion agreement (Task 3) is documented.

Figure 16. Task 3. Relationship Between Dyadic Interaction and Post-Discussion Agreement (Data Adjustment 1).



From Figure 16 it is apparent that both dyadic interaction and group size have no effect upon participants' post-discussion agreement. The results of the ANOVA and ANCOVA (in brackets) used to test this observation are provided in Table 6. In the ANCOVA participants' pre-discussion agreement r' scores (Task 1) were again entered as co-variates.

Table 6. ANOVA and ANCOVA Results at Task 3 (Data Adjustment 1).

Source	df	MS	F	p < .05
Dyadic Interaction	1		0.80	ns.
			(0.00)	ns.
Group Size	1		0.07	ns.
			(0.85)	ns.
Dyadic Interaction X Group Size	1		0.97	ns.
			(1.15)	ns.
ERROR	98	0.05		
	(97)	(0.04)		

As anticipated, the ANCOVA signified no reliable differences between the conditions of dyadic interaction and group size (all Fs < 1.15). The same findings were apparent when group was treated as a random factor (see Appendix 7). These findings indicate that in the five and ten person discussions, participants' personal beliefs were not influenced by who they interacted with.

4.5.2.2 Data Adjustment 2

Table 7 documents the average number of adjacent turns shared between dyads falling into the high and low categories of dyadic interaction following Data Adjustment 2.

Table 7. Mean Interaction Scores (Data Adjustment 2).

GROUP SIZE	DYADIC INTERACTION	N	MEAN	STD.
Five	HIGH	50	24.38	13.69
	LOW	50	10.00	7.94
Ten	HIGH	50	15.65	7.74
	LOW	50	6.93	3.82

It is apparent from Table 7 that high and low interacting dyads in the five person discussions interacted more often than those in the ten person discussions. As was the case at Data Adjustment 1 (Table 3), this was expected to occur as a consequence of the greater competition for speaking turns in the larger discussion groups.

The analyses which document the effect of pre-discussion agreement upon dyadic interaction (Task 1), and dyadic interaction upon co-ordination (Task 2) and post-discussion agreement (Task 3) are related next. Table 8 provides the mean level of agreement ($\underline{r}$') exhibited by members of the five and ten person discussion groups following Data Adjustment 2. Standard deviations are provided in brackets.

Table 8. Mean Agreement Scores (Data Adjustment 2).

GROUP SIZE	TASK 1		TASK 2		TASK 3	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
Five	0.47 (0.31)	0.39 (0.23)	1.00 (0.29)	0.86 (0.27)	0.71 (0.37)	0.72 (0.23)
Ten	0.55 (0.30)	0.50 (0.30)	0.98 (0.40)	0.89 (0.35)	0.71 (0.33)	0.71 (0.22)

Comparison of Table 4 (Data Adjustment 1) and Table 8 (Data Adjustment 2) indicate that the primary change in agreement scores as a consequence of Data Adjustment 2, occur at Task 2. For this reason, only the Task 2 data are graphically illustrated.

- Task 1

The results found following Data Adjustment 1 were partially replicated following Data Adjustment 2 at Task 1.

The ANOVA revealed a main effect of dyadic interaction $\underline{F}(1, 98) = 5.30$, $\underline{MSE} = 0.04$]. This finding, that group members interact more regularly with those they agree with prior to their discussion, replicates that found at Data Adjustment 1. Again, like Data Adjustment 1, there was no interaction between dyadic interaction and group size ($\underline{F} < 1$).

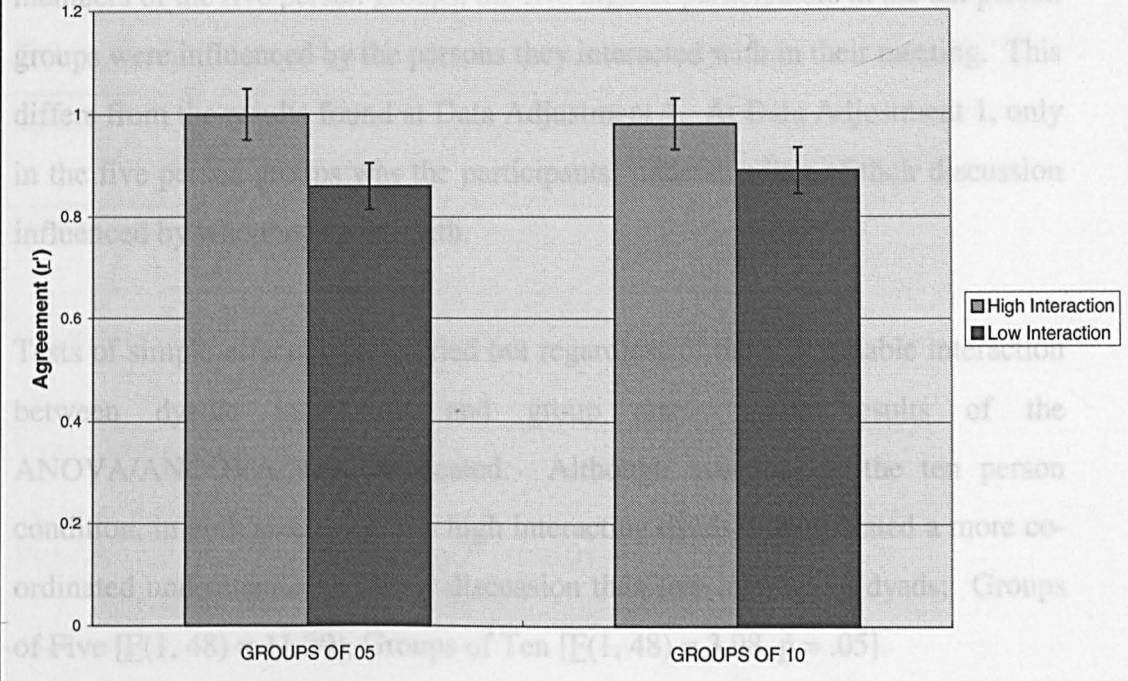
Unlike Data Adjustment 1, following Data Adjustment 2 there was a main effect of group size [$\underline{F}(1, 98) = 4.22$, $\underline{MSE} = 0.04$]. This effect indicates that the five highest participators in the ten person groups agreed more, prior to the discussion, than those in the five person groups.

When reanalysed treating group as a random factor, none of the these Task 1 differences were reliable (see Appendix 8).

- Task 2

Figure 17 illustrates the effect of dyadic interaction upon participants' shared understanding of their discussion (Task 2). In both sizes of group, high interacting dyads can be seen to attain a more co-ordinated understanding of their discussion than low interacting dyads. This observation represents a departure from that found at Data Adjustment 1 (see Figure 15).

Figure 17. Task 2. Relationship Between Dyadic Interaction and Co-ordinated Understanding of Group Discussion (Data Adjustment 2).



This observation was corroborated in the ANOVA and ANCOVA. As before, participants' pre-discussion agreement r' scores (Task 1) were entered as co-variates in the ANCOVA. Table 9 presents the results of these analyses, where the ANCOVA output is provided in brackets. The discussion of the results concerns only the more thorough ANCOVA output.

Table 9. ANOVA and ANCOVA Results at Task 2 (Data Adjustment 2).

Source	df	MS	F	p < .05
Dyadic Interaction	1		18.99	sig.
			(14.30)	sig.
Group Size	1		0.00	ns.
			(0.01)	ns.
Dyadic Interaction X Group Size	1		1.31	ns.
			(1.04)	ns.
ERROR	98	0.03		
	(97)	(0.03)		

The results documented in Table 9 demonstrate, as expected, only a main effect of dyadic interaction [$F(1, 97) = 14.30$]. These findings show that like the members of the five person groups, the five highest participators in the ten person groups were influenced by the persons they interacted with in their meeting. This differs from the results found at Data Adjustment 1. At Data Adjustment 1, only in the five person groups was the participants' understanding of their discussion influenced by who they spoke with.

Tests of simple effects were carried out regardless of the non reliable interaction between dyadic interaction and group size. The results of the ANOVA/ANCOVA were replicated. Although marginal in the ten person condition, in both sizes of group high interacting dyads demonstrated a more co-ordinated understanding of their discussion than low interacting dyads; Groups of Five [$F(1, 48) = 11.20$], Groups of Ten [$F(1, 48) = 3.98$, $p = .05$].

Therefore, like the members of the five person groups, the top five participators in the ten person groups follow the prediction of the collaborative model hypothesis.

When the data was reanalysed treating group as a random factor, the effect of dyadic interaction was replicated only in the five person condition (see Appendix 9a and 9b).

- Task 3

The results found at Data Adjustment 1 were replicated following Data Adjustment 2 at Task 3.

As before, an ANOVA and ANCOVA were used to assess the effect of dyadic interaction upon post-discussion agreement (Task 3). The results of these analyses are displayed in Table 10, where the ANCOVA output is given in

brackets. Again, pre-discussion agreement r' scores (Task 1) were entered as co-variates in the ANCOVA.

Table 10. ANOVA and ANCOVA Results at Task 3 (Data Adjustment 2).

Source	df	MS	F	p < .05
Dyadic Interaction	1		0.01	ns.
			(0.72)	ns.
Group Size	1		0.00	ns.
			(0.64)	ns.
Dyadic Interaction X Group Size	1		0.00	ns.
			(0.05)	ns.
ERROR	98	0.05		
	(97)	(0.04)		

The results displayed in Table 10 show that there were no reliable differences between the conditions of dyadic interaction and group size at Task 3 testing (all Fs < 1). The same findings emerged when the data was reanalysed treating group as a random factor (see Appendix 10).

Thus, once again it is shown that the participants' personal beliefs were not influenced by who they interacted with in their discussion.

4.5.2.3 Summary of Results

To provide a valid test of the collaborative model hypothesis it was necessary to ascertain the participants' pre-discussion agreement. Controlling pre-discussion agreement ensured the later results were a consequence of who the participants interacted with in their discussion, rather than who they agreed with prior to the discussion.

At Task 1 it was shown that participants interacted more often with those they agreed with prior to the discussion. This effect was observed in both the five and ten person groups. Furthermore, the five highest participators in the ten person groups agreed more, prior to the discussion, than those in the five person groups. Taken together, these findings indicate a bias in multiparty communication. They illustrate that participants who agree more, prior to their meeting, form alliances within their meeting.

These Task 1 findings were not consistent across the experimental groups, although the low power of the analysis ($df = 18$) may account for this.

Task 2 analyses illustrate that the collaborative model hypothesis is applicable only to the smaller five person discussion groups. Only in the five person groups was the participants' understanding of their discussion influenced by who they interacted with. However, when the ten person groups were analysed as a sub-group, containing only the five highest participators, they also followed the collaborative model hypothesis. Thus, when the groups are taken as a whole, only in the five person groups are the participants influenced by who they interact with in their meeting.

The consistency of the five person data across discussion groups is testament to the generalisability of this finding. Although the predictions of the collaborative model were not consistent across the five highest participators in the ten person groups, this could be attributed to the low power of the test ($df = 8$).

The final analysis assessed participants' post-discussion agreement (Task 3) following the discussion. In both the five and ten person groups participants were not influenced by who they interacted with in their meeting. Thus, the participants' understanding of their meeting (Task 2), as explained by the collaborative model hypothesis, was not assimilated into what they personally believed following the discussion (Task 3).

4.5.3 Autonomous Model Hypothesis

A similar effect to that documented in Figure 13 was found when participation was measured in terms of words contributed. Figure 18 illustrates the average proportion of words contributed by each group member plotted against their rank level of participation.

Figure 18. Proportion of Words Contributed by Members of the Five and Ten Person Discussion Groups.

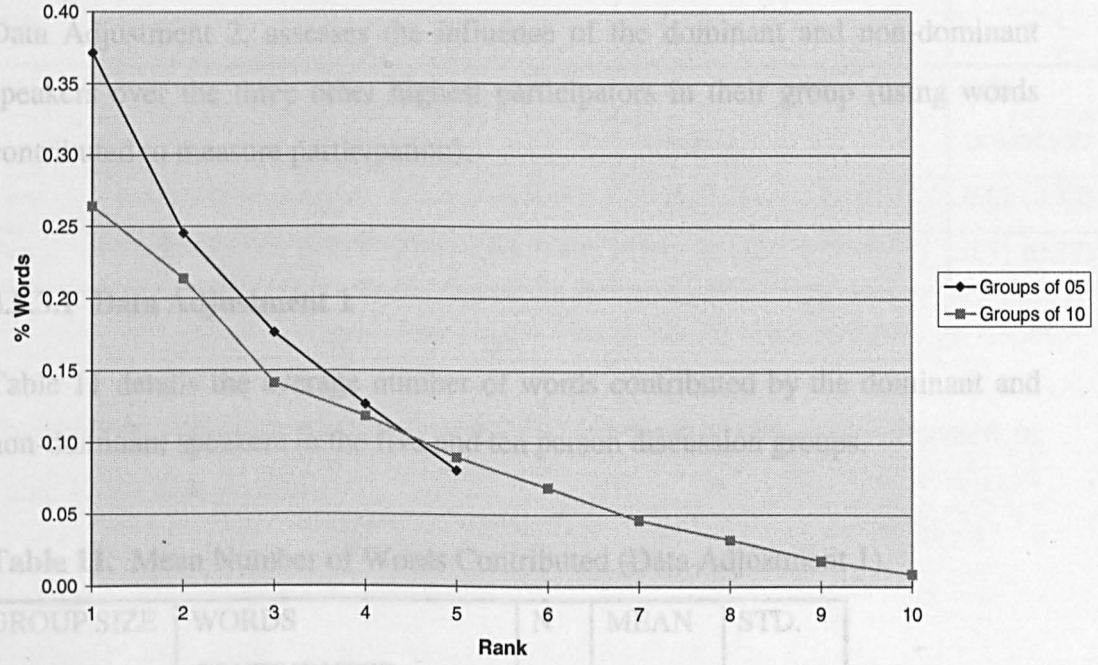


Figure 18 demonstrates the exponential decrease in participation rate exhibited by members of the five and ten person discussion groups. It also highlights the negligible proportion of words contributed by the least dominant speakers in the ten person discussion groups. With 6 of the 10 least dominant speakers in the ten groups not contributing a single word to their discussion, it would be inappropriate to measure their influence.

For this reason the autonomous model hypothesis was tested by comparing the influence of the dominant speaker with the fifth most dominant speaker in the five and ten person discussion groups. This ensured that the dominant and non-dominant speakers were comparable across the different sized groups.

Identifying dominant and non-dominant speakers in this way provided two different ways to assess the autonomous model hypothesis. The first, referred to as Data Adjustment 1, assesses the influence of the dominant and non-dominant speakers over the remaining members of their group. The second, referred to as Data Adjustment 2, assesses the influence of the dominant and non-dominant speakers over the three other highest participators in their group (using words contributed to measure participation).

4.5.3.1 Data Adjustment 1

Table 11 details the average number of words contributed by the dominant and non-dominant speakers in the five and ten person discussion groups.

Table 11. Mean Number of Words Contributed (Data Adjustment 1).

GROUP SIZE	WORDS CONTRIBUTED	N	MEAN	STD.
Five	DOMINANT	30	1037.70	318.95
	NON-DOMINANT	30	225.10	86.69
Ten	DOMINANT	80	1039.70	428.16
	NON-DOMINANT	80	383.40	232.14

Table 11 illustrates that the dominant and non-dominant speakers in the five and ten person groups contributed a similar number of words to their discussion. Also apparent is the greater variability in number of words contributed by the dominant and non-dominant speakers in the larger discussions.

Next I report the analyses which investigate the effect of pre-discussion agreement (Task 1) upon speaker dominance, and the effect of speaker dominance upon co-ordination (Task 2) and post-discussion agreement (Task 3). Table 12 displays the mean level of agreement (r') exhibited by the dominant and non-dominant speakers in the five and ten person discussion groups. Standard deviations are provided in brackets.

Table 12. Mean Agreement Scores (Data Adjustment 1).

GROUP SIZE	TASK 1		TASK 2		TASK 3	
	DOMINANT	NON-DOMINANT	DOMINANT	NON-DOMINANT	DOMINANT	NON-DOMINANT
Five	0.46 (0.39)	0.41 (0.32)	0.96 (0.32)	0.99 (0.35)	0.66 (0.43)	0.81 (0.34)
Ten	0.51 (0.34)	0.36 (0.29)	1.02 (0.40)	0.82 (0.44)	0.76 (0.27)	0.51 (0.37)

To illustrate main effects and interactions the mean r' values documented in Table 12 are also graphed.

- Task 1

In Figure 19 the effect of pre-discussion agreement (Task 1) upon speaker dominance is illustrated.

Figure 19. Task 1. Relationship Between Pre-Discussion Agreement and Speaker Dominance (Data Adjustment 1).

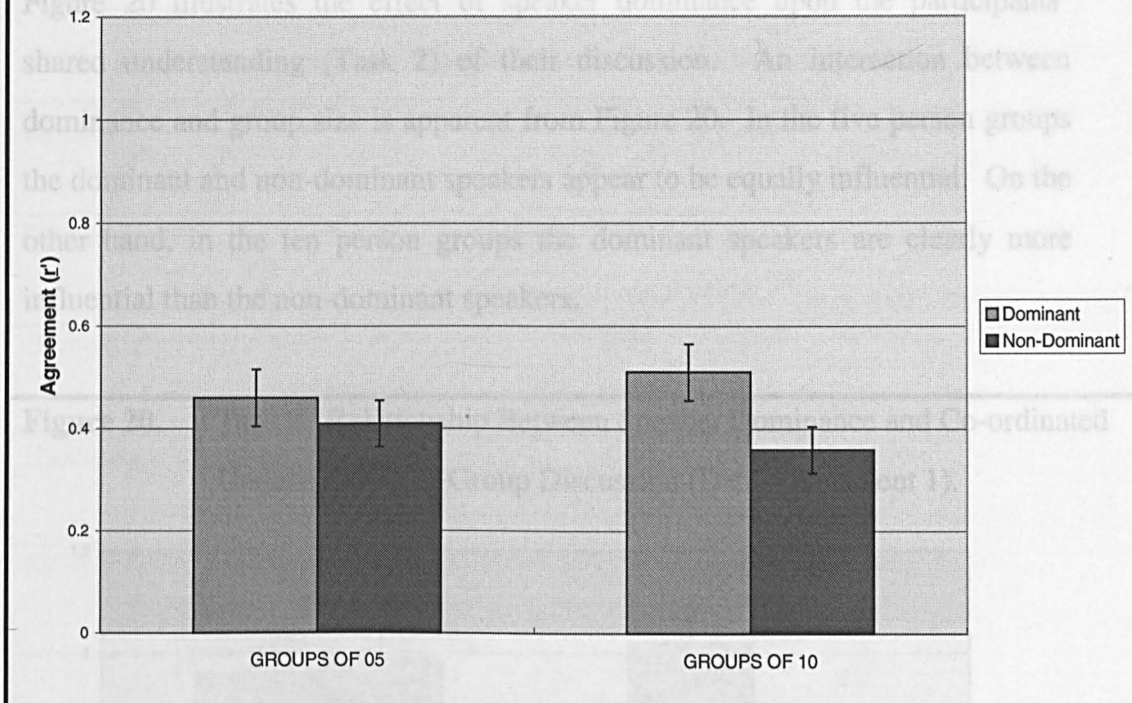


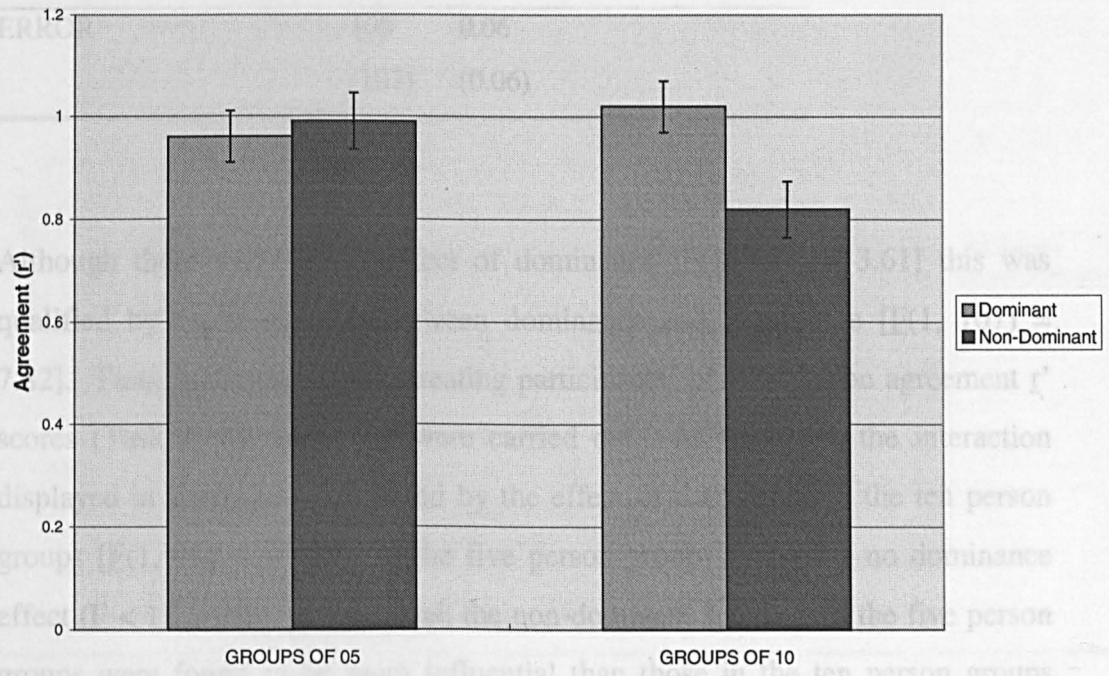
Figure 19 indicates that the dominant speakers, in both the five and ten person groups, agreed more with the other members of their group, prior to the discussion, than the non-dominant speakers. This observation was corroborated by the ANOVA, where a main effect of dominance was found [$\underline{F}(1, 108) = 4.72$, $\underline{MSE} = 0.09$]. Although Figure 19 suggests that the dominance effect is stronger in the ten person groups, there was no reliable main effect of group size or interaction between dominance and group size ($\underline{F}s < 1.20$).

