An investigation of the concept of cognitive similarity

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The study is primarily concerned with the need for effective teacher education. Problems investigated within this area are discussed and it is proposed that communication processes between lecturers and students are a central concern. Problems of effective communication are discussed within the context of research in social psychology which investigates such processes. Within this field research by Runkel (1956) is discussed in detail since his interesting results provide the basis for the investigation. Runkel suggests that cognitive similarity is a facilitating mechanism in communication and that students cognitively similar to a lecturer achieve greater success in courses than students who are cognitively dissimilar. Runkel measures cognitive similarity by means of an index of co-linearity. Runkel's research is discussed in relation to work by Triandis (1959.1960). Triandis explored other measures of cognitive similarity and suggests that cognitive similarity can be explained in terms of other intrapersonal variables. The possibility of viewing Bartlett's work (1958) as a exploratory measure is discussed. A critical appraisal of Runkel's research leads to the following main areas of investigation.

1. investigation of the index of co-linearity over a wide range of subject areas.

2. investigation of "transfer" groups i.e. those who throughout the course changed their position of cognitive similarity.

3. investigation of an exploratory measure of cognitive similarity.

The experimental design, statistical methods, sample, methods and measures are described. In general the results show

1. cognitive similarity as measured by the index of co-linearity was not significantly related to achievement.

2. The trend of the results showed that "transfer" groups tended to have characteristics in common.

3. The exploratory measure, although in-effective as an index of cognitive similarity, has