When the Task 1 data was reanalysed treating group as a random factor no reliable effects were found (see Appendix 11).

- Task 2

Figure 20 illustrates the effect of speaker dominance upon the participants' shared understanding (Task 2) of their discussion. An interaction between dominance and group size is apparent from Figure 20. In the five person groups the dominant and non-dominant speakers appear to be equally influential. On the other hand, in the ten person groups the dominant speakers are clearly more influential than the non-dominant speakers.

Figure 20. Task 2. Relationship Between Speaker Dominance and Co-ordinated Understanding of Group Discussion (Data Adjustment 1).



To provide a valid test of the autonomous model hypothesis it was important to control for the participants' pre-discussion agreement (Task 1) with the dominant and non-dominant speakers. This was required on account of the previously documented bias, wherein group members agreed more with the dominant speakers prior to the discussion. For this reason, the Task 2 data was analysed using both an ANOVA and ANCOVA design. Table 13 provides the output of these analyses, where the ANCOVA output is given in brackets. Only the more

rigorous ANCOVA results are discussed, where participants' pre-discussion agreement r' scores (Task 1) were entered as co-variates.

Table 13. ANOVA and ANCOVA Results at Task 2 (Data Adjustment 1).

Source	df	MS	F	p < .05
Dominance	1		5.37	sig.
			(3.61)	sig.
Group Size	1		0.48	ns.
			(0.48)	ns.
Dominance X Group Size	1		8.87	sig.
			(7.82)	sig.
ERROR	108	0.06		
	(107)	(0.06)		

Although there was a main effect of dominance [F(1, 107) = 3.61] this was qualified by the interaction between dominance and group size [F(1, 107) = 7.82]. Tests of simple effects, treating participants' pre-discussion agreement r' scores (Task 1) as co-varites, were carried out. As expected, the interaction displayed in Table 13 was caused by the effect of dominance in the ten person groups [F(1, 48) = 16.86]. In the five person groups there was no dominance effect (F < 1). Although marginal, the non-dominant speakers in the five person groups were found to be more influential than those in the ten person groups [F(1, 107) = 2.86, p = .09].

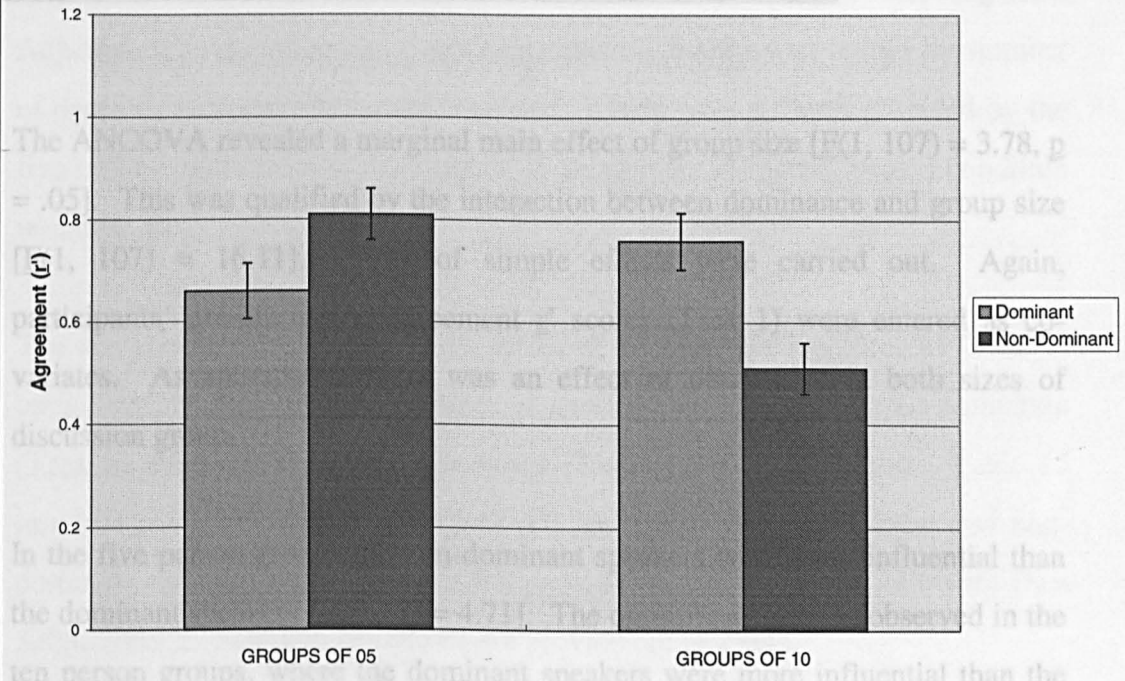
These results demonstrate that only in the ten person groups are the dominant speakers more influential upon the participants' understanding of their discussion than the non-dominant speakers. Thus, the autonomous model hypothesis applies only to the larger ten person discussion groups.

When the data was reanalysed treating group as a random factor, the interaction between dominance and group size was replicated (see Appendix 12a). No reliable differences were found in the tests of simple effects (see Appendix 12b).

- Task 3

In Figure 21 the effect of speaker dominance upon post-discussion agreement (Task 3) is presented. From Figure 21 there appears, once again, to be an interaction between dominance and group size. This time, the non-dominant speakers in the five person groups are more influential than the dominant speakers. The opposite is the case in the ten person groups.

Figure 21. Task 2. Relationship Between Speaker Dominance and Post Discussion Agreement (Data Adjustment 1).



The results of the ANOVA and ANCOVA (in brackets) used to test these observations are relayed in Table 14. As before, in the ANCOVA participants' pre-discussion agreement r' scores (Task 1) were entered as co-variates. The results of these analyses are discussed in terms of the ANCOVA output.

Table 14. ANOVA and ANCOVA Results at Task 3 (Data Adjustment 1).

Source	df	MS	F	p < .05
Dominance	1		1.12	ns.
			(0.22)	ns.
Group Size	1		3.31	.07
			(3.78)	.05
Dominance X Group Size	1		17.64	sig.
			(16.11)	sig.
ERROR	108	0.10		
	(107)	(0.09)		

The ANCOVA revealed a marginal main effect of group size [F(1, 107) = 3.78, p = .05]. This was qualified by the interaction between dominance and group size [F(1, 107) = 16.11]. Tests of simple effects were carried out. Again, participants' pre-discussion agreement r' scores (Task 1) were entered as co-variates. As anticipated, there was an effect of dominance in both sizes of discussion group.

In the five person groups the non-dominant speakers were more influential than the dominant speakers [F(1, 28) = 4.71]. The opposite effect was observed in the ten person groups, where the dominant speakers were more influential than the non-dominant speakers [F(1, 78) = 16.43]. The non-dominant members of the five person groups were also found to be more influential than those in the ten person groups [F(1, 107) = 15.02].

These findings indicate that the dominance effect exhibited in the ten person groups at Task 2, was maintained at Task 3 testing. Not only do the ten person groups' dominant speakers influence the group members' understanding of their discussion, but they also influence their personal beliefs following the discussion. Thus, the autonomous model hypothesis is also applicable to the ten person discussion groups at post-discussion testing. The apparent greater influence of the non-dominant speakers in the five person condition is somewhat

counterintuitive. It is more likely that this effect is caused by non-dominant speakers being influenced more by the other members of the group when compared with the dominant speaker.

These Task 3 findings were replicated when the data was reanalysed treating group as a random factor (see Appendix 13a and 13b).

4.5.3.2 Data Adjustment 2

The average number of words contributed by the dominant, and non-dominant, speakers in the five and ten person discussions was unchanged following Data Adjustment 2 (see Table 11). Data Adjustment 2 did however reduce the number of data points in the ten person condition. Using only the data provided by the five highest participators, the number of data points in the ten person condition was now 30.

The analyses which investigate the effect of pre-discussion agreement (Task 1) upon speaker dominance, the effect of speaker dominance upon co-ordination (Task 2) and post-discussion agreement (Task 3) are reported next. Table 15 provides the mean agreement scores (r'), exhibited by the dominant and non-dominant speakers in the five and ten person discussion groups, following Data Adjustment 2. Standard deviations are provided in brackets.

Table 15. Mean Agreement Scores (Data Adjustment 2).

GROUP SIZE	TASK 1		TASK 2		TASK 3	
	DOMINANT	NON-DOMINANT	DOMINANT	NON-DOMINANT	DOMINANT	NON-DOMINANT
Five	0.46 (0.39)	0.41 (0.32)	0.96 (0.32)	0.99 (0.35)	0.66 (0.43)	0.81 (0.34)
Ten	0.56 (0.44)	0.39 (0.37)	1.01 (0.43)	0.82 (0.48)	0.79 (0.29)	0.52 (0.30)

Comparison of Table 12 (Data Adjustment 1) and Table 15 (Data Adjustment 2) indicate the minimal change in agreement scores occurring as a consequence of Data Adjustment 2. For this reason the Task 1, 2 and 3 data are not re-graphed following Data Adjustment 2.

- Task 1

The results found at Data Adjustment 1 were replicated following Data Adjustment 2 when tested at Task 1.

The ANOVA revealed a marginal main effect of dominance [$F(1, 58) = 3.16$, $MSE = 0.12$, $p = .09$]. Again, there was no effect of group size or interaction between dominance and group size ($Fs < 1$). Thus, in both the five and ten person groups, participants agreed more with the dominant speaker, as opposed to the non-dominant speaker, prior to the discussion.

When the Task 1 data was reanalysed treating group as a random factor no reliable effects were found (see Appendix 14).

- Task 2

Analysis of the Task 2 data, following Data Adjustment 2, replicated the results found at Data Adjustment 1.

Table 16 presents the results of the ANOVA and ANCOVA, where the ANCOVA output is given in brackets. As before, participants' pre-discussion agreement r' scores (Task 1) were entered as co-variates in the ANCOVA. The discussion of the results concerns only the more thorough ANCOVA design.

Table 16. ANOVA and ANCOVA Results at Task 2 (Data Adjustment 2).

Source	df	MS	F	p < .05
Dominance	1		4.63	sig.
			(3.27)	.08
Group Size	1		0.34	ns.
			(0.36)	ns.
Dominance X Group Size	1		7.75	sig.
			(6.79)	sig.
ERROR	58	0.04		
	(57)	(0.04)		

The results documented in Table 16 demonstrate a marginal main effect of dominance [$F(1, 57) = 3.27$, $p = .08$]. This effect was qualified by the reliable interaction between dominance and group size [$F(1, 57) = 6.79$]. Tests of simple effects, treating participants' pre-discussion agreement r' scores (Task 1) as co-variates, revealed a dominance effect in the ten person condition [$F(1, 28) = 10.50$]. In the five person condition there was no effect of speaker dominance ($F < 1$).

These results demonstrate that only in the ten person groups are the dominant speakers more influential than the non-dominant speakers at Task 2 testing. This once again confirms that the autonomous model hypothesis applies only to the ten person discussion groups.

When the data was re-analysed treating group as a random factor the ANOVA and ANCOVA results were replicated (see Appendix 15a). No reliable differences were found in the tests of simple effects (see Appendix 15b).

- Task 3

Analysis of the Task 3 data, following Data Adjustment 2, on the whole replicated the results found at Data Adjustment 1. The results of the ANOVA and ANCOVA (in brackets) used to determine the effect of speaker dominance upon post-discussion agreement (Task 3) are provided in Table 17. In the ANCOVA pre-discussion agreement r' scores (Task 1) were entered as co-variates. The results are discussed in terms of the ANCOVA output.

Table 17. ANOVA and ANCOVA Results at Task 3 (Data Adjustment 2).

Source	df	MS	F	p < .05
Dominance	1		1.31	ns.
			(0.21)	ns.
Group Size	1		1.45	ns.
			(2.23)	ns.
Dominance X Group Size	1		15.73	sig.
			(14.62)	sig.
ERROR	58	0.08		
	(57)	(0.07)		

Although the main effect of dominance found at Data Adjustment 1 (Table 14) was not replicated, the interaction between dominance and group size was [F(1, 57) = 14.62] following Data Adjustment 2. Tests of simple effects, treating participants' pre-discussion agreement r' scores (Task 1) as co-variates, replicated the Data Adjustment 1 findings. Once again, in both sizes of group there was a dominance effect. In the five person groups the non-dominant speakers were more influential than the dominant speakers [F(1, 28) = 4.71]. In contrast, dominant speakers in the ten person groups were more influential than the non-dominant speakers [F(1, 28) = 9.78].

These findings confirm that the dominance effect observed at Task 2 was maintained at Task 3 testing in the ten person groups. Thus, in the ten person groups the autonomous model is also capable of accounting for the participants' personal beliefs following the discussion. As stated earlier, the dominance effect apparent in the five person groups is counterintuitive. It is hard to imagine that the non-dominant speakers were actually more influential than the dominant speakers in the five person discussions. What's more likely is that the non-dominant speaker was influenced more by the other members of the group when compared with the dominant speaker.

These Task 3 findings were replicated when the data was reanalysed treating group as a random factor (see Appendix 16a and 16b).

4.5.3.3 Summary of Results

To ensure a reliable test of the autonomous model hypothesis it was necessary to determine the participants' pre-discussion agreement with their groups' dominant and non-dominant speakers. Controlling pre-discussion agreement guaranteed that the later results were a consequence of the information transmitted by the dominant and non-dominant speakers. Otherwise, it could be argued that they emerged on account of the participants' prior agreement with the dominant or non-dominant speaker.

Task 1 analyses showed that members of both sizes of discussion group agreed more with the dominant speaker, as opposed to the non-dominant speaker, prior to the discussion. This finding suggests that in group discussions, participants either promote the participation of those they agree with, or inhibit the participation of those they disagree with prior to their meeting. This effect was not consistent across the experimental groups, although this may be due to the low power of the analysis ($df = 18$).

Finding that participants agree more with the dominant speakers, prior to the discussion, reflects a similar tendency to that found in the tests of the collaborative model hypothesis. Here participants were found to interact more often with those they agreed with prior to the discussion. Taken together, these findings indicate a bias, wherein commonly held beliefs are promoted within group discussions. This finding does not represent anything out of the ordinary. Indeed, it would be strange for people not to promote opinions which they agree with.

Task 2 analyses demonstrate that the autonomous model hypothesis is applicable only to the larger ten person discussion groups. Only in the ten person groups was the participants' understanding of their discussion influenced more by the dominant speaker when compared with the non-dominant speaker. Thus, consistent with the autonomous model, in the ten person groups participants were influenced by the person transmitting the greatest amount of information. In the five person groups the dominant and non-dominant speakers were equally influential.

This dominance effect at Task 2 testing was not entirely consistent across the experimental discussion groups. Although the interaction between dominance and group size was reliable, no reliable effects were observed in the tests of simple effects. This could be attributed to the low power of the analysis ($df = 8$).

The final set of analyses compared the influence of the dominant speaker and non-dominant speaker upon the participants' personal view of the issues discussed (Task 3). The autonomous model was able to account for the participants' personal beliefs following the ten person discussions. As was the case at Task 2, participants' personal beliefs were influenced by the dominant speakers in the ten person groups. Therefore, the person transmitting the greatest amount of information also influenced the group members' personal representation of the topic discussed.

In the five condition the opposite effect was observed. Here participants' personal beliefs following the discussion appeared to be influenced more by the non-dominant speaker than the dominant speaker. On reflection, this effect is more likely to be caused by the non-dominant speakers being influenced more by the other members of the group when compared with the dominant speaker. Further investigation of the reasons why this effect occurred are required.

The fact that the Task 3 findings were consistent across the experimental discussion groups is testament to the generalisability of these findings.

4.6 Discussion

The Experiment 1 results point to two different modes of face-to-face communication which take place in small and large discussion groups. In the small five person groups communication was a bilateral process of establishing consensus among pairs of group members. In the large ten person groups it was a unilateral process of broadcasting information to the group as a whole.

Participants' understanding of their discussion was influenced by who they interacted with in the five person groups. As predicted by the **collaborative model hypothesis** the interaction, or grounding process was addressee-specific. For this reason, the side-participants who overheard the conversations of others understood less of what was communicated when compared to those actively engaged in the grounding process.

Although the communication between the five highest participators in the ten person groups was partially explained by the collaborative model, the **autonomous model hypothesis** provided a fuller explanation of the communication taking place in the ten person groups. In this condition an utterance's meaning was contained within the message transmitted. For this reason, the dominant speaker - the person transmitting the greatest amount of information - influenced the participants' understanding of their discussion. This

finding indicates that in ten person discussions, the messages transmitted are understood equally well by all the members of the group.

The autonomous model hypothesis was also capable of accounting for the ten person group members' personal beliefs following their discussion. At post-discussion testing, participants' personal representation of the topic discussed was influenced by the group's dominant speaker. This findings is made more impressive by the fact that the collaborative model was unable to account for the five person group members' post-discussion beliefs. Thus, the autonomous model was able to account for the both the participants' understanding of, and their personal representation of the material discussed.

The question of why the communication taking place in the five and ten person discussions was characterised by two different models of interpersonal communication remains unanswered. More specifically, why were the conversations taking place in the five person groups less accessible to the overhearing side-participants than those taking place in the ten person groups?

I anticipate that this effect was caused by differences in the communication taking place in the different sized discussions. Speakers in the ten person groups address a larger audience, which they will be less able to monitor than speakers in the five person groups. To compensate for this I predict that speakers in larger groups will construct more elaborate and informative messages. By doing so speakers can ensure that the requirements of their broader audience are met. This proposition is supported by the Perspective-Taking Model outlined in Chapter 2.

In the next chapter I test this prediction. Chapter 5, entitled Dialogue Characteristics, presents several measures which describe, and differentiate, the communication taking place in the different sized discussions.

Chapter 5. Dialogue Characteristics

The current chapter is devoted to an exploration of why influence and understanding is best characterised by the collaborative model in small group discussions, and by the autonomous model in large group discussions. To understand what causes the findings outlined in Experiment 1 (Chapter 4) I undertook an investigation of the dialogue characteristics which define/differentiate the discussions of the different sized groups.

This investigation comprised six lines of enquiry. These are listed and described below.

- SURFACE STRUCTURE. An investigation of the different contribution types that compose the five and ten person discussions. This analysis includes the incidence of speaking turns, interruptions and feedback messages.

- SPEAKER SEQUENCING. The incidence of pair-wise conversations taking place in the five and ten person discussions.

- TURN LENGTH. The length of the speaking turns being produced in the five and ten person discussions.

- EQUALITY OF PARTICIPATION AND FREEDOM OF INTERACTION. How equally members of the five and ten person groups participated, and interacted in the discussions.

- TOPIC TRANSITION. The coherency of the discussion. This analysis assesses the relevance of one contribution to the next in the different sized discussions.

- TURN EXCHANGE. The formality of speaker exchange across the five and ten person discussions.

The theory behind, design and results relating to each analysis are discussed next. A results summary is provided at the end of the chapter. This is followed by a discussion of the results and how they explain the findings documented in Experiment 1.

5.1 Surface Structure

Table 18 provides a breakdown of the frequency of the different contribution types occurring in the five and ten person discussions. For a description of each of these contribution types see the section entitled Transcription and Coding in the Pilot study (Chapter 3). Also provided in Table 18 is the number and proportion of utterances left unidentified, where the proportions are in brackets. Tests of inter-coder reliability justified both the validity of the coding scheme and the identity of the speakers (see Transcription and Coding section in Experiment 1, Chapter 4).

It was more difficult to identify contributors in the ten person groups because there were more potential speakers. Nevertheless, the originators of the vast majority speaking turns were identified in both group sizes (100% in the five person groups and 99.7% in the ten person groups).

However, unsuccessful interruptions, collaborative contributions and backchannel contributions presented a greater problem. For example, the speakers responsible for 20.7% of all backchannel utterances in the ten person groups were left unidentified. The decreased ability to identify the persons responsible for non turn-attaining contributions was not a problem, as speaker identity was irrelevant to the analyses based on these measures.

The first category identified in Table 18 (Total Speaking Turns) relates to the total number of speaking turns made in the five and ten person discussions. This category is composed of unhindered speaking turns (those attained without competition and without interrupting), simultaneous responses, successful interruptions and irrelevant contributions. Comparison of the five and ten person

groups indicates that a similar number of speaking turns occurred across the different sized discussions (1755 and 1872 respectively).

As mentioned previously, simultaneous responses are instances where more than one group member attempts to follow the turn held by the current speaker. Of the simultaneous responses identified, 244 attained control of the next speaking turn in the five person discussions and 357 in the ten person discussions. Thus, in the five person discussions 14% of speaking turns were followed by a series of simultaneous responses, whereas in the ten person groups this increases to 19%. The higher incidence of simultaneous responses in the ten person discussions illustrates the increased competition for speaking turns in this condition.

An independent t-test was used to assess this difference. The t-test data consisted of the proportion of simultaneous response episodes to speaker turns in each five and ten person discussion. Although marginal, the t-test illustrates the higher incidence of simultaneous response episodes in the ten person discussions [$t(18) = 1.83$, $p = .08$].

With the ten person groups containing more than double the number of potential speakers than the five person groups (9 versus 4), it is not surprising that there was more competition for speaking turns in the larger groups.

The higher expected incidence of each contribution type in the larger ten person groups is what makes the results of the analyses which are reported next all the more convincing.

Table 18. Frequency of Contribution Types.

Group Size	Total Speaking Turns		Simultaneous Responses	Successful Interruptions	Irrelevant Turns	Unsuccessful Interruptions	Backchannel Responses	Collaborative Contributions
Five	1755		526	537	53	317	734	72
Unidentified	0		0	0	0	2 (0.6%)	19 (2.6%)	0
Ten	1872		816	474	28	296	902	65
Unidentified	5 (0.3%)		52 (6.4%)	0	2 (7.1%)	14 (4.7%)	187 (20.7%)	4 (6.2%)

The next analysis compares the incidence of successful interruptions in the five and ten person discussions. As mentioned previously, successful interruptions are speaker turns which prematurely cut short the turn of another speaker. Discussions characterised by a higher incidence of successful interruptions are thought to be more interactive.

As can be seen from Table 18, successful interruptions occurred more frequently in the five person discussions. In the five person groups 30.5% of speaking turns were interrupted, whereas in the ten person groups 25.3% of speaking turns were interrupted. Like the simultaneous response data, the incidence of successful interruptions were compared across the five and ten person groups using an independent t-test.

The t-test data constituted the proportion of successful interruptions to speaker turns in each group discussion. Although a higher incidence of successful interruptions were found in the five person discussions, this effect did not reach statistical significance [$t(18) = 1.36, p > .10$].

The final set of analyses compare the incidence of unsuccessful interruptions, backchannel utterances and collaborative contributions made in the five and ten person discussions. Each of these contribution types constitute utterances which did not attain control of a speaking turn. In the case of unsuccessful interruptions the speaker's intent is to attain control of the speaking turn, whereas backchannel and collaborative contributions are used to signal attention/understanding to the current speaker. The incidence of these contribution types was assessed by calculating how often they occurred, on average, relative to the total number of words contributed (in speaking turns) in each group discussion.

Each of these contribution types occurred more frequently in the five person discussions. On average, unsuccessful interruption attempts followed every 63 words in the five person discussions and every 112 words in the ten person discussions. Backchannel utterances followed every 44 words in the five person discussions and every 52 words in the ten person discussions. A collaborative contribution was

produced after every 501 words in the five person discussions and every 842 words in the ten person discussions.

Using independent t-tests the incidence of each of these contribution types were compared across the five and ten person groups. The data for each analysis was derived by calculating, on average, how regularly (words) each contribution type occurred in each group discussion.

Although marginal, there was a higher incidence of unsuccessful interruptions in the five person discussions when compared with the ten person discussions [$t(18) = 1.79$, $p = .09$]. While proportionately more backchannel responses and collaborative contributions occurred in the five person discussions, neither effect was reliable; Backchannel responses [$t(18) = 1.08$, $p > .10$], Collaborative contributions [$t(17) = 1.69$, $p > .10$]. The reason for 17 degrees of freedom in the collaborative contribution comparison is due to one of the five person dialogues not containing any collaborative contributions.

When the backchannel and collaborative contribution categories were collapsed into a single 'feedback' category, a marginal effect of feedback was found [$t(18) = 2.02$, $p = .06$]. In the five person discussions more speaker feedback was provided when compared with the ten person discussions.

In summary, these findings indicate that the smaller five person discussions were more interactive than the ten person discussions. Turn exchange in the ten person groups occurred more often by group members competing for control of the next speaking turn once the current speaker had completed his/her contribution. In contrast, in the five person groups turns were exchanged more often by participants interrupting the turn of the current speaker (although this effect was not reliable). Furthermore, members of the five person groups provided more speaker feedback than those in the ten person groups.

5.2 Speaker Sequencing

Parker (1984, 1988) investigated the sequencing of speaking turns in informal discussion groups. His observation of four person mock juries (Parker, 1988) illustrated that group interaction is characterised predominantly by two speakers alternating turns e.g. speaker A followed by speaker B followed by A and so on. Indeed, Parker (1988) demonstrated that the most likely person to follow person B in an AB sequence would be person A, thus creating an ABA sequence. He called these ABA patterns 'floor states'. Parker found that 61% of speaking turns in his discussion groups were in a floor state. Similarly, Stasser and Taylor (1991) found their six person mock juries to be in a floor state 49% of the time.

Dabbs and Ruback (1987) observed similar patterns of speaker interchange in their five person laboratory discussion groups. This led to their observation that group members "speak in clusters or 'megaturns', holding the floor more or less continually for a period of time, while others offered brief comments, questions or backchannel utterances" (p. 155).

Like Carletta et al. (1998) I have used floor state incidence to measure pair-wise interaction in multiparty communication. I expected the five person discussions to exhibit a higher degree of pair-wise 'conversations' when compared with the ten person discussions. This hypothesis emerged on account of the increased competition for speaking turns in the ten person groups. With more people competing for control of the next speaking turn in the ten person groups, I expected pair-wise conversations to be more difficult to establish, and maintain, in this condition.

Simply comparing the occurrence of floor states across the different sized discussions was not appropriate. A comparison of the five and ten person discussions would need to consider the higher proportion of floor states which would occur by chance in the smaller groups.

To gauge the chance expectancy of floor states occurring in each discussion it was necessary to establish how often each group member contributed in their discussion. This was accomplished by calculating the number of speaking turns held by each group member. Dividing the number of turns held by each group member by the total for their group provided a measure of how likely each person was to contribute at any point in their discussion. Once each group member's probability of contributing to their discussion was calculated, I was able to establish the baseline expectancy of a floor state for each discussion.

If the probability of a Speaker$_i$ contributing next is given by P_i and there are n members in the group, then the baseline probability of a three turn ABA floor state is given by the formula $\sum_{i=1,n} \left(P_i^2 - P_i^3\right)$. In the five person groups the likelihood of a floor state occurring by chance was 17%, whereas in the ten person groups it was 12%.

Next I ascertained the actual frequency of floor states occurring in the five and ten person discussions. To do so the sequencing of speaker interchange was collated across the five and ten person groups. It was then divided into 3 speaker segments which I refer to as triads. Example 10 illustrates this procedure.

Example 10. Floor states.

3	And so
5	I don't think he should be like chucked out the university and not given a degree or anything like that
1	He should probably I mean probably in that sort of case he should be given a, a warning and you know have to resit it do his thesis again so
5	I think he should have to do it again
2	What his entire thesis again
5	Well he's got to have some kind of punishment if he just has to re-write the bit he plagiarised it's not a exactly a very good punishment is it

It was necessary to segment each set of speaker sequences into triads to provide an independent measurement of floor state frequency. If the speaker sequences were not divided into triads then there would have been instances where two or more floor states occurred which were not mutually exclusive. For example, in the 351525 sequence illustrated in Example 10 two floor states are apparent, 515 and 525, which are not independent of one another. Both share a speaking turn contributed by person 5 (351525). Counting only the mutually exclusive floor states overcomes the problem of independence. This in turn permits a valid comparison of floor state frequency across the five and ten person discussions.

Table 19 demonstrates both the observed and chance corrected incidence of floor states (ABA) and non floor states (Not ABA) occurring in the five and ten person discussions. The chance corrected frequencies are provided in brackets.

Table 19. Frequency of Floor States (observed and chance corrected).

Group Size	**Floor State Frequency**	
	ABA	Not ABA
Five	245	335
	(146.4)	(433.6)
Ten	185	444
	(109.52)	(519.48)

Calculation of the actual proportion of floor states to triads illustrates the higher incidence of floor states in the five person discussions (42.2%) when compared with the ten person discussions (29.4%). After subtracting the proportion of floor states which were expected by chance, the five person discussions were still characterised by proportionately more floor states than the ten person discussions (25.2% as compared to 17.4% respectively).

The frequency of floor states, occurring over and above that expected by chance, in the five and ten person discussions were compared using an independent t-test. In this analysis the proportion of floor states to triads for each group, with the chance probability of a floor state subtracted, was entered as data. The five person discussions were found to exhibit a higher incidence of floor states when compared with the ten person discussions [$t(18) = 2.30$, $p < .05$].

The higher incidence of floor states in the five person discussions indicates that communication in this condition was more conversational than in the ten person condition. This finding is consistent with a more interactive dialogue being a product of smaller group discussions.

5.3 Turn Length

The next comparison investigates the length of speaking turns taken by participants in the five and ten person discussions. To carry out this analysis I calculated the mean length of turns, using words contributed to measure turn length, held by each member of each discussion group. Only speaking turns were used in this calculation due to the brevity of non turn attaining contributions e.g. a backchannel where someone says 'uh huh'.

The mean length of turn made by each member of the five and ten person discussion groups was compared using an independent t-test. In the ten person groups nine group members did not participate at all in their respective discussions. For this reason they were omitted from the analysis. This left a sample size of 91 across the ten, ten person groups.

In the five person groups the average speaking turn was 16.15 words long whereas in the ten person groups it was 21.18 words. This difference was reliable [$t(139) = 5.10$, $p < .05$]. To ensure this finding was consistent across the experimental discussions the data was reanalysed by group. Here the mean length of turn in each discussion was entered as data. Once more it was found that the utterances produced in the larger

ten person groups were longer than those produced in the five person groups [$t(18) = 4.60$, $p < .05$].

Further analyses were undertaken to more closely examine the length of the turns made by speakers in the different sized discussions. Figure 22 illustrates the proportion of speaking turns between 0-20, 21-40, 41-60 and upwards of 61 words made in the five and ten person discussions.

Figure 22. Proportionate Incidence of Different Lengths of Speaking Turns in the Five and Ten Person Discussions.

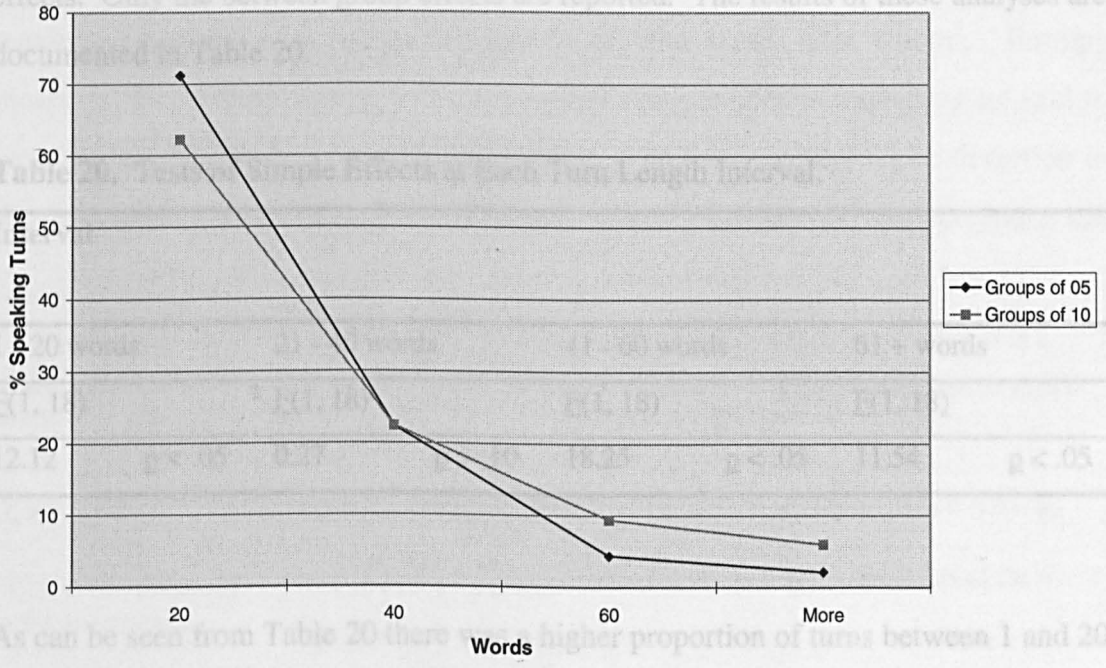


Figure 22 shows that both the five and ten person discussions were characterised by a higher proportion of shorter turns. More significantly, speakers in the five person groups contributed a higher proportion of short utterances (20 or less words) while those in the larger groups contributed a higher proportion of long utterances (upwards of 41 words).

This observation was tested in a 2X4 Mixed Design ANOVA, where interval (1-20, 21-40, 41-60 and upwards of 61 words) was treated as a within subject factor and group size as a between subject factor. The data for the analysis was generated by determining, for each discussion, the proportion of contributions falling within each of the designated intervals. As expected the ANOVA demonstrated a main effect of interval [$F(1, 18) = 673.31$, $MSE = 24.83$, $p < .05$]. This finding was qualified by the reliable interaction between group size and interval [$F(1, 18) = 8.53$, $MSE = 24.83$, $p < .05$]. There was no main effect of group size ($F < 1$).

The interaction between group size and interval was investigated using tests of simple effects. Only the between group effects are reported. The results of these analyses are documented in Table 20.

Table 20. Tests of Simple Effects at Each Turn Length Interval.

Interval							
1 - 20 words		21 - 40 words		41 - 60 words		61 + words	
$F(1, 18)$		$F(1, 18)$		$F(1, 18)$		$F(1, 18)$	
12.12	$p < .05$	0.27	$p > .10$	18.25	$p < .05$	11.54	$p < .05$

As can be seen from Table 20 there was a higher proportion of turns between 1 and 20 words in the five person discussions. A similar proportion of turns between 21 and 40 words were produced across the five and ten person discussions. Contributions longer than 41 words were produced reliably more often in the larger ten person discussions.

The findings reported in this section demonstrate that participants' speaking turns are longer when they take part in a larger group discussion. The smaller five person discussions were characterised by a higher incidence of short utterances whereas the utterances made in the larger ten person discussions were more elaborate. These findings are again consistent with a more interactive dialogue taking place in smaller group discussions.

5.4 Equality of Participation and Freedom of Interaction

The following analyses assess the equality of participation/interaction exhibited in the different sized experimental discussions. While equality of participation relates to how equally group members participate in their discussion, freedom of interaction assesses how actively group members interact in their discussion.

Equality of participation was measured by determining the distance between the observed number of words contributed by each group member and the number one would expect if each group member had participated equally, and then inverting it[4]. Freedom of interaction was measured by using the inverse of the proportion of maximum entropy achieved in the pattern of who spoke after whom[5]. Entropy measures the predictability of a data sequence; less predictable sequences are said to be more informative and have higher entropy. The freer the pair-wise interaction in the discussion, the less easy it is to predict who will speak next, given who spoke last

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[4] E (equality) represents $(\sum_{p \in P} W_p) / |P|$, the total number of words spoken by participants in a meeting divided by the number of participants. In groups with equal participation each person says E words.

$\sum_{p \in P} \left((W_p - E)^2 / E \right)$ reflects the average distance from equal participation because it is 0 if all participants speak equally and $E|P|(|P|-1)$ at it's maximum if one person contributes all the words in the discussion.

The equation $1 - \left(\sum_{p \in P} \left((W_p - E)^2 / E \right) / E|P|(|P|-1) \right.$ was used to assess the equality of participation in the group discussions. The values returned fell between 0 and 1, where higher values represent more equal participation.

[5] $S_{a,b}$ represents the number of times speaker b followed speaker a in the discussion and T_b represents the total number of times speaker b followed anyone else in the discussion. On this basis the entropy, H, of the discussion was calculated by the equation $H = -\sum_{Sa,b} \left(S_{a,b} / T_b \right) \log_2 \left(S_{a,b} / T_b \right)$. H is 0 if whenever someone has just spoken the same person always speaks next, and is at it's theoretical maximum, 1, when all the group's members have an equal chance of following the current speaker. This maximum varies with the size of the meeting and is equal to $-n \log_2 \left(1/n - n^2 \right)$, where n is the number of group members. It was possible to measure freedom of interaction by subtracting H from the maximum possible for a discussion of that size and dividing by that maximum. This returned a score between 0 and 1 where values closer to 0 denoted less predictable interaction. This score was then subtracted from 1 to provide a measure of freedom and not predictability of interaction. The values returned again fell between 0 and 1, where freer interaction was represented by scores closer to 1.

plus the relative frequencies of all the possible two-person speaker sequences in the data.

Discussions were considered more active if they demonstrated more equal participation/interaction. The formulae used to assess equality of participation and freedom of interaction was derived from the work of Carletta et al. (1998).

Using the formulae documented in footnote 3 and 4 I calculated, for each group, an equality of participation and freedom of interaction score. The scores returned were entered into two independent t-tests and compared across the five and ten person groups.

Comparison of the five and ten person discussions demonstrated a similarly high level of equality of participation, 0.93 and 0.91 respectively, on a scale between 0 and 1, where higher values represent more equal participation. This difference was not reliable [$t(18) = 0.47, p > .10$].

When the five and ten person discussions were compared in terms of their freedom of interaction scores a different story emerged. Figures 23 and 24 provide an illustration of the interaction patterns prevalent in the most interactive five and ten person discussion respectively. In each figure participants are represented by squares labelled with a number. The heaviness of the line connecting any two group members reflects how often they followed each other, on adjacent turns, relative to the other pairs of group members. In general, the more equal the lines between the participants, the more diverse the interactions that took place.

Figure 23. Participant Interaction in the Most Interactive Five Person Discussion.

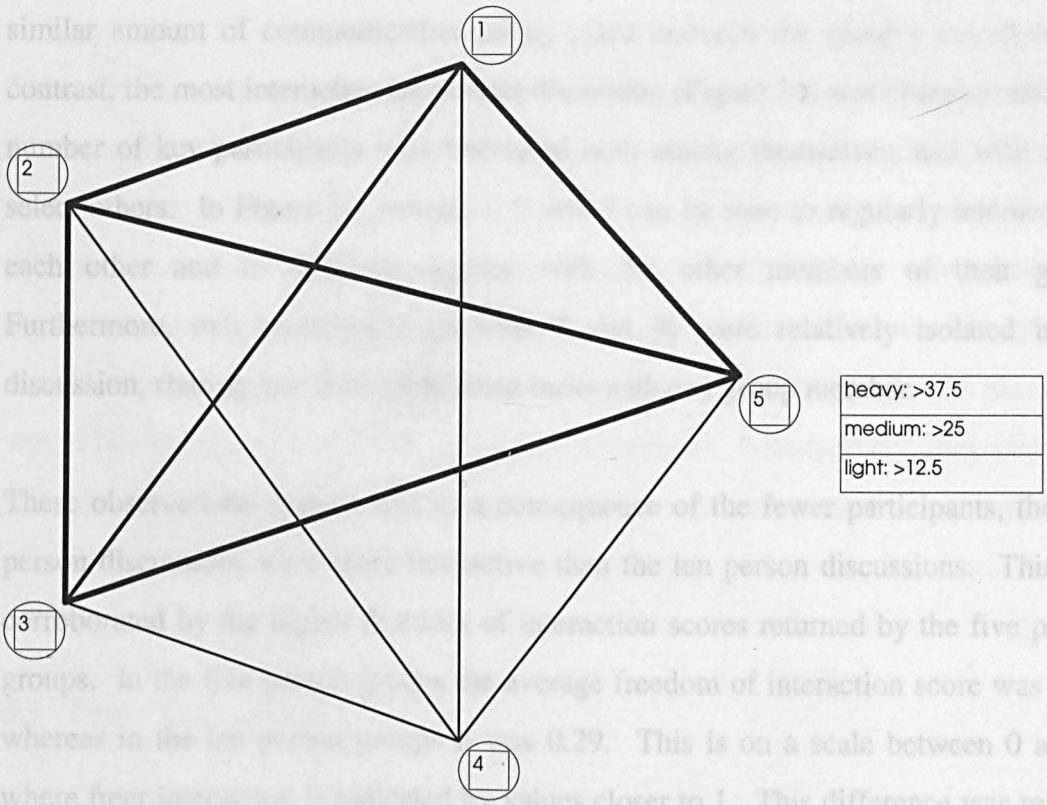
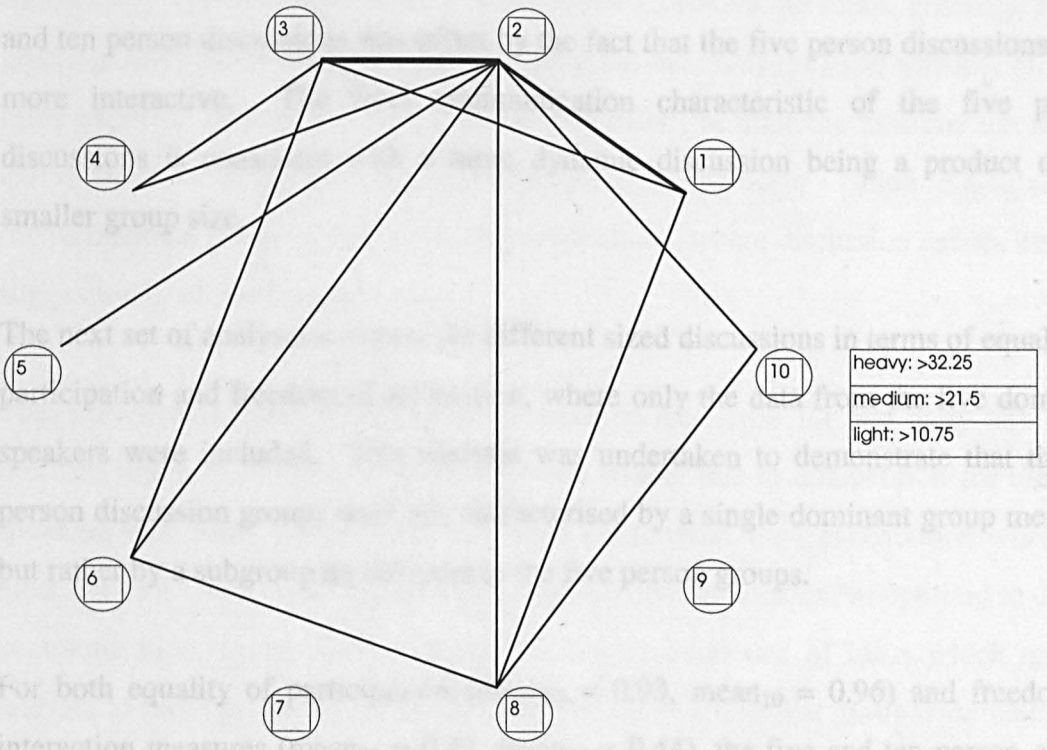


Figure 24. Participant Interaction in the Most Interactive Ten Person Discussion.



In the five person discussion (Figure 23) the interaction was very free. This is apparent both by the use of all the potential channels of communication and the similar amount of communication taking place between the group's members. In contrast, the most interactive ten person discussion (Figure 24) was characterised by a number of key participants who interacted both among themselves, and with a few select others. In Figure 24 persons 1, 2 and 3 can be seen to regularly interact with each other and to differing degrees with the other members of their group. Furthermore, two participants (persons 7 and 9) were relatively isolated in the discussion, sharing less than 10 adjacent turns with any group member.

These observations suggest that as a consequence of the fewer participants, the five person discussions were more interactive than the ten person discussions. This was corroborated by the higher freedom of interaction scores returned by the five person groups. In the five person groups the average freedom of interaction score was 0.43, whereas in the ten person groups it was 0.29. This is on a scale between 0 and 1, where freer interaction is indicated by values closer to 1. This difference was reliable [$t(18) = 5.10, p < .05$].

Thus, the finding that participants contributed a similar number of words in the five and ten person discussions was offset by the fact that the five person discussions were more interactive. The freer communication characteristic of the five person discussions is consistent with a more dynamic discussion being a product of the smaller group size.

The next set of analyses compare the different sized discussions in terms of equality of participation and freedom of interaction, where only the data from the five dominant speakers were included. This analysis was undertaken to demonstrate that the ten person discussion groups were not characterised by a single dominant group member, but rather by a subgroup no different to the five person groups.

For both equality of participation ($mean_{05} = 0.93$, $mean_{10} = 0.96$) and freedom of interaction measures ($mean_{05} = 0.43$, $mean_{10} = 0.44$), the five and ten person groups were comparable. Neither measure demonstrated a reliable difference across the

different sized discussion groups; Equality of participation [$t(18) = 1.71$, $p > .10$], Freedom of interaction [$t(18) = 1.27$, $p > .10$].

These findings demonstrate that the five and ten person discussions were comparable when participation and interaction was assessed using only the five dominant speakers in the ten person groups. Hence, the ten person discussions were less interactive than the five person discussions as a consequence of the non participative role assumed by the non-dominant speakers in the ten person groups. Perhaps the ten person groups' non-dominant speakers believed that if they regularly participated, the discussion would become less manageable and more fragmented. Alternatively, they may have felt that the resources of the dominant speakers were adequate for successful task completion.

5.5 Topic Transition

Face-to-face communication is constrained by what can be said at any given moment. Successful groups must understand each other, and part of understanding is being able to link one contribution to the rest of the discussion. In conversation talk usually follows well defined patterns, for instance, answers follow questions, greetings follow greetings and acknowledgements follow information. Schegloff and Sacks (1973) call these expected pairs of utterances 'adjacency pairs', as after the first one the second one is expected to follow. More extended patterns also occur - called 'dialogue' or a 'conversational game' - often following suggestions, where discussion ensues before a suggestion is adopted or discarded.

These predictable contribution patterns make perfect sense for two party talk. The problem arises in multiparty communication where, due to competition for the next speaking turn, some group members do not get to make their contribution when it is most relevant. As a consequence I expect group communication, as opposed to dyadic communication, to be characterised by a higher incidence of turns which are not relevant to those preceding them. For this reason, I believe that group communication will be more disjointed than dyadic communication.

Furthermore, the larger the group, the more the problem of relevance is exacerbated. Hence, the ten person discussions should be more disjointed than the five person discussions.

To assess this hypothesis each speaking turn, in each discussion, was coded in terms of the plagiarism issue it addressed. Fourteen categories were constructed, thirteen relating to the thirteen plagiarism issues and one concerning contributions not relevant to any of the plagiarism issues (non-issue). Tests of inter-coder reliability validated this coding scheme (see Inclusion Criteria section in Experiment 1, Chapter 4).

Sequences of 'non-issue' related contributions were not counted as speaker transitions. The reason being that there was no uniform way to code the relevance of one 'non-issue' contribution to the next. Entry into and out of a 'non-issue' contribution/sequence was therefore categorised as a single topic transition.

Once each turn was coded in terms of the plagiarism issue it addressed, each speaker transition was coded as relevant or irrelevant to the preceding turn. The discussion excerpt provided in Example 11 illustrates the procedure used to identify relevant and irrelevant topic transitions. In column five a 1 represents a relevant topic transition and a 0 an irrelevant topic transition.

Example 11. Relevant and Irrelevant Topic Transitions.

3	But I mean for someone who didn't plagiarise all the way through their university career they could obviously, they could obviously start plagiarising if they went into journalism	3	non-issue	
4	Aye but yeah they could, but they surely know enough to get, like if he's passed his degree dead well he's surely doesn't need to really do it man, it's only just because	4	non-issue	0
5	That's why they should check his other work, see if it's, it's okay	5	quality of previous	1
4	Aye they should check his work	4	quality of previous	0
8	Maybe, maybe as well the kind of tutors who know him and all of the, they might know what sort of person he is, like if he's	8	f of academics	1
6	That's taking, that's taking the tutors' personal opinion into account, they, they might like him	6	f of academics	

In Example 11 the group initially (first two contributions) discussed something irrelevant to the plagiarism issues provided - the fact someone could begin plagiarising only in their final year (person 3) and that the person caught plagiarising did not need to plagiarise (person 4). This series of 'non-issue' related contributions were not counted as speaker transitions.

A 0 was inserted in the far right column, two cells down, to signify the transition from a 'non-issue' state to a topic relevant to the plagiarism case, namely the quality of the student's previous work (quality of previous). Because the next speaking turn also related to the quality of the student's previous work a 1 was inserted to signify the relevant topic transition (far right column, three cells down). The next speaker transition constitutes a change in the topic under discussion (quality of previous to feelings of academics, 'f of academics'). A 0 was inserted (far right column, four cells down) to indicate the unrelated topic transition. Lastly, the final contribution was relevant to previous speaker's turn, and for this reason a 1 was inserted (far right column, five cells down) to signify the relevant topic transition.

Table 21 illustrates the frequency of relevant and irrelevant topic transitions occurring in the five and ten person discussions.

Table 21. Frequency of Relevant and Irrelevant Topic Transitions.

Group Size	**Topic Transition**	
	Relevant	Irrelevant
Five	734	278
Ten	861	433

Table 21 indicates that for both sizes of group there were more relevant, topic-related speaker transitions than irrelevant transitions. However, there was proportionately more relevant topic transitions in the five person discussions (72.5%) than in the ten person discussions (66.5%).

This difference was tested using an independent t-test. In this analysis the data consisted of each group's proportionate incidence of relevant topic transitions to total transitions. Results demonstrated that the five person discussions were characterised by a higher incidence of relevant topic transitions when compared with the ten person discussions [$t(18) = 2.35, p < .05$].

This finding verifies that the ten person discussions were more disjointed than the five person discussions. I believe this effect is caused by the greater competition for speaking turns in the larger group discussions. As a result, in the ten person discussions speakers more often have to refrain from making their contribution at the most appropriate juncture, and therefore postpone it until a less relevant point in the discussion.

5.6 Turn Exchange

The final analysis in this chapter assesses whether the process of exchanging speaking turns was qualitatively different across the different sized discussions.

It is assumed that due to the greater number of participants in the ten person groups, speakers in this condition would be less able to monitor their audience than those in the five person groups. Thus, speakers in the ten person groups were expected to be less able to assess both the verbal e.g. backchannel (Duncan, 1972) and non verbal e.g. gaze, head nods etc. (Kendon, 1967) cues which have been associated with turn exchange. To overcome/alleviate this disadvantage I predict that speakers in the ten person discussions, as opposed to those in the five person discussions, will resort to more formal, explicit turn exchange techniques to facilitate speaker transfer.

A methodology for assessing the formality of speaker interchange was derived from the experimental literature which assesses video-mediated technologies. Commonly, researchers appraise the effectiveness of video conferencing tools by comparing the communication of those using the technology, with the communication taking place in face-to-face groups.

Both O'Conaill, Whittaker and Wilbur (1993) and Sellen (1995) compared turn formality across remote and natural discussion groups. To do so the authors identified a number of turn exchange devices used by speakers to indicate either who the next speaker should be, or simply that their turn had ended. A synthesis of these categories provided three distinct turn exchange devices which were used by speakers in my experimental discussion groups. A description and example of each of these categories is given.

- Naming. When the current speaker indicates the next speaker by naming him/her.

Example 12. Naming.

1	I agree, Martin?	N
2	You know I don't agree	

- Question. Instances where the current speaker either specifically directs someone to be the next speaker without using his/her name, or signals that they intend to relinquish the floor e.g. 'what do you think?'

Example 13. Question.

3	I think for my number one I put the opinion of the, of the teachers and tutors that know him	
4	I didn't, I didn't think that was important	
3	Yeah, you didn't think it was important?	Q
4	No, not really, I put that about number six or seven, I thought it was difficult cause a lot of them were important were important it's like it was really difficult to decide one or two which you thought right okay em I can't remember right what for example but it was like I think one of them that I thought was quite important like the extent to which they plagiarised	

- Tag Question. When the current speaker indicates that another speaker may take over by attaching a stereotypical question to the end of his/her contribution e.g. 'isn't it' or 'you know'.

Example 14. Tag Question.

5	He might have been plagiarising for the whole time he was at university though, mightn't he	T
2	But you can't do it in an exam, you can't do it in an exam	

Using the audio tapes and discussion transcripts, each turn in each discussion was coded in terms of the turn exchange device used to facilitate speaker transfer. A 0 was used to identify utterances where no turn exchange device was used, N when names were used, Q for questions and T when tag questions were used to relinquish the turn of the current speaker. To check the reliability this coding scheme, four group discussions (two five and two ten person discussions chosen randomly) were independently coded. Tests, using the Kappa statistic, indicated a satisfactory level of inter-coder agreement ($K = 0.77$, $k = 2$, $N = 515$).

Table 22 details how often each of the turn exchange devices were used in the five and ten person discussions.

Table 22. Frequency of Turn Exchange Devices.

Group Size	**Exchange Device**			
	No Exchange Device	Name	Question	Tag Question
Five	1491	0	193	71
Ten	1456	2	336	78

Across the entire discussion corpus turn exchange devices were used in 18.7% of all speaker transitions. Table 22 demonstrates the higher incidence of question to tag questions, and the infrequent occurrence of turns being exchanged through naming the specified next speaker. The low incidence of naming was not surprising considering that that the participants had never met before. For this reason, the naming turn exchange category was excluded from the analysis.

With the number of speaking turns varying from one discussion to another, the proportionate incidence of questions and tag questions were calculated against the total number of turns exchanged in each discussion. This allowed the comparison of the different exchange devices across the experimental groups.

Assessment of the relative incidence of question and tag questions revealed that both types of exchange device were used more frequently in the ten person discussions than in the five person discussions (Questions, 17.9% compared with 11.0% respectively; Tag Questions, 4.2% compared with 4.0% respectively), although the difference was greater in the question category of exchange device.

The incidence of explicit floor exchange devices were compared across the five and ten person groups using a 2X2 Mixed Design ANOVA, where exchange device (Question or Tag Question) was treated as a within subject factor, and group size as a between subject factor. A reliable main effect of exchange device ($F(1, 18) = 45.09$, $MSE = 24.08$, $p < .05$) and a marginal effect of group size ($F(1, 18) = 4.14$, $MSE = 25.02$, $p = .06$) was returned by the ANOVA. The interaction between exchange device and group size was not reliable ($F < 2.20$).

The main effect of device type was of little theoretical interest. This finding simply indicates that more turns were exchanged using questions when compared to tag questions in both sizes of discussion. Of greater interest was the higher incidence of turn exchange devices used by speakers in the ten person discussions when compared with those in the five person discussions. Speakers in the ten person groups must therefore have felt the need to be more careful and unambiguous with regard to when their turn had ended, and who was to speak next.

This finding indicates that speakers in the ten person groups were less able to monitor turn exchange cues when compared with speakers in the five person groups. To alleviate this discrepancy in monitoring ability, members of the ten person group used more explicit/formal speaker switching techniques.

5.7 Summary of Results

Each of the analyses reported in this chapter support the proposition that the communication in the five person discussions was more dynamic, and interactive, than the communication in the ten person discussions. I shall now present a summary of the results documented in the previous sections of this chapter and how they may be related.

In the ten person groups speakers competed for control of the next speaking turn at the end of the current speaker's utterance. Members of the five person groups, on the other hand, more often interrupted the turn held by the current speaker. The higher incidence of interruptions in the five person discussions partly explains the shorter length of speaking turns in this condition. However, using only the uninterrupted turns as data, speakers in the ten person groups were still found to produce longer contributions than those in the five person groups ($mean_{05}$ = 17.04 words, $mean_{10}$ = 21.16 words). This difference is reliable [$t(18) = 4.80$, $p < .05$].

The more interactive nature of the smaller five person discussions was illustrated by the higher incidence of pair-wise conversations taking place in this condition. Further evidence was provided by the equality of participation and freedom of interaction measures. Although members of the five and ten person groups were found to contribute a comparable number of words to their discussion, the interaction in the five person groups was freer.

The findings documented so far promote the five person discussions as being like a dialogue, whereas the ten person discussions more closely resembled a monologue, or narrative.

Using two separate content analyses I investigated the coherency and formality of the communication taking place in the five and ten person discussions. The results of these analyses demonstrated that the ten person discussions were not only more disjointed than the five person discussions, but they were also more formal.

The more disjointed dialogue characteristic of the larger discussions was attributed to the increased competition for speaking turns in the ten person groups. With more people in the ten person groups not able to contribute at a relevant juncture, I suggest that they retain their contribution until the next available speaker transition, at which point their utterance may no longer be relevant. As a consequence, the ten person discussions were more disjointed than the five person discussions.

Finally, the more formal nature of the ten person discussions was evident by the speakers' greater use of explicit turn exchange devices in this condition. Speakers' reliance upon these turn exchange devices in the ten person groups illustrates their inability to monitor their larger audience. Participants' less frequent use of speaker feedback in the ten person discussions is also likely to heighten the need for explicit turn exchange devices.

Taken together, the findings of these content analyses indicate that the communication in the ten person discussions was more detached than in the five person discussions. Speaking turns in the ten person groups were less relevant to those preceding them and were relinquished in a more formal manner than in the five person groups. These findings enhance the proposition that communication in the larger ten person discussions was like a monologue.

5.8 Discussion

In Experiment 1 (Chapter 4) it was demonstrated that the process of influence and understanding differed across the different sized discussion groups. Five person group members' understanding of their discussion, as predicted by the collaborative model hypothesis, was influenced by who they interacted with in their meeting. Thus, the side-participants who overheard the conversations of others in the five person discussions were at a disadvantage. Members of the ten person groups, as predicted by the autonomous model hypothesis, were influenced by the person transmitting the greatest amount of information in the discussion.

As outlined in the current chapter, the communication taking place in the five person groups was more interactive than that taking place in the ten person groups. As a consequence of this I believe the collaborative model is more applicable to the five person discussions, and the autonomous model to the ten person discussions. More specifically, I propose that it is the more interactive nature of the five person discussions that causes the overhearing deficit documented in Experiment 1.

The five person discussions were more dialogue-like, characterised by a higher incidence of pair-wise conversations, interruptions and shorter turns when compared with the ten person discussions. The fact more interruptions were produced in the five person discussions follows the explanation of the overhearer deficit provided by Schober and Clark (1989). By interrupting the speaker before they complete their turn, overhearers may not have been given an adequate opportunity to ground the utterance's meaning.

When compared with the five person discussions, communication in the ten person discussions resembled a monologue or narrative. The more disjointed, formal nature of the ten person discussions suggests that speaking turns made in this condition were more self-contained than those made in the five person discussions. Examples are used to illustrate this point.

Examples 15 and 16 both relate the first contribution made by a member of a five (Example 15) and ten (Example 16) person discussion group. Both contributions concern the plagiarist's reasons for cheating.

Example 15. Member of Five Person Discussion.

2	His reasons' that's what I put	2

Example 16. Member of Ten Person Discussion.

5	Why he did it, obviously the reasons why /1 Cause eh is it because he's feeling insecure, is it because eh he's wanted to cheat to make sure he was getting his first or whatever /1, is it a conscious, is it really a kind of conscious decision to plagiarise or was he just kind of	5

When taken in the context of their respective discussions, both contributions assert that the plagiarist's reasons for cheating are important considerations. In the five person group (Example 15) the speaker simply asserted that the plagiarist's reasons were important. The speaker in the ten person group (Example 16) asserted not only that the plagiarist's reasons were important, but also justified why this was so. Thus, in the five person example the other members of the group may require the speaker to justify her assertion, whereas in the ten person example this was encompassed within the message transmitted.

Anecdotally, this assertion-justification contribution type was more characteristic of the ten person discussions.

As a consequence of the more elaborate, monologue like utterances produced in the ten person groups I believe the overhearing side-participants were bettered catered to in the larger discussions. Such a **speaker-based account** suggests that side-participants attend to everything that is said in their discussion, but in the five person groups they are less able to understand the conversations they do not take part in.

This would attribute the overhearing deficit apparent in Experiment 1 to the speakers and what has been termed 'audience design' (Clark & Murphy, 1982). Audience design, like Perspective-Taking Models (see Chapter 2), posit that speakers consider their audience when constructing their utterance. According to the Perspective-Taking account, in larger discussion groups speakers will construct more elaborate utterances in order to cater to the greater number of perspectives present.

Although the speaker-based account provides a plausible explanation of the Experiment 1 findings, another equally plausible explanation exists. This is referred to as the **listener-based account**. According to Sacks et al. (1974) listeners attend more closely to the conversations they take part in. If correct, then the overhearing deficit documented in Experiment 1 is caused by members of the five person groups attending less closely to conversations they did not take part in when compared to those in the ten person groups.

Experiment 2 was designed to differentiate between the speaker and listener-based explanations of the overhearing deficit.

Chapter 6. Experiment 2. Overhearer's Understanding of Group Discussions

Experiment 1 (Chapter 4) showed that participants in the five person discussion groups were influenced by who they interacted with in their meeting. Thus, side-participants who overheard the conversations of others in the five person groups did not fully understand what was being communicated. This finding is consistent with the **collaborative model hypothesis**. In the ten person discussions participants were influenced by the group's dominant speaker. This was predicted by the **autonomous model hypothesis**. To understand why the collaborative model was applicable to the five person groups and the autonomous model to the ten person groups, the dialogue prevalent in the different sized discussions was compared (Chapter 5). Several separate measures illustrated that the five person discussions were more interactive than the ten person discussions.

Two opposing theories, capable of explaining the Experiment 1 findings, were generated on the basis of these dialogue comparisons. They are referred to as the speaker and listener based accounts.

The **speaker-based account** assumes that side-participants attend to everything that is said in their discussion, but in the smaller groups they have more trouble understanding the conversations they do not take part in. Support for this position was provided by the analyses documented in Chapter 5. It was found that speakers in the ten person groups produced more elaborate/informative utterances than those in the five person groups. The more audience-orientated nature of the contributions made in the larger groups explains why, in Experiment 1, members of the ten person groups did not suffer from the overhearing deficit witnessed in the five person groups.

In contrast, the **listener-based account** posits that the utterances produced in the five and ten person discussions are equally comprehensible. It predicts that the overhearing deficit found in Experiment 1 is caused by attentional differences which exist between the members of the different sized discussions. Therefore, according to

the listener-based account, the overhearing deficit is due to participants in the five person discussions attending less closely to the conversations they are not engaged in.

Experiment 2 was designed to test the speaker and listener based accounts. This was accomplished by assessing genuine overhearers' (i.e. those who listen to tape recordings of the original discussions without having taken part in them) understanding of the Experiment 1 discussions.

Three sets of predictions follow the speaker and listener based accounts.

First, if the speaker-based account is correct, and the contributions made in the larger groups are more audience-oriented, then genuine overhearers should attain a better understanding of what was agreed in the larger discussions. On the other hand, if the listener-based account is correct, and it is attentional differences that cause the overhearing deficit found in Experiment 1, then genuine overhearers should attain a comparable understanding of the different sized discussions.

Second, if the contributions made in the larger discussions are more informative, genuine overhearers will be influenced more by the dominant speaker, as opposed to the non-dominant speaker, in the ten person groups. No effect of dominance was expected following the five person discussions. These speaker-based account predictions are made on the grounds that only the in the ten person discussions are overhearers able to properly understand what is being communicated. The listener-based account predicts that the overhearers will be influenced more by the dominant speaker in both sizes of group. This prediction is made on the basis that the contributions made in the different sized discussions are equally comprehensible.

The final set of predictions relate to how the genuine overhearers' understanding of the discussions will compare with that attained by the actual discussion participants. The speaker-based account predicts that the overhearers will attain an understanding of the ten person discussions which is comparable to that exhibited by the discussion participants. Those overhearing the five person discussions will understand less of what was agreed in the meeting when compared with the discussion participants.

Again, these predictions are made on account of the more informative, audience-orientated nature of the contributions made in the larger group discussions.

Different predictions are made by the listener-based account. If the listener-based account is correct, and persons attend less closely to conversations they are not involved in, then genuine overhearers should understand less of what was agreed in the overheard discussions when compared with the discussion participants. Thus, the listener-based account predicts that persons overhearing the five and ten person discussions will understand less of what was agreed in the meetings when compared with the discussion participants.

6.1 Method

6.1.1 Subjects

One hundred undergraduate students acted as overhearers of the set of discussions recorded in Experiment 1. Each subject overheard two discussions, one five person discussion and one ten person discussion. The discussions were matched in terms of the participants' co-ordinated understanding of what was agreed in their meeting (this was based on the Task 2 issue rankings made in Experiment 1). Thus, for each matched pair of discussions there were ten overhearers. The order of presentation of the different sized experimental discussions was counterbalanced across the subjects.

6.1.2 Procedure

The experimental procedure adopted in Experiment 2 resembled that used in Experiment 1. The experiment began with the subjects being asked to read the one page plagiarism scenario used in Experiment 1 (see Appendix 1).

After reading the scenario the subjects were given the list of 13 plagiarism issues used in Experiment 1 (see Appendix 4). They were asked to rank these plagiarism issues in order of importance, using 1 to indicate the most important and 13 to indicate the

least important issue. This task, again referred to as Task 1, was used to gauge pre-discussion agreement.

On completion of Task 1 the experimental materials were collected, and the subjects listened to the tape recording of the first group discussion. The subjects overheard the discussions in groups of five. In order to prevent any unwanted noise interference each subject was provided with a separate set of earphones with which to listen to the discussion.

After listening to the discussion the subjects were again provided with the list of plagiarism issues. At this point they were required to rank the issues in terms of how important they had been agreed to be in the overheard discussion. When the subjects had completed this task they were given a ten minute break before listening to the second discussion. Finally, they were required to rank the plagiarism issues in terms of how important they had been agreed to be in the second overheard discussion. These ranking tasks constitute Task 2 of Experiment 2.

6.2 Data Analysis

Tests of the speaker and listener based account of the Experiment 1 findings were carried out in two parts. Part 1 compares the overhearers' understanding of the different sized discussions, and the influence of the groups' dominant and non-dominant speakers. Part 2 compares the overhearers with the actual discussion participants. This was done both in terms of their understanding of what was agreed in the different sized discussions, and the influence of the groups' dominant and non-dominant speakers.

6.2.1 Part 1. Overhearer's Understanding of the Discussions

The plagiarism issue rankings were analysed in two ways. To assess the overhearers' understanding of the different sized discussions, each overhearer's Task 2 issue rankings were inter-correlated with those who had overheard the same discussion. Using Fisher's (1921) formula, the R correlation coefficients returned were transformed into r' scores. Each overhearer's average level of agreement was then calculated. This provided a total of 10 agreement scores for each overheard discussion.

These Task 2 r' scores were compared using an ANOVA and ANCOVA, where group size (five / ten) was treated as a within subject factor. In the ANCOVA, the overhearers' pre-discussion agreement r' scores (Task 1) were entered as a co-variate. The ANCOVA ensured that the overhearers' understanding of the discussion was not affected by their personal opinion of the plagiarism issues.

To determine the effect of speaker dominance, each overhearer's issue rankings were correlated with the rankings made by the discussion group's dominant and non-dominant speaker (issue rankings made at Task 2 in Experiment 1). The R values returned were again transformed into r' scores. This provided a total of 20 agreement scores for each overheard discussion, 10 falling into the dominant speaker category and 10 into the non-dominant speaker category.

These Task 2 r' scores were compared using a 2X2 ANOVA and ANCOVA, where dominance (dominant / non-dominant) and group size were treated as within subject factors. In the ANCOVA the overhearers' pre-discussion agreement r' scores (Task 1) were entered as co-variates. The ANCOVA ensured that the influence of the dominant and non-dominant speakers was not coloured by the overhearers' personal opinion of the plagiarism issues.

6.2.2 Part 2. Participants' and Overhearers' Understanding of the Discussions

In Part 2 the issue rankings were again analysed in two ways. The first analysis compares the overhearers' understanding of the discussions with that of the actual discussion participants. The second compares the effect of speaker dominance across the discussion participants and overhearers. The data from the five and ten person discussions was analysed separately. This was necessary due to the different experimental designs used in Experiment 1 and 2 (mixed design in Experiment 1 and within design in Experiment 2).

To assess the participants' and overhearers' understanding of the discussions their Task 2 issue rankings were inter-correlated. As before, the R values returned were transformed into r' scores. These r' scores were compared using an ANOVA and ANCOVA, where presence (participant / overhearer) was treated as a between subject factor. In the ANCOVA the participants' and overhearers' pre-discussion agreement r' scores (Task 1) were entered as co-variates. The ANCOVA ensured that the participants' and overhearers' understanding of the discussion was not influenced by their personal opinion of the plagiarism issues.

To determine the effect of speaker dominance, each overhearer's and participant's Task 2 issue rankings were correlated with those of the discussion group's dominant and non-dominant speaker. Again, the R values returned were transformed into r' scores. These r' scores were compared using a 2X2 Mixed Design ANOVA and ANCOVA, where dominance was treated as a within subject factor and presence as between. In the ANCOVA, overhearers' and participants' pre-discussion agreement r' scores (Task 1) were entered as co-variates. The ANCOVA ensured that the influence of the dominant and non-dominant speakers was not coloured by the participants', or overhearers' personal opinion of the plagiarism issues.

All the correlations were computed using Spearman's correlation coefficient for ranked data. The R values returned were transformed into r' scores in order to normalise the data, which in turn permits the use of the proposed parametric tests.

6.3 Results

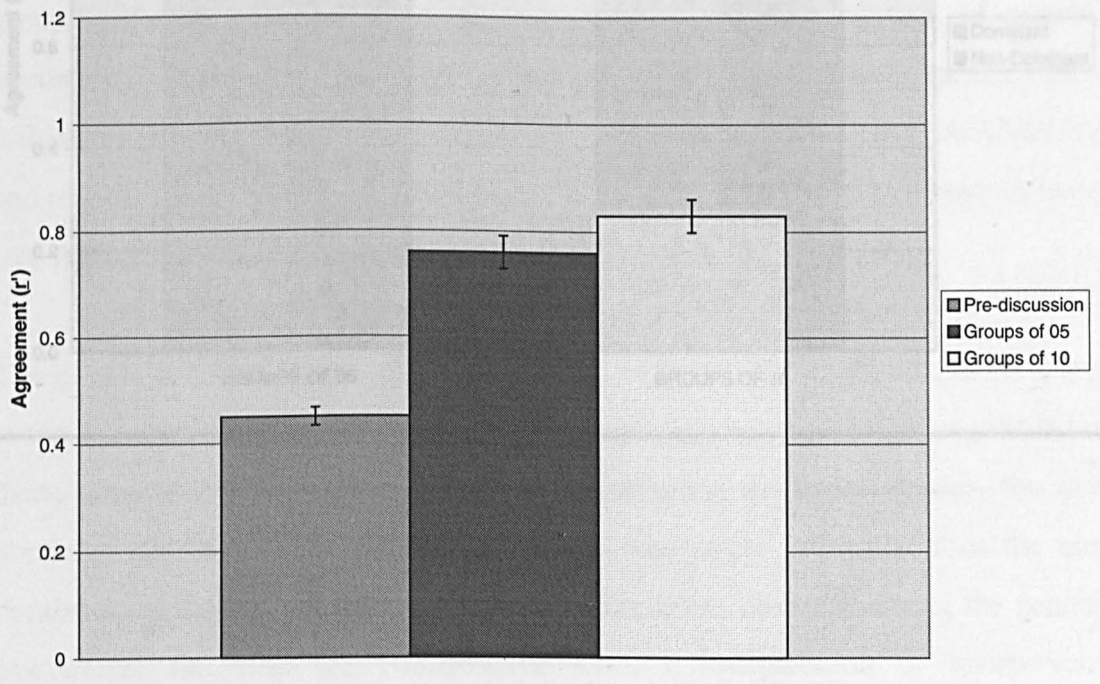
The overhearers' five and ten person r' scores did not differ reliably from a normal distribution according to the Kolmogorov-Smirnov test; Five (K-S Z = 1.03, p > .10), Ten (K-S Z = 0.96, p > .10). Thus, the r' scores were suitable data for the parametric analyses reported next.

All the Fs reported are reliable at $p < .05$ where marginal effects are reported when $.05 < p < .10$.

6.3.1 Part 1. Overhearer's Understanding of the Discussions

The first analysis of Part 1 compares the overhearers' understanding of what was agreed in the different sized discussions. The mean level of agreement (r') exhibited by those overhearing the five and ten person discussions is documented in Figure 25. Also provided in Figure 25 is the overhearers' mean level of pre-discussion (Task 1) agreement.

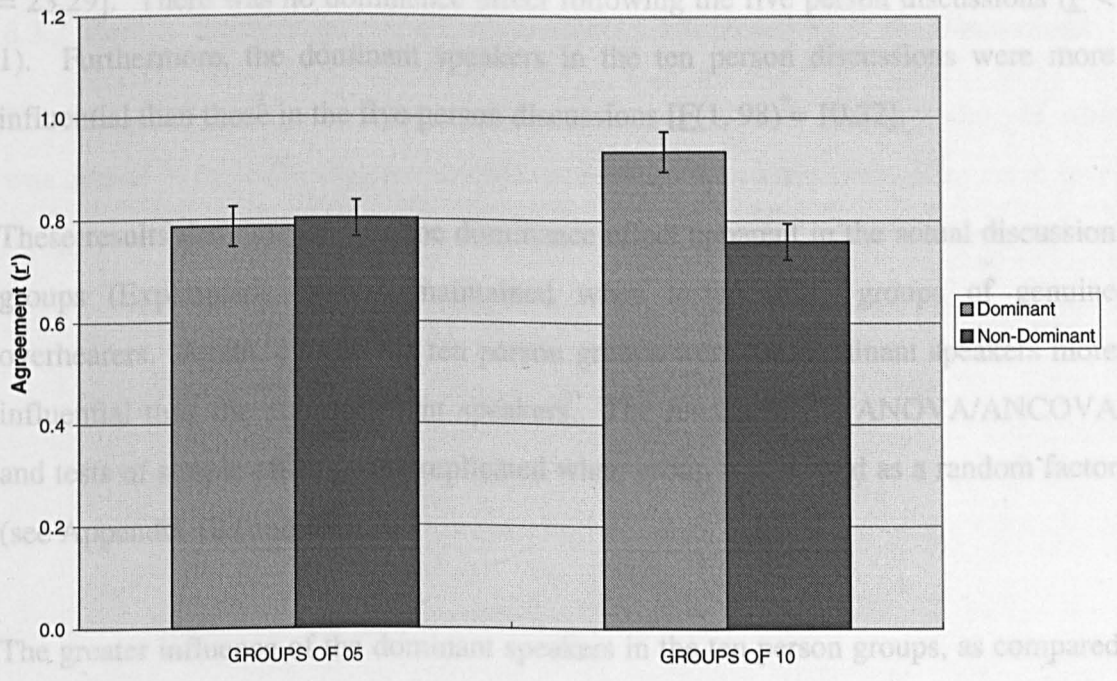
Figure 25. Overhearer's Understanding of what was Agreed in the Five and Ten Person Discussions.



It is evident from Figure 25 that the overhearers shared a more co-ordinated understanding of what was agreed in the larger ten person discussions. This was confirmed in the ANOVA and ANCOVA. As anticipated, both analyses revealed a reliable main effect of group size; ANOVA [F(1, 99) = 7.40, MSE = 0.03], ANCOVA [F(1, 98) = 10.35, MSE = 0.03]. When the data was re-analysed, treating group as a random factor, there were no reliable differences between the five and ten person conditions (see Appendix 17).

The next analysis investigates the effect of speaker dominance upon the overhearers' understanding of what was agreed in the five and ten person discussions. Figure 26 illustrates the mean level of agreement (r') shared between the overhearers and the groups' dominant and non-dominant speakers.

Figure 26. Relationship Between Speaker Dominance and the Overhearers' Understanding what was Agreed in the Discussion.



An interaction between speaker dominance and group size is apparent from Figure 26. The dominant speakers in the ten person groups are more influential upon the overhearers' than the non-dominant speakers. In the five person discussions the dominant and non-dominant speakers are equally influential.

These observations were corroborated in the ANOVA and ANCOVA tests. Both analyses demonstrated a reliable main effect of dominance; ANOVA [$F(1, 99) = 11.95$, $MSE = 0.05$], ANCOVA [$F(1, 98) = 9.96$, $MSE = 0.05$]. There was no effect of group size ($Fs < 2.52$). In both analyses the main effect of dominance was qualified by the reliable interaction between dominance and group size; ANOVA [$F(1, 99) = 19.67$, $MSE = 0.05$], ANCOVA [$F(1, 98) = 19.43$, $MSE = 0.05$].

Tests of simple effects, treating the overhearers' pre-discussion agreement $\bar{r}$' scores (Task 1) as a co-variate, were carried out. As expected, the interaction was caused by the greater influence of the dominant speakers in the ten person discussions [$F(1, 98) = 23.29$]. There was no dominance effect following the five person discussions ($F < 1$). Furthermore, the dominant speakers in the ten person discussions were more influential than those in the five person discussions [$F(1, 98) = 10.32$].

These results demonstrate that the dominance effect apparent in the actual discussion groups (Experiment 1) was maintained when tested using groups of genuine overhearers. Again, only in the ten person groups were the dominant speakers more influential than the non-dominant speakers. The results of the ANOVA/ANCOVA and tests of simple effects were replicated when group was treated as a random factor (see Appendix 18a and 18b).

The greater influence of the dominant speakers in the ten person groups, as compared to the dominant speakers in the five person groups, was not apparent among the actual discussion participants (see Figure 20). In the actual discussion groups, the non-dominant speakers in the five person groups were more influential than the non-dominant speakers in the ten person groups. The effect observed among the genuine overhearers fits with the collaborative model's interpretation of interpersonal communication.

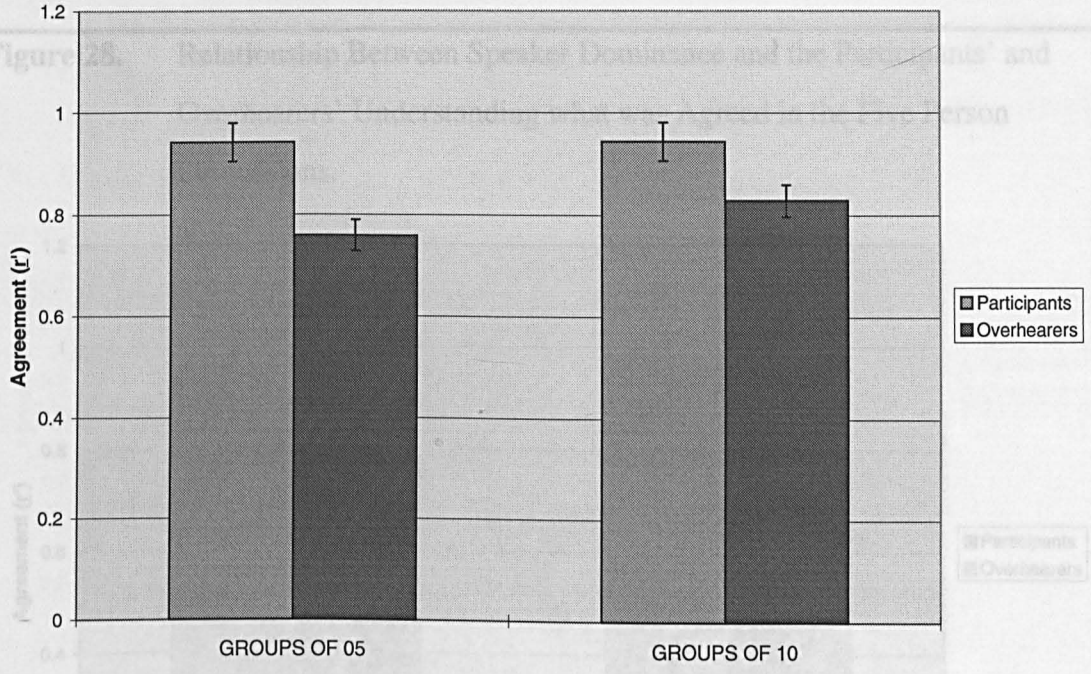
Unable to interact with the discussion participants, genuine overhearers are denied the interaction benefit attributed to those participating in the discussions. Thus, unlike genuine overhearers, discussion participants are able to engage in conversations where they can clarify, or ground, the meaning of the speaker's contribution. As was shown in Experiment 1, this grounding process is particular to the five person discussions. As a result, the genuine overhearers were not influenced by the interaction itself, which in turn depressed their overall understanding of the five person discussions.

Taken together, the results documented in Part 1 support the speaker-based account of the Experiment 1 findings. Overhearers not only shared a more co-ordinated understanding of the ten person discussions, but they were also influenced more by the dominant speakers in the ten person groups. Both findings indicate that the utterances produced in the larger ten person discussions were more informative/audience-orientated than those produced in the five person discussions.

6.3.2 Part 2. Participant's and Overhearer's Understanding of the Discussions

The first pair of analyses of Part 2 compare the participants' understanding of what was agreed in their discussion with that attained by the overhearers. The mean level of agreement ($\underline{r}$') exhibited by the participants and overhearers of the five and ten person discussions is illustrated in Figure 27.

Figure 27. Participants' and Overhearers' Understanding of what was Agreed in the Five and Ten Person Discussions.



As can be seen from Figure 27, in both the five and ten person discussions, the participants attained a more co-ordinated understanding of what was agreed in their discussion when compared with the overhearers. This observation was confirmed in ANOVA and ANCOVA tests. In the five person condition, there was a main effect of presence in both the ANOVA [$\underline{F}(1, 148) = 9.61$, $\underline{MSE} = 0.10$] and ANCOVA [$\underline{F}(1, 147) = 10.70$, $\underline{MSE} = 0.09$]. The same effect was demonstrated in the ten person condition; ANOVA [$\underline{F}(1, 198) = 6.85$, $\underline{MSE} = 0.09$], ANCOVA [$\underline{F}(1, 197) = 4.05$, $\underline{MSE} = 0.09$].

However, when the data was reanalysed, treating group as a random factor, these effects were not replicated (see Appendix 19a and 19b).

The next pair of analyses assess the effect of speaker dominance upon the participants' and overhearers' understanding of the five and ten person discussions. The first analysis compares the influence of the five person groups' dominant and non-dominant speakers upon the participants and overhearers. Figure 28 displays the mean

level of agreement (r') shared between the group's dominant and non-dominant speakers and the participants and overhearers.

Figure 28. Relationship Between Speaker Dominance and the Participants' and Overhearers' Understanding what was Agreed in the Five Person Discussions.

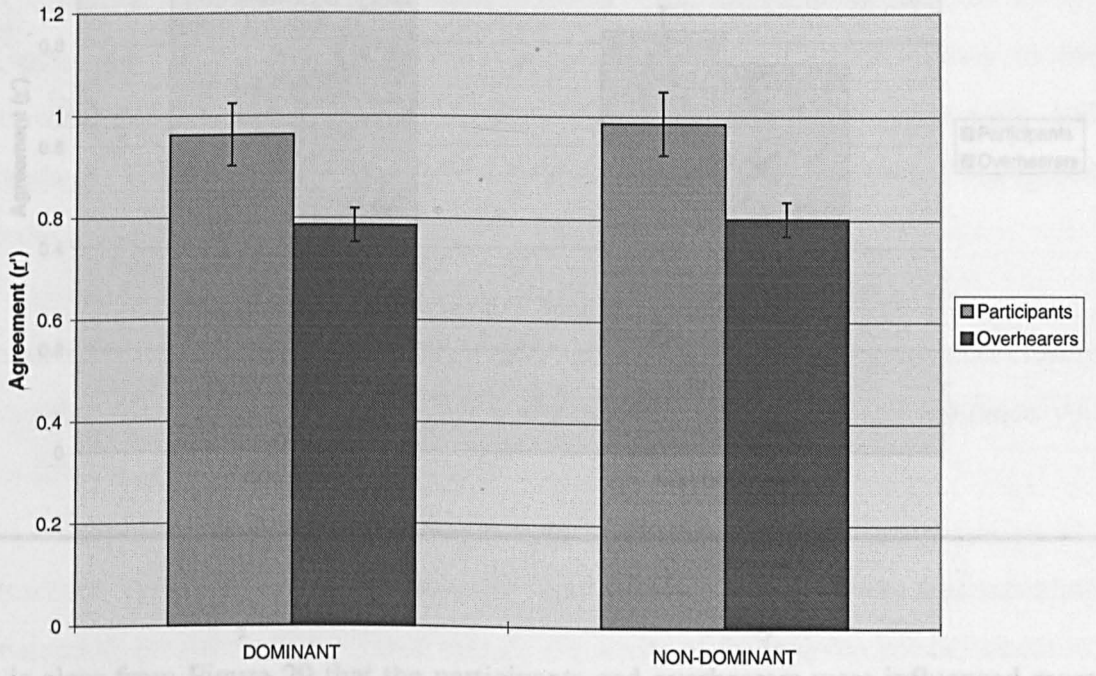
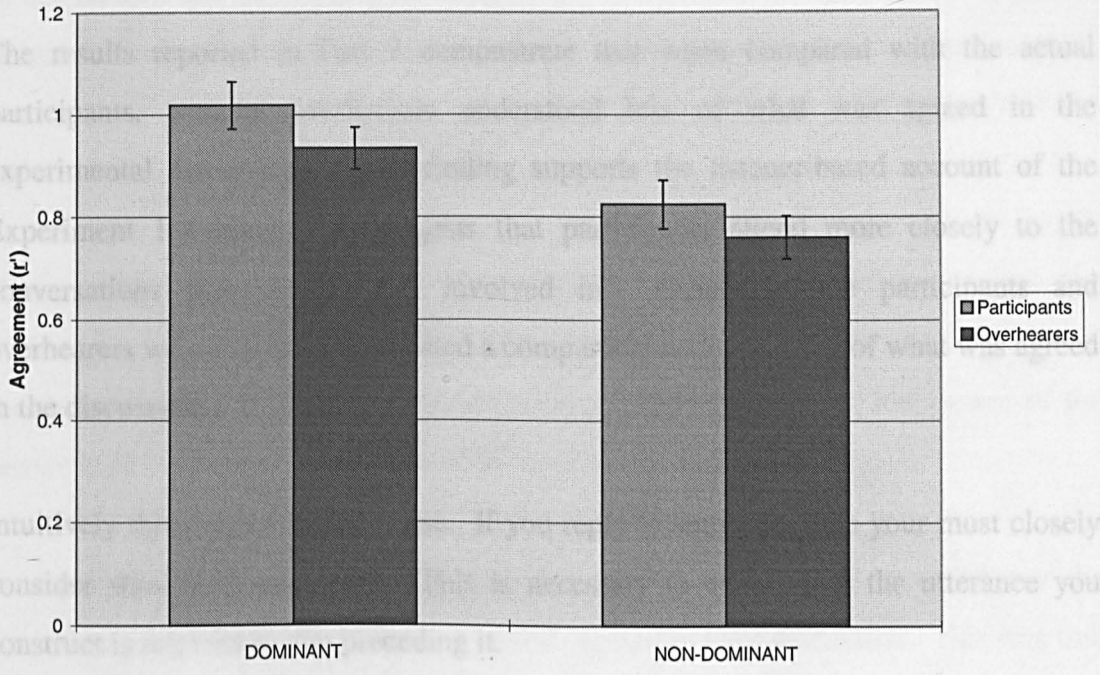


Figure 28 indicates only a main effect of presence. The five person groups' dominant and non-dominant speakers clearly influence the participants' understanding of the discussion more than the overhearers'. This was corroborated by the ANOVA and ANCOVA. Both analyses demonstrated a main effect of presence; ANOVA [$F(1, 128) = 8.42$, $MSE = 0.18$], ANCOVA [$F(1, 127) = 10.09$, $MSE = 0.16$]. There was no effect of dominance or interaction between dominance and group size ($Fs < 1$). When the data was reanalysed, treating group as a random factor, these findings were replicated (see Appendix 20a).

Similar findings emerged in the ten person condition. Figure 29 shows the mean level of agreement (r') shared between the group's dominant and non-dominant speakers and the participants and overhearers.

Figure 29. Relationship Between Speaker Dominance and the Participants' and Overhearers' Understanding what was Agreed in the Ten Person Discussions.



It is clear from Figure 29 that the participants and overhearers were influenced more by the dominant speakers, as opposed to the non-dominant speakers, in the ten person groups. In addition, the dominant and non-dominant speakers influenced the participants more than the overhearers. These observations were, for the most part, corroborated.

The ANOVA and ANCOVA demonstrated a main effect of dominance; ANOVA [$F(1,178) = 49.35$, $MSE = 0.06$], ANCOVA [$F(1,177) = 39.15$, $MSE = 0.06$]. Therefore, like the discussion participants, the overhearers were influenced more by the dominant speakers in the ten person groups. Only the ANCOVA returned a main effect of presence, although this effect was marginal; ANOVA ($F < 1.72$), ANCOVA [$F(1, 177) = 3.41$, $MSE = 0.28$, $p = .07$]. The more thorough ANCOVA demonstrates that the discussion participants were influenced more by the dominant and non-dominant speakers than the overhearers. There was no interaction between dominance and presence ($Fs < 1$).

When the data was re-analysed, treating group as a random factor, there were no reliable differences between the participants and overhearers in the ten person condition (see Appendix 20b).

The results reported in Part 2 demonstrate that when compared with the actual participants, genuine overhearers understood less of what was agreed in the experimental discussions. This finding supports the listener-based account of the Experiment 1 findings. It suggests that participants attend more closely to the conversations they are directly involved in. Otherwise, the participants and overhearers would have demonstrated a comparable understanding of what was agreed in the discussions.

Intuitively this finding makes sense. If you reply to someone, then your must closely consider what they have said. This is necessary to ensure that the utterance you construct is relevant to that preceding it.

However, there are other factors which may account for the lower understanding attained by the overhearers. These include the clarity of the tape recorded discussions, and the overhearers' inability to follow the non-verbal communication (e.g. head nods, gaze, facial gestures etc.) which took place in the overheard discussions. Both factors may have prevented the overhearers from being able to fully appreciate what was being communicated in the discussions.

6.4 Discussion

On the whole, the results of Experiment 2 support the **speaker-based account** of the Experiment 1 findings. Genuine overhearers better understood what was agreed in the ten person discussions when compared with the five person discussions. Furthermore, their understanding of the overheard discussions was influenced more by the dominant speaker, as opposed to the non-dominant speaker, only in the ten person discussions. The dominant and non-dominant speakers in the five person discussions were equally influential.

Taken together, these findings indicate that speakers design their utterances differently for different audiences. In the larger ten person discussions speakers produced more elaborate and informative utterances which were understood by their wider audience. In the smaller five person groups speakers produced utterances which were designed only for their current conversational partner. This explains why, in Experiment 1, members of the five person discussion groups were unable to fully understand the conversations they did not take part in.

When analysed by group, only the dominance effect was consistent across the different sized discussions. Overhearers did not consistently attain a better understanding of what was agreed in the larger discussions. The low power of the analysis (df = 8) may be the cause of this.

A comparison of the discussion participants with the overhearers revealed that the participants better understood what had been agreed in their discussion. This was true of both the five and ten person discussions. The discussion participants were also influenced more by the groups' dominant and non-dominant speakers when compared with the overhearers. These findings are consistent with the **listener-based account** of the Experiment 1 findings. They suggest that participants attend more closely to the conversations they take part in, and for this reason they better understand what was agreed in their discussion. Indeed, it is plausible that even the possibility of being required to take part in the discussion (e.g. being asked a question) may raise the participants' attentiveness to what was being said. This suggests that there is something special about taking part in a discussion.

The results of the majority of participant/overhearer comparisons were not found to be consistent across the experimental groups. Again, this was probably due to the low power of the analyses (df = 8 in the within subject designs, and df = 17 in the mixed designs).

While the listener-based account provides a plausible explanation of why the participants better understood what was agreed in their discussion, alternative explanations exist. The quality of the tape recorded discussions, or the overhearers'

inability to track the participants' non-verbal communication, may have reduced their understanding of the discussions. Thus, there may not be anything special about actually taking part in a discussion.

It would be possible to test these opposing explanations by running another experiment where overhearers are able to observe the actual group discussions as they happen. This would need to be done without the discussion group's knowledge, so as to ensure that the speakers do not consider the overhearing audience when constructing their utterances. Real-time observation would ensure that the overhearers' understanding of the discussion was not negatively affected by quality of the recorded discussions. It would also allow the overhearers to follow the non-verbal communication taking place in the discussions. If the participants still demonstrate a more co-ordinated understanding of what was agreed in their discussion, then it could be concluded that it is attentional differences which differentiate the participants from the overhearers.

Chapter 7. General Discussion

Motivated by field observations (Chapter 1), this thesis investigates the effect group size has upon influence and process in communication. This involved assessing the applicability of current models of interpersonal communication (Chapter 2), all of which are based on dyadic communication, to the group context. In this respect, the research reported is somewhat pioneering.

Following a pilot study (Chapter 3), I compared the communication taking place in a series of five and ten person experimental discussion groups (Chapter 4).

Communication in the five person groups was consistent with the collaborative model of communication (Clark & Wilkes-Gibbs, 1986). In the five person groups, participants' understanding of their discussion was influenced by the persons they interacted with in the meeting. Thus, as a consequence of the collaborative nature of communication, group members understood less of the conversations they did not take part in when compared with the addressees. This 'overhearer deficit' is well documented (Schober & Clark, 1989).

The communication taking place in the ten person groups was consistent with autonomous models of interpersonal communication (i.e. Encoder/Decoder, Intentionalist and Perspective-Taking Models). In this condition, participants' understanding of what was agreed in their discussion was influenced by the dominant speaker (i.e. the person transmitting the greatest amount of information). The dominant speaker was also responsible for the participants' personal beliefs following the discussion.

Thus, Experiment 1 (Chapter 4) points to two different modes of face-to-face communication taking place in small and large discussion groups. In small groups it is a bilateral process of establishing consensus among pairs of participants. In large groups it is a unilateral process of broadcasting information to the group as a whole.

To attain an understanding of why the overhearing deficit was specific to the five person groups, the communication taking place in the different sized discussions was compared (Chapter 5). It was found that the five person discussions were more dialogue-like, characterised by a higher incidence of pair-wise conversations, interruptions and short speaking turns. The ten person discussions were monologue-like, the communication being both more disjointed and formal when compared with the five person discussions.

It was anticipated that the more formal, elaborate utterances produced by speakers in the ten person groups would be more audience-oriented than those produced in the five person groups. Thus, the overhearing deficit found in the five person groups was attributed to the speakers, and what has been called 'audience design' (Clark & Murphy, 1982).

Using genuine overhearers (i.e. persons who listen to the tape recorded experimental discussions) this speaker-based account was tested (Chapter 6). Genuine overhearers were found to better understand what was agreed in the larger ten person discussions when compared with the five person discussions. Thus, as predicted, speakers in the larger groups constructed utterances which were accessible to their broader audience. In the five person groups speakers were sensitive only to their current conversational partner. Hence, the overhearing deficit was specific to the five person discussion groups.

7.1 Implications of Research

The findings reported in this thesis have implications for practitioners involved in the mediation of group communication.

As a consequence of the collaborative nature of the communication taking place in the five person groups, participants were influenced by who they spoke with in their discussion and not by who said the most (i.e. the dominant speaker). Thus, members of the five person groups left their meeting with divergent views of what had been discussed and agreed. It would therefore be advised that a memorandum, regarding

what was agreed in the discussion, be sent round all the members of small groups. This ensures that there is a general consensus among everyone involved in the discussion regarding what was agreed. This precaution would not be necessary in the ten person groups on account of the participants all being influenced by the group's dominant speaker.

Finally, the results of this thesis have practical consequences for 'real-life' decision making. If it is important to take into account the range of opinions among the group members (as would be the case in creative discussion groups), then small groups should perform better, as only in small groups are participants able to influence one another. On the other hand, if the goal is to disseminate a particular opinion through a dominant group member (e.g. the leader), then large groups should be more effective.

7.2 Future Directions

Four areas of future research are discussed.

First, although motivated by field research, the work presented is limited by its use of zero-history, laboratory discussion groups. While this maintains internal validity, it lacks the external validity attributed to research carried out on real-life groups. It has been argued that the ability to generalise from laboratory groups to real-life bona fide groups is limited, primarily because students, unlike their real-world counterparts, have little investment in these groups and the tasks they are asked to solve (Frey, 1994).

Therefore, as a check on the generality of the findings documented in this thesis, it is desirable that they are replicated using real-world discussion groups. However, the experimental design required for such a study remains enigmatic.

A second line of research would involve the investigation of where communication in the group moves from being collaborative to being autonomous. This would involve the assessment of the communication taking place in groups whose size ranges from five to ten members. Research suggests that as a consequence of communication constraints no more than seven persons can be directly responsive to one another in a discussion (Dunbar et al., 1995; Hare, 1962; James, 1951). This may indicate the critical size that communication becomes autonomous.

In this thesis influence was measured in terms of participants' co-ordinated understanding of the material discussed. A second measure of influence relates to how participants' vocal patterns are influenced by the persons they engage in conversation with. Measures of 'vocal congruence' (Dabbs & Ruback, 1987) such as pitch and intonation, provide a second, less explicit measure of co-ordination in communication. Indeed, this measure would allow a preliminary test of the collaborative and autonomous models in 'real-life' discussion groups.

Finally, an interesting line of inquiry would involve the comparison of the face-to face discussion groups documented in this thesis with those performing the same task using a video-mediated technology. Since the review provided by Williams (1977), video mediated-groups have consistently been found to bear a greater resemblance to audio-only groups than face-to-face groups. Perhaps, a more informative line of enquiry would be to determine whether the communication taking place in the video-mediated groups is more similar to a monologue (i.e. a ten person group) than a dialogue (i.e. a five person group). If, for example, communication in a five person video-mediated group were more similar to a monologue, then this would have implications as to what could be achieved in such a group. As discussed above, such a finding would suggest that video-mediated groups are better suited to tasks where the goal of the group is to disseminate a particular opinion through a dominant group member (e.g. the leader).

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Appendices

Appendix 1. PLAGIARISM SCENARIO.

SCENARIO

In 1978 Martin Cook was a journalism student in his final year at Glasgow University. Throughout his years at the university Martin showed an excellent academic record. Indeed, Martin's previous coursework and examination grades left him in the position of being a borderline first/upper second class degree student as he entered his final year.

Taking an active role in the debating society and being a frequent contributor to the university newspaper Martin was held in high esteem by the majority of academics in the English department.

The high quality of Martin's final year creative writing thesis (worth 20% of his final degree classification) would have ensured him a first class honours degree if it were not for the scrupulous second marking given by his external examiner. The external examiner, an expert in American literature, discovered that Martin had plagiarised the work of a little-known American writer.

As a member of the university senate it is your job to discuss the issues you believe to be most important to this case and recommend that these issues be considered by the select committee responsible for the final decision concerning the most appropriate disciplinary action to be taken (verbal warning, suspension, expulsion etc.).

Appendix 2. TRANSCRIPT OF 05 PERSON DISCUSSION.

Who	Words	Sequence	Coding
1	What do you think was the most important then	1	turn
2	I've put down the em other students like eh	2	turn
3	I put down the extent of /4 the plagiarism	3	s_interruption
4	Yeah that's what I put down as well, /1 like whether it was like the whole essay or whatever it was or if it /3 was just like	4	turn
1	Yeah		bc
3	Or a sentence or something		sresponse
5	A quote or something /4 then that's	5	s_interruption
4	Yeah it was just like a sentence or paragraph, although it must have been more than a sentence for the guy to notice /3 so it must have been /3 a paragraph at least	4	s_interruption
3	Yeah		bc
3	Like one paragraph		collaborative
5	But if it's a thesis then you're talking so many different pages, like so many pages /4 in one thesis I mean /1 it depends how much, I thought also the em, his coursework before, obviously if he's /4 done really well in exams and he's /3	5	turn
4	Yeah		bc
1	Yeah		bc
4	Yeah		bc
3	No but he might have plagiarised in that as well /4	3	s_interruption
4	Yeah that's what I was thinking /3 as well	4	s_interruption
3	His exams /5 are a bit more important but no, not just the coursework	3	turn
5	His exams		bc
5	Right yeah, definitely the exams, if he's sitting at a /3 /4 two-one, first then /1	5	turn
3	Yeah		bc
4	Cause he can't help		u_interruption
1	He must be doing pretty well	1	turn
3	Yeah		sresponse
4	/5 Yeah		sresponse
5	Yeah and you can't plagiarise in exams as well	5	sresponse
4	Yeah cause I thought like his previous work, but then it was like he could have just done the same thing /3 and it could have gone undetected so, you know he might have plagiarised in everything he's done	4	turn
3	Yeah		bc
3	Mm hm, apart from exams you can't /5 really /4 plagiarise in exams	3	turn
5	What about the		u_interruption
4	Yeah so that's what I put, exams, I put the extent first and then I put exams second /5 cause then	4	turn

5	What about the fact that other students probably plagiarise and don't get caught though	5	turn
3	/4 Yeah it is quite important		sresponse
4	Yeah that is quite, quite high up as well because I mean /3	4	sresponse
3	He's just been unlucky /4 to * * he was unlucky that	3	s_interruption
4	It was he just /5 got unlucky there /1 to get caught	4	s_interruption
5	Yeah		bc
1	Yeah		bc
1	And plus the fact that the, what the university has to do to him, right I think that was like sort of within the that, that plagiarising and everyone else does it that kind of came in that category /2 you know	1	s_interruption
2	I think it's got to be, I put down it was quite important em the university's policy on, on it because everybody's got to be treated the same, like just because the tutors like him or whatever	2	turn
5	I didn't think his reasons for cheating was very important, I put quite like being unimportant /3	5	turn
3	No I didn't think that was much either	3	turn
5	It doesn't really matter why he cheated /1 or how he admitted to it /1	5	turn
1	An plus his		u_interruption
1	His reactions as well that, that, that	1	s_interruption
5	Yeah		sresponse
3	Yeah	3	sresponse
5	So it's basically his academic record beforehand /4	5	turn
4	Yeah I suppose /5 so	4	turn
5	What about his tutors though, the people who had known him before like	5	turn
3	It doesn't matter what kind of guy he is, what he's done	3	turn
5	I know but your tutors also know how /2	5	turn
2	How intelligent you /5 /1 /4 are	2	s_interruption
5	Yeah		sresponse
1	Yeah		sresponse
4	Yeah, they'll /5 know exactly	4	s_interruption
5	What you standard of work is like so maybe they could even /4 say well	5	s_interruption
4	Yeah		bc
4	Like they can't put they're like middle eh	4	turn
1	It might have been a well I wouldn't know but I can't hardly see it being a mistake if it was a mistake then at least his tutors can say look he's usually producing a high quality of work	1	turn
3	Yeah but he might have plagiarised all that as well so /1 /2 I don't think it matters what kind of guy he is /4 at all	3	turn
1	Yeah		bc

2	* * * laugh		bc
4	It was also like his final degree, it was like the very, really important thing, it wasn't like an exam it's more than anything it was /1 like his final degree /5 which is like yeah	4	turn
1	Yeah		bc
5	It's worth twenty per cent of his final degree classification	5	s_interruption
1	So if he gets that it's quite a lot	1	turn
5	Yeah but I mean you'd imagine that all the rest go on exams cause you usually only have one thesis at the end and if all the rest were exams which you can't plagiarise in, and he's /4 /1 getting really good marks then	5	turn
4	Yeah		bc
1	Mmm		bc
1	More so yeah	1	turn
5	I don't know	5	turn
2	I suppose it could've been exceptional circumstances no that's not really but /4 em I suppose like someone, someone might have died or something I know /4 it doesn't say that /4, it doesn't say that, that there was any really good reasons for him it doesn't say what reasons at all /4, but I /5 still thinks its	2	turn
4	Yeah		bc
4	No it doesn't no		u_interruption
4	Yeah		bc
4	Because he could, yeah		u_interruption
5	I think it comes		u_interruption
5	It comes back to how much he plagiarised as well, it could have been an accident you know /1, it sometimes hard when you're writing a thesis /4 and you,	5	turn
1	Yeah		bc
4	Or you get I you just you /3 start doing it		u_interruption
3	You start reading so many books	3	s_interruption
5	You read, /2		u_interruption
2	Copy out of Bernstein	2	turn
5	Yeah you read, you read, you read someone else's work and suddenly you think oh yeah I agree with that and you just write it /4, you know	5	turn
4	Yeah		bc
4	And you can't /1 really put it in your own /5 words, it doesn't sound the same	4	turn
1	Possibly		u_interruption
5	Words		collaborative
1	It's the fact it's the examiner that's happened by chance to be like an expert in this /4 /5 field	1	turn
4	Yeah		bc
5	This field yeah that no one would ever know and lucky	5	turn

1	Yeah	1	turn
4	The thing is, I don't really think circumstances, like why he done it were like that important but I mean, like considering like, he'd done so well I mean it's like it's quite known that if he did so well, you're like under so much pressure as well, you could have been thinking like right I've got to do this really good /1 /5 so maybe that's why he did it, like he was worried /1, you know he felt he's let everyone down or something like that maybe /1 I know it happened to a girl not so long ago you know she went a bit to the extreme em, you know maybe she just like, she was kind of felt she had to do the best and not let people down and /5 under so much pressure and whatever	4	turn
1	Mmm		bc
5	Yeah		bc
1	Plus the fact that he's		u_interruption
1	He was		u_interruption
5	Yeah but		u_interruption
1	He was borderline as well so		sresponse
5	Think of all the other students /4 in the class who actually they're under the same amount of pressure and they don't plagiarise /1 /4 I mean it's a, we should probably be getting consideration but it's not really a reason to cheat /4 I mean everybody goes through a final dissertation	5	sresponse
4	Yeah		bc
1	Yeah		bc
4	Mmm		bc
4	Mmm		bc
4	Mmm can't give him though		sresponse
1	Should be harder to go and treat all the other students as well, if they let this go how are they gonna feel /5 if they haven't plagiarised and did it all themselves	1	sresponse
5	Yeah		bc
5	I mean you'd be raging if you'd done it	5	turn
1	Yeah		sresponse
2	/5 Yeah	2	sresponse
5	And someone else plagiarises someone's thesis and he still gets a first	5	turn
2	But I think what we're really saying is that we can understand why someone would do it, but we don't agree with it cause it's not /4 really an option	2	turn
4	Yeah I can see why he would but I just you know it's obviously	4	s_interruption
2	It's not right he shouldn't do it	2	turn
5	But then it depends on what level of punishment you're supposed to give /4, I mean I don't think it would be fair to expel him without a degree	5	turn
4	Yeah		bc

4	Yeah because I mean /1 then there's other /2 you can't go through everyone and sit down and think, and figure out whether they plagiarised as well, obviously I mean, you know obviously people have probably done it as well but you can't really pick out the people who have so you couldn't really go to the stream, big stream and then they'll get away with it but then you can't let him off because, you know, other people that did it their own work they're you know, you might know you can't give them the same kinda credit that you'd be giving them so it's obviously something would have to happen to him, but I think expelling him would be a bit	4	turn
1	I know		bc
2	He can't do it again		bc
5	Are we supposed to discuss, to discuss	5	turn
2	Well I think he should, get him, well we think just send him away, it's not good, so maybe do something like tell him to do it again	2	turn
3	No but he /1		u_interruption
1	It's his final thing though so he can't really /3 do it again	1	turn
3	Maybe just take a percentage off /2		sresponse
2	Is this after it's already /4 been done	2	sresponse
4	Yeah		bc
3	Like say okay /5 this is your /1 percentage off, you have to do really well in the final exam /1	3	turn
5	Yeah		bc
1	Yeah		bc
1	What can you do that yeah	1	s_interruption
3	Yeah we're the select committee, we can do anything grouplaughter it's like take a huge whack off and go okay do really well in the exam and that's you pass /4 on you go	3	turn
4	Yeah cause you couldn't really give him like	4	s_interruption
3	But if he didn't do well /4, just pass him but pass him badly know what I mean, like don't give him /4 a first or whatever, just give him a /1, you passed go away /5 that's it	3	turn
4	Yeah		bc
4	Yeah		bc
1	Hmm		bc
5	Whereas there's a big difference between like just a pass rate which is like a third class and a first /1 I mean I don't /3 think it would be fair to give someone a third class because he plagiarised a little bit of his thesis	5	turn
1	Yeah		bc
3	Mmm		bc
3	We don't know how much it is /5 it could be a big bit, if it was a big chunk, you know most of it	3	turn
5	Yeah		bc

5	Well you'd have to re-write it I would say so he can get a /3 because then /4, you're still not, I mean the whole thing is /1 you still don't know how good he is if he's plagiarising	5	turn
3	Mm		bc
4	Mmm you can't really tell yeah		bc
1	You have to		u_interruption
1	Eh you, you'd have to find out /2 then I suppose why he did it or if he actually knew he was doing it, I suppose he must have known, but if it was only a small amount /5 maybe /4 he's got it from a different source rather from the, like the original little known American writer /4 get it from somewhere else	1	turn
2	Just have to believe him		bc
5	Yeah		bc
4	Mm-hmm		bc
4	Yeah		bc
5	So do you think em it /4 basically comes down to how much he plagiarised I mean	5	turn
4	I think		u_interruption
4	Yeah		sresponse
2	Yeah		sresponse
3	The extent	3	sresponse
4	I mean he must have, I mean he must have known he was doing it, like he wouldn't, like he chose a little known American writer, he probably thought oh yeah /1, I'm gonna get away with this /3 you know rather than like doing someone well known or whatever, so he obviously knew he was doing it, he obviously thought right I'm gonna get away with this, so I mean, but I think it does mostly depend on how much he did like plagiarise	4	turn
1	Yeah		bc
3	Mmm		bc
2	I think the way they're talking, they're talking about a lot of, a lot of it was you know, they're saying like yeah, what is it exactly they're saying /4 discovered that Martin had plagiarised into the bargain	2	turn
4	I mean it must have been a huge chunk if the guy, if the guy plagiarised it /3	4	s_interruption
3	I suppose if the guy noticed it yeah	3	s_interruption
4	Of a little known American writer /2, it has to be a fair amount he copied	4	turn
2	Yeah I mean		u_interruption
3	Mmm		sresponse
2	It must have been basically what he'd done in /3	2	sresponse
3	Yeah but if the /5 rest of it's his own it's just that bit /5 it's his	3	s_interruption
5	He says it's scrupulous		u_interruption
5	Just, he says it's the scrupulous second marking, I	5	s_interruption

	mean, I would imagine it would it was easy to look over /4 and mark this guy because he knew who's American /4 literature expert /1 plus, it sounds as though it wasn't that much but we don't know /2 but		
4	Mmm		bc
4	It was		u_interruption
1	Mmm		bc
2	Yeah		bc
2	No way to really sort of guess	2	turn
1	But he might have done it because of the fact, as I say he was on a borderline and it says here that it would have ensured him a first class	1	turn
5	Mmm		sresponse
4	Yeah so	4	sresponse
1	So	1	turn
4	Yeah	4	turn
5	It doesn't really matter what it's about his em extra-curricular activities /4 all it matters about	5	turn
4	Yeah and that's no basis at all whatsoever	4	s_interruption
5	Yeah cause whether he's great at debating or whatever it doesn't matter	5	turn
4	Yeah	4	turn
3	So basically extent we're saying yeah	3	turn
5	The extent of the plagiarism	5	turn
1	Yeah	1	turn
3	And the universities /5	3	turn
5	Policies	5	s_interruption
3	Policies and it's the /1 responsibility of people who don't plagiarise	3	turn
1	It's just that he can't		u_interruption
1	But /4		u_interruption
4	It's a really hard thing to decide on /5 actually		sresponse
5	But then again the responsibility to him as well I mean this is a guy who's went through four years /4 and he could have made all little albeit unknown mistake /1 at the end /3 of his thesis I mean if it's such a big amount of work he could have just written it by accident, so you have a responsibility to him as well to give him a good /4 degree if he deserves it	5	sresponse
4	Yeah		bc
1	Yeah		bc
3	Mm-hm yeah		bc
4	Mm-hm yeah		bc
2	So we're talking, we're talking about either just taking most of the marks away from the, the thesis then well then or not the thesis /3 whatever it was	2	turn
3	And you said make him write it again	3	s_interruption
5	Yeah I don't know, have we decide what we should do with him	5	turn
4	I think that probably would be quite a good idea	4	turn

	to write it again		
1	Yeah		sresponse
5	But then it's /4 it is such a massive piece of work	5	sresponse
4	I don't know by then it would be his /3 I know		u_interruption
3	The thing is that will take away from his final grade, his final exam won't it, he won't have enough time to, if he's going to another complete /4 huge, huge /5 essay then	3	s_interruption
4	Yeah then he'll have like		u_interruption
5	It depends how much, it comes back to how much he plagiarised. I mean if it's just, if it's a paragraph say then re-write /3 the paragraph you know, if it's half the thesis then /3 you're talking more marks off or re-write it	5	s_interruption
3	Who cares you know		collaborative
3	Yeah that's		bc
3	/1 Yeah		sresponse
1	Yeah that's right, it's the extent of it I suppose yeah	1	sresponse
4	Yeah, I mean he wouldn't have to write the whole thing again, it's just you know the stuff that he had plagiarised you know em, /1 you can't have that	4	turn
1	If he's plagiarised too much then there should be like marks knocked off rather than asking him to re-write and /5 if it isn't a lot, it's a matter to re-writing that small amount	1	s_interruption
5	Yeah		bc
5	Yeah		sresponse
4	Yeah		sresponse
2	Either than or just give him half marks for it if it's like half the marks that he actually got /1 if it was just um, uh or /3 if was just all copied out just take the full twenty per cent	2	sresponse
1	Yeah		bc
3	Aye		bc
3	Mm-hm		sresponse
5	Yeah		sresponse
4	Yeah I think that as well	4	sresponse
5	Yep, do you want to knock	5	turn

Appendix 3. TRANSCRIPT OF 10 PERSON DISCUSSION.

Who	Words	Sequence	Coding
1	Shall we start with who, what everybody put as the most the important thing on their list for starters, okay so I put the extent of /3 /4 plagiarism	1	turn
3	I put that as well		sresponse
4	I put that as well		sresponse
2	And I put, I think it's the most important thing is like to make sure it's fair for everyone else who is /U doing it	2	sresponse
U	Yeah		bc
3	Uh huh that gives you a fair		sresponse
5	Their responsibility to the normal students, that's the one I put as most important /6 cause	5	sresponse
6	Yeah I put the university policy	6	s_interruption
8	Yeah I put that as well		sresponse
2	I think policy /5 And the extent as well is just like a tie of it and it's not as bad as	2	sresponse
5	Yeah uh huh		bc
7	I thought it was the responsibility to other students /U /1 that was most important	7	turn
U	Yeah		bc
1	Yeah		bc
2	Yeah to make it fair for them		sresponse
1	But that's also you've got to remember that the thing about the, a lot of people do do it and get away with it which kind of balances that maybe	1	sresponse
5	Yeah I put that quite high up /2 cause a lot of people		sresponse
2	But then again there might be some people who haven't done it at all	2	sresponse
7	But they're only assuming that people do get away with it cause they don't know that cause obviously they're not getting caught	7	s_interruption
5	But you have to remember /1 Like a lot of people		u_interruption
1	It's a pretty fair assumption though		sresponse
5	Yeah but a lot of people might have to some extent cause it said in there it was only because of the second examiner /3 Looked at it carefully	5	sresponse
3	Uh huh		bc
3	A lot of people could get away with it		sresponse
2	I think if they've all been marked like the same though then it's, like whether that, that would marked stricter than the rest of them /U cause you know they've got them all about the same	2	sresponse
U	Yeah		bc
7	I think , I think sort of saying that well people did get away with it is irrelevant because everybody	7	turn

	that submits a piece of work knows that if they are caught plagiarising then they face a penalty /3 /2 And I don't think you can take it into consideration whether or not other people are doing it because everyone's in the same boat when they submit the work in the first place, if they choose to plagiarise		
3	Uh huh		bc
2	Yeah		bc
2	Suppose if you do do it then it's your own sort of like fault /5 if you get caught then you've got to face the consequences don't you	2	turn
5	Seems pretty harsh		u_interruption
5	Seems really harsh though /6 when a lot of people get away with it		sresponse
6	If people aren't, if people aren't punished for doing it then they're gonna think well it's all right for us to do it	6	sresponse
2	Sorry	2	turn
6	If nothing happens to somebody who does it	6	turn
2	No, no, no I'm not saying nothing should happen I mean I'm just saying /6 Can't remember what I was saying	2	turn
6	Yeah		bc
3	Something like that		sresponse
5	What you talking about		sresponse
7	You can't, you can't, canny moderate any law by saying, by taking into term, consideration how many folk get away with it, whether or not it's a, it's a university senate law or a, a national law I mean you can't say ah well we won't give you a harsh penalty because we probably think a lot of folk actually diddle their tax returns so we won't actually like /1 Eh, prosecute you for this	7	sresponse
1	Yeah		bc
5	You didn't need to take a strong action but just maybe give it some consideration	5	s_interruption
2	But you have to like, you do have to follow the policy because if, otherwise there's no point even having a policy is there /3 Because if there's a rule that says if you get caught /3 you get thrown out or whatever well you have to say well so you've been caught /3 you're thrown out	2	turn
3	Uh huh, yeah		bc
3	Such and such		collaborative
3	Uh huh		bc
3	Otherwise there's no point in having one	3	turn
2	Does anyone like think extra-curricular things or anything, or anything like that	2	s_interruption
U	No		sresponse
3	Shouldn't matter what he's /6 doing it's what /2	3	sresponse
6	What about the fact that he's /2		u_interruption

2	It's like your degree isn't it it's like what you're work is, /3 it's not whether you play football	2	turn
3	Uh huh		bc
6	What about how he's like first year first /3 degree or whatever	6	turn
3	I don't think that should be really taken /1 into consideration	3	s_interruption
1	No		bc
8	What about exams, his exam results /U /2 do they	8	turn
U	I don't think exam results		u_interruption
2	Yeah make exam results		u_interruption
2	I think it's whether like in a way it's whether his work is the standard of like the first class degree and if it is /3 then /1 he should /3 get it	2	turn
3	Uh huh		bc
1	Yeah		bc
3	If his previous work but that, that should be checked to see if there's any influence of if he's done it before	3	s_interruption
2	Alright, kind of like re-do it or something	2	s_interruption
7	See that's the thing cause I mean that fact that he's been caught throws doubt on every other piece of work he's submitted	7	turn
U	Yeah		sresponse
5	So you can take away his exam results		sresponse
2	Apart from his exam work		sresponse
6	But not in his exam work, aye	6	sresponse
2	Exam results cause like	2	turn
6	What about em what his tutors and people think	6	turn
9	I don't know they night have a false opinion of somebody /4 They don't know	9	turn
4	Yeah		bc
7	I thought they were fairly irrelevant, the same as like extra-curricular activities, it's whenever a lawyer starts mentioning stuff like that you always know the lawyer thinks the guys guilty as well	7	turn
6	Yeah		sresponse
2	Cause it really it is, it's not his personality that depends on what you get in your degree is it, it's your work and that's it	2	sresponse
3	Right what sort of action	3	turn
5	Could even take into consideration of all the people that know him that it could have been something that was out of character or whether it could be, like it could've been	5	turn
6	You know the reasons for the tutoring /5 As well	6	s_interruption
5	Yeah, uh huh		bc
7	I think the, the reasons for, for it em and his reaction and stuff like that should have a bearing on his overall punishment, I think would be relevant to that	7	turn

6	Do you think his reaction's important, like whether he owned up or not	6	turn
2	Yeah but he could just like pretend anyway couldn't he like /8 He could just like act really sorry and not care and do it again anyway	2	turn
8	Yeah		bc
7	I don't think it matters if he owns up or not cause he's been caught bang in rights, I mean even if he doesn't own up it's pretty obvious /5 if he's got four chapters of a novel in his thesis and he's got a couple of punctuation errors slightly different	7	turn
5	I know, uh huh		bc
2	Sounds like my essay	2	turn
7	Oh, you get away with it in first year	7	turn
3	Just as well	3	turn
2	What about the, do you think it's important about the like journalism, d'you think that it's	2	turn
9	No, not at all		sresponse
3	I think he needs to be shown that he canny do that if he's going into journalism but I don't think it's important in his punishment	3	sresponse
5	His tutor's, his tutors as well /3 /2 you need to know about that	5	turn
3	Uh huh		bc
2	Yeah		bc
7	I think that the, the, the actual occupation, if it was a sort of occupational degree you're going for then that might have some relevance to it but I think sort of just, I mean was he doing a journalism degree or was it just a sort of degree in English lit, I don't know, is there a journalism degree, but I mean if you're doing a vocational course like sort of like something that's actually got a vocational bar exam on the go or something like that, it's actually part of the, then I think then the profession might have something to say about your overall punishment, know what I mean, but with a general degree it's irrelevant	7	turn
U	Yeah		sresponse
U	Mm hm		sresponse
U	Yeah		sresponse
3	Stuck now	3	sresponse
7	Is that them all	7	turn
3	Eh I /1 think so		sresponse
1	Yeah I think so	1	sresponse
6	So what about his punishment then	6	turn
3	What are the options	3	turn
7	Death by hanging, start at the top and work our way down	7	turn
8	Is like a verbal warning or an expulsion or something	8	turn
2	Are we supposed to decide what the punishment	2	turn

	is		
3	Uh huh		sresponse
8	Yeah, I think so /2 Suppose what's available suspension	8	sresponse
2	It depends really what's in the policy like /3 /1 If it says like /U whatever's /3, Whatever the university policy is they should just follow it really cause there's no point like making /7 /9 Exceptions or anything is there, it's like	2	s_interruption
3	I know		bc
1	Yeah		bc
U	Yeah		bc
3	It depends on a lot of		u_interruption
7	Yeah		bc
9	Exceptions		collaborative
7	The policies probably might, might be that, that this group decides on the recommendations that are the group of choices /8 Cause I mean if there was a set down, well this is the way it's gonna go, if you're caught doing this then this happens then there wouldn't be any point having a, a group /2 /1 Sitting together to discuss what the appropriate punishments would be	7	turn
8	Mm hm		bc
2	Yeah		bc
1	Yeah		bc
5	Well I suppose we just have to decide what, there must be a policy and to what extent did he like, the severity of it maybe depends on the issues and what issues are important that we decide	5	turn
7	Aye, policy probably has an influence on things like that I mean	7	s_interruption
3	Have to take part in psychology experiments for the rest of your life	3	turn
2	Without getting paid	2	turn
7	You have to sit in front of a terminal that continually flashes words at you, yes, no, yes, no	7	turn
2	You must have electric shocks	2	turn
7	Well I think his punishment should be that, and this also takes into consideration a couple of the factors, like his previous work and stuff like that, his, his punishment should be that em that piece of work is completely disallowed and his, his eh end degree is going to result from the rest of his work and that's not gonna be allowed to be submitted	7	turn
2	But that /3 Other, his other piece of work might have like loads of stuff in it as well but they've just not picked up on it cause they're not /U like familiar with the person who wrote it	2	turn
3	It should be		u_interruption
U	Yeah		bc
8	That's the same for everyone else though	8	turn

2	Yeah that's true, yeah	2	s_interruption
6	So do you think there should be like a review of what he's done before	6	turn
2	So what they just say can I have this from everything else	2	turn
3	/7 Uh huh		sresponse
7	Mm hm, I mean what it said from that, from that passage it suggests that was the, the rest of it was exam based because it wasn't anything about any other pieces of submitted work he'd done at home or whatever	7	sresponse
6	So do you think he should be allowed to re-do it, his thesis	6	turn
7	No		sresponse
U	/3 No		sresponse
3	No, I don't think so		sresponse
5	Cause that wouldn't be a punishment	5	sresponse
2	Em, yeah, you don't know that he's not like gonna just do it again do you	2	turn
1	Yeah		sresponse
3	Uh huh /8 He probably, probably wouldn't do it again if he'd got caught but it's not really fair that he gets to do it again	3	s_interruption
8	I suppose his reasons Make him		u_interruption
2	Yeah		sresponse
7	No it's really got to be quite harsh for the sake of other students /3 /2 his punishment	7	sresponse
3	Uh huh		bc
2	Yeah		bc
3	What about a verbal warning then is that too late do you think	3	turn
4	Yeah		sresponse
2	Sorry	2	sresponse
3	/4 A verbal warning is that too late d'you think, about his action, don't know, what was the next one, can't remember	3	turn
6	A suspension /8 /3 which		sresponse
8	Yeah suspension		sresponse
3	Suspension	3	sresponse
6	I don't know	6	turn
7	What do you mean suspension, what d'you mean what, chucked out	7	turn
9	No		sresponse
8	I don't know		sresponse
9	I think it just means out for a /U few days		sresponse
U	Few days		collaborative
2	It's the end of his degree though anyway isn't it /7 /6 cause it basically he gets his degree or not is it or	2	sresponse
7	Yeah I mean		bc
6	Yeah, it's not		bc
9	Yeah		sresponse

3	Aye		sresponse
6	So does it come down to him having just like a lesser degree than	6	sresponse
2	I don't know cause like sometimes you can actually get your degree taken off you can't you, somebody was telling us in management studies that some big like even after they'd like graduated they found out afterwards that some of the work had like plagiarism in it and they actually took the degree off them, but that might have been a really severe case like everybody's left like been from tomorrow	2	s_interruption
7	Yeah if they find out someone else has like sat one of your exams and stuff like that as well they're quite severe about that	7	turn
3	Sit him down and give him a test, right there	3	turn
7	How about he's not allowed an honors degree he just gets an ordinary degree	7	turn
6	But that's depends on /2 All the others		sresponse
2	But if all the rest of the work that he's done his self is like really high standard and	2	sresponse
6	You can never, you can't really make a decision unless you know actually /3 what the circumstances are	6	turn
3	What all the facts are		collaborative
7	/2 Yeah		sresponse
2	Yeah I don't know, I just think if he's like if he, if he has got the ability top get like an honors, like a first class honors degree without the plagiarism maybe he should still be allowed to have one but then again /5 Then he's not getting punished	2	sresponse
5	But that means he's not really being punished	5	s_interruption
2	Yeah, and I suppose he wouldn't been to to have done it then it's a bit stupid	2	turn
7	I'd have to take extenuating circumstances into account to a certain extent because I mean I think if somebody makes one mistake then perhaps you find out that his entire family were killed and he was so upset that he didn't have a chance to do his, his eh thesis or whatever, em if there's some sort of reasonable justification then maybe you should allow the mistake, it may be a bit harsh to totally destroy the guy's life for making one mistake	7	turn
U	Mm hm		sresponse
U	Yeah		sresponse
U	Yeah		sresponse
6	Uh huh, but that also kind of depends on the extent of the, the /U plagiarism	6	sresponse
U	Plagiarism		collaborative
3	Uh huh		sresponse
7	Mm hm I mean I /3 think you would have to investigate any other submitted work that he did	7	sresponse

	as well /U, that would need to be all re-marked		
3	If it was just one line		u_interruption
U	Uh huh		bc
3	If it was just like one line out of a book or something you know it's gonna be a bit harsh to take his entire /2 degree off him if it's that	3	turn
2	Yeah but why should they re-mark all his, sorry, why should they re-mark all his other work because that's like other people could have got away with it in the past and like if you start sort of /6 sivving through all his other stuff	2	s_interruption
6	Yeah, but if he's, he's sort of already proved to be, to be a cheat then /5 You should maybe look at what he's done /1 before to see if he's done it before /5 or is it just a one off	6	s_interruption
5	Yeah you should check his other work		collaborative
1	Yeah		bc
5	Cause if he's plagiarised all his work up till then as well then /3 You can have a harsher view, he's just a rascal	5	s_interruption
3	Chuck him out of Uni or whatever		bc
7	Yeah cause particularly, I mean particularly sort of like in, in earlier years when you're marking, people are marking like hundreds upon hundreds of psychology essays I mean they're probably to a certain extent marking them on trust because they're only given a probably the most cursory of reads because they've got like five-hundred of them sitting there	7	turn
3	Probably got Bernstein in all of them	3	turn
8	So, it's sort of depending on like his reasons and /1 /6 The policy /1	8	turn
1	The extent		collaborative
6	The extent		collaborative
1	Yeah and the policy	1	s_interruption
3	And that's final enough	3	turn
2	Is that it then	2	turn
8	I don't really know		sresponse
6	Do we have a decision	6	sresponse
7	Do we not actually have to decide on what his punishment should be, or just choose which issues are most important	7	turn
5	We just have to decide which issues you have to consider the most	5	turn
1	Yeah		sresponse
2	So it's just the /5 policy, reasons for doing it and the extent /5 of it, anything else	2	sresponse
5	The policy		collaborative
5	Extent yeah		bc
3	No that's all we've to do isn't it	3	turn

Appendix 4. PLAGIARISM ISSUES.

RANKING (1 - 13 WHERE 1 IS MOST IMPORTANT)	ISSUE
	University responsibility to the individual student (Martin).
	Consideration of Martin's extra-curricular activities.
	Martin's reasons for cheating.
	University responsibility to other non-plagiarising students.
	Quality of Martin's previous work.
	University policy on plagiarism.
	Extent of plagiarism.
	Reaction to being caught (e.g. own up or deny it).
	The fact Martin was a borderline first/upper second class degree student.
	Plagiarism as being a more serious offence in journalism and therefore should be more heavily punished.
	Consideration of the possibility that many people plagiarise to some degree and do not get caught.
	Feelings of academics and tutors familiar with Martin as to the appropriate punishment.
	Consideration of examination results (assumes student cannot plagiarise in exams).

Appendix 5. EXPERIMENT 1. TEST OF COLLABORATIVE MODEL HYPOTHESIS. TASK 1 (DATA ADJUSTMENT 1) ANOVA BY GROUP.

[see Pages 103 - 104]

Source	df	MS	F	p < .05
Dyadic Interaction	1		2.53	ns.
Group Size	1		0.88	ns.
Dyadic Interaction X Group Size	1		0.00	ns.
ERROR	18	0.03		

Appendix 6a. EXPERIMENT 1 - TEST OF COLLABORATIVE MODEL HYPOTHESIS. TASK 2 (DATA ADJUSTMENT 1) ANOVA AND ANCOVA BY GROUP.

[see Pages 104 - 106]

Source	df	MS	F	p < .05
Dyadic Interaction	1		4.80	sig.
			(2.67)	ns.
Group Size	1		0.01	ns.
			(0.01)	ns.
Dyadic Interaction X Group Size	1		4.15	.06
			(4.24)	.06
ERROR	18	0.01		
	(17)	(0.01)		

Note. ANCOVA output provided in brackets.

Appendix 6b. EXPERIMENT 1 - TEST OF COLLABORATIVE MODEL HYPOTHESIS. TASK 2 (DATA ADJUSTMENT 1) TESTS OF SIMPLE EFFECTS BY GROUP.

[see Pages 104 - 106]

Source	df	F	p < .05
Within Treatments			
High vs. Low (05)	1, 8	16.27	sig.
High vs. Low (10)	1, 8	0.01	ns.
Between Treatments			
High Interaction	1, 17	0.22	ns.
Low Interaction	1, 17	0.71	ns.

Appendix 7. EXPERIMENT 1 - TEST OF COLLABORATIVE MODEL HYPOTHESIS. TASK 3 (DATA ADJUSTMENT 1) ANOVA AND ANCOVA BY GROUP.

[see Pages 107 - 108]

Source	df	MS	F	p < .05
Dyadic Interaction	1		0.31	ns.
			(0.06)	ns.
Group Size	1		0.02	ns.
			(0.42)	ns.
Dyadic Interaction X Group Size	1		0.38	ns.
			(0.52)	ns.
ERROR	18	0.02		
	(17)	(0.02)		

Note. ANCOVA output provided in brackets.

Appendix 8. EXPERIMENT 1 - TEST OF COLLABORATIVE MODEL HYPOTHESIS. TASK 1 (DATA ADJUSTMENT 2) ANOVA BY GROUP.

[see Pages 109 - 110]

Source	df	MS	F	p < .05
Dyadic Interaction	1		2.96	ns.
Group Size	1		1.15	ns.
Dyadic Interaction X Group Size	1		0.22	ns.
ERROR	18	0.02		

Appendix 9a. **EXPERIMENT 1 - TEST OF COLLABORATIVE MODEL HYPOTHESIS. TASK 2 (DATA ADJUSTMENT 2) ANOVA AND ANCOVA BY GROUP.**

[see Pages 110 - 112]

Source	df	MS	F	p < .05
Dyadic Interaction	1		11.51	sig.
			(7.01)	sig.
Group Size	1		0.00	ns.
			(0.00)	ns.
Dyadic Interaction X Group Size	1		0.73	ns.
			(0.47)	ns.
ERROR	18	0.01		
	(17)	(0.01)		

Note. ANCOVA output provided in brackets.

Appendix 9b. **Experiment 1 - TEST OF COLLABORATIVE MODEL HYPOTHESIS. TASK 2 (DATA ADJUSTMENT 2) TESTS OF SIMPLE EFFECTS BY GROUP.**

[see Pages 110 - 112]

Source	df	F	p <.05
Within Treatments			
High vs. Low (05)	1, 8	16.27	sig.
High vs. Low (10)	1, 8	0.05	ns.
Between Treatments			
High Interaction	1, 17	0.05	ns.
Low Interaction	1, 17	0.01	ns.

Appendix 10. EXPERIMENT 1 - TEST OF COLLABORATIVE MODEL HYPOTHESIS. TASK 3 (DATA ADJUSTMENT 2) ANOVA AND ANCOVA BY GROUP.

[see Pages 112 - 113]

Source	df	MS	F	p < .05
Dyadic Interaction	1		0.00	ns.
			(2.19)	ns.
Group Size	1		0.00	ns.
			(0.19)	ns.
Dyadic Interaction X Group Size	1		0.00	ns.
			(0.19)	ns.
ERROR	18	0.03		
	(17)	(0.01)		

Note. ANCOVA output provided in brackets.

Appendix 11. EXPERIMENT 1 - TEST OF AUTONOMOUS MODEL HYPOTHESIS. TASK 1 (DATA ADJUSTMENT 1) ANOVA BY GROUP.

[see Pages 117 - 118]

Source	df	MS	F	p < .05
Dominance	1		1.63	ns.
Group Size	1		0.00	ns.
Dominance X Group Size	1		0.44	ns.
ERROR	18	0.06		

Appendix 12a. EXPERIMENT 1 - TEST OF AUTONOMOUS MODEL HYPOTHESIS. TASK 2 (DATA ADJUSTMENT 1) ANOVA AND ANCOVA BY GROUP.

[see Pages 119 - 120]

Source	df	MS	F	p < .05
Dominance	1		2.64	ns.
			(1.34)	ns.
Group Size	1		0.19	ns.
			(0.18)	ns.
Dominance X Group Size	1		4.49	sig.
			(3.75)	.70
ERROR	18	0.03		
	(17)	(0.02)		

Note. ANCOVA output provided in brackets.

Appendix 12b. EXPERIMENT 1 - TEST OF AUTONOMOUS MODEL HYPOTHESIS. TASK 2 (DATA ADJUSTMENT 1) TESTS OF SIMPLE EFFECTS BY GROUP.

[see Pages 119 - 120]

Source	df	F	p<.05
Within Treatments			
Dominant vs. Non-Dominant (05)	1, 8	0.48	ns.
Dominant vs. Non-Dominant (10)	1, 8	1.34	ns.
Between Treatments			
Dominant	1, 17	0.15	ns.
Non-Dominant	1, 17	0.99	ns.

Appendix 13a. EXPERIMENT 1 - TEST OF AUTONOMOUS MODEL HYPOTHESIS. TASK 3 (DATA ADJUSTMENT 1) ANOVA AND ANCOVA BY GROUP.

[see Pages 121 - 123]

Source	df	MS	F	p < .05
Dominance	1		0.44	ns.
			(0.00)	ns.
Group Size	1		1.26	ns.
			(2.13)	ns.
Dominance X Group Size	1		6.83	sig.
			(6.35)	sig.
ERROR	18	0.06		
	(17)	(0.05)		

Note. ANCOVA output provided in brackets.

Appendix 13b. EXPERIMENT 1 - TEST OF AUTONOMOUS MODEL HYPOTHESIS. TASK 3 (DATA ADJUSTMENT 1) TESTS OF SIMPLE EFFECTS BY GROUP.

[see Pages 121 - 123]

Source	df	F	p < .05
Within Treatments			
Dominant vs. Non-Dominant (05)	1, 8	4.02	0.08
Dominant vs. Non-Dominant (10)	1, 8	1.96	ns.
Between Treatments			
Dominant	1, 17	0.48	ns.
Non-Dominant	1, 17	6.75	sig.

Appendix 14. EXPERIMENT 1 - TEST OF AUTONOMOUS MODEL HYPOTHESIS. TASK 1 (DATA ADJUSTMENT 2) ANOVA BY GROUP.

[see Page 124]

Source	df	MS	F	p < .05
Dominance	1		1.61	ns.
Group Size	1		0.12	ns.
Dominance X Group Size	1		0.52	ns.
ERROR	18	0.08		

Appendix 15a. EXPERIMENT 1 - TEST OF AUTONOMOUS MODEL HYPOTHESIS. TASK 2 (DATA ADJUSTMENT 2) ANOVA AND ANCOVA BY GROUP.

[see Pages 124 - 125]

Source	df	MS	F	p < .05
Dominance	1		2.93	ns.
			(1.63)	ns.
Group Size	1		0.14	ns.
			(0.13)	ns.
Dominance X Group Size	1		5.34	sig.
			(4.43)	0.05
ERROR	18	0.02		
	(17)	(0.02)		

Note. ANCOVA output provided in brackets.

Appendix 15b. EXPERIMENT 1 - TEST OF AUTONOMOUS MODEL HYPOTHESIS. TASK 2 (DATA ADJUSTMENT 2) TESTS OF SIMPLE EFFECTS BY GROUP.

[see Pages 124 - 125]

Source	df	F	p < .05
Within Treatments			
Dominant vs. Non-Dominant (05)	1, 8	0.54	ns.
Dominant vs. Non-Dominant (10)	1, 8	3.22	ns.
Between Treatments			
Dominant	1, 17	0.10	ns.
Non-Dominant	1, 17	0.91	ns.

Appendix 16a. EXPERIMENT 1 - TEST OF AUTONOMOUS MODEL HYPOTHESIS. TASK 3 (DATA ADJUSTMENT 2) ANOVA AND ANCOVA BY GROUP.

[see Pages 126 - 127]

Source	df	MS	F	p < .05
Dominance	1		0.62	ns.
			(0.02)	ns.
Group Size	1		0.78	ns.
			(1.45)	ns.
Dominance X Group Size	1		7.84	sig.
			(7.37)	sig.
ERROR	18	0.05		
	(17)	(0.04)		

Note. ANCOVA output provided in brackets.

Appendix 16b. EXPERIMENT 1 - TEST OF AUTONOMOUS MODEL HYPOTHESIS. TASK 3 (DATA ADJUSTMENT 2) TESTS OF SIMPLE EFFECTS.

[see Pages 126 - 127]

Source	df	F	p < .05
Within Treatments			
Dominant vs. Non-Dominant (05)	1, 8	4.08	.08
Dominant vs. Non-Dominant (10)	1, 8	3.18	ns.
Between Treatments			
Dominant	1, 17	0.40	ns.
Non-Dominant	1, 17	8.68	sig.

Appendix 17. EXPERIMENT 2 - GENUINE OVERHEARERS' UNDERSTANDING OF THE EXPERIMENTAL DISCUSSIONS. TASK 2 ANOVA AND ANCOVA BY GROUP.

[see Pages 165 - 166]

Source	df	MS	F	p < .05
Group Size	1		2.51	ns.
			(2.29)	ns.
ERROR	9	0.01		
	(8)	(0.01)		

Note. ANCOVA output provided in brackets.

Appendix 18a. **EXPERIMENT 2 - EFFECT OF SPEAKER DOMINANCE UPON THE GENUINE OVERHEARERS' UNDERSTANDING OF THE EXPERIMENTAL DISCUSSIONS. ANOVA AND ANCOVA BY GROUP.**

[see Pages 166 - 167]

Source	df	MS	F	p < .05
Dominance	1		2.61	ns.
			(1.42)	ns.
Group Size	1		1.21	ns.
			(0.09)	ns.
Dominance X Group Size	1		3.91	.08
			(4.15)	.08
ERROR	9	0.02		
	(8)	(0.02)		

Note. ANCOVA output provided in brackets.

Appendix 18b. **EXPERIMENT 2 - EFFECT OF SPEAKER DOMINANCE UPON THE GENUINE OVERHEARERS' UNDERSTANDING OF THE EXPERIMENTAL DISCUSSIONS. TESTS OF SIMPLE EFFECTS BY GROUP.**

[see Pages 166 - 167]

Source	df	F	p < .05
Within Treatments			
Dominant vs. Non-Dominant (05)	1, 8	0.86	ns.
Dominant vs. Non-Dominant (10)	1, 8	3.52	.09
Dominant	1, 8	3.62	.09
Non-Dominant	1, 8	0.56	ns.

Appendix 19a. **EXPERIMENT 2 - COMPARISON OF PARTICIPANTS' AND GENUINE OVERHEARERS' UNDERSTANDING OF THE FIVE PERSON EXPERIMENTAL DISCUSSIONS. ANOVA AND ANCOVA BY GROUP.**

[see Pages 168 - 169]

Source	df	MS	F	p < .05
Group Size	1		1.88	ns.
			(2.31)	ns.
ERROR	18	0.07		
	(17)	(0.07)		

Note. ANCOVA output provided in brackets.

Appendix 19b. **EXPERIMENT 2 - COMPARISON OF PARTICIPANTS' AND GENUINE OVERHEARERS' UNDERSTANDING OF THE TEN PERSON EXPERIMENTAL DISCUSSIONS. ANOVA AND ANCOVA BY GROUP.**

[see Pages 168 - 169]

Source	df	MS	F	p < .05
Group Size	1		0.95	ns.
			(0.92)	ns.
ERROR	18	0.07		
	(17)	(0.07)		

Note. ANCOVA output provided in brackets.

Appendix 20a. **EXPERIMENT 2 - EFFECT OF SPEAKER DOMINANCE UPON THE PARTICIPANTS' AND GENUINE OVERHEARERS' UNDERSTANDING OF FIVE PERSON EXPERIMENTAL DISCUSSIONS. ANOVA AND ANCOVA BY GROUP.**

[see Pages 169 - 170]

Source	df	MS	F	p < .05
Dominance	1		0.36	ns.
			(0.88)	ns.
Presence	1		3.17	.09
			(4.48)	sig.
Dominance X Presence	1		0.02	ns.
			(0.06)	ns.
ERROR	18	0.01		
	(17)	(0.01)		

Note. ANCOVA output provided in brackets.

Appendix 20b. **EXPERIMENT 2 - EFFECT OF SPEAKER DOMINANCE UPON THE PARTICIPANTS' AND GENUINE OVERHEARERS' UNDERSTANDING OF TEN PERSON EXPERIMENTAL DISCUSSIONS. ANOVA AND ANCOVA BY GROUP.**

[see Pages 170 - 172]

Source	df	MS	F	p < .05
Dominance	1		9.37	sig.
			(4.18)	0.06
Presence	1		0.29	ns.
			(1.12)	ns.
Dominance X Presence	1		0.03	ns.
			(0.14)	ns.
ERROR	18	0.04		
	(17)	(0.03)		

Note. ANCOVA output provided in brackets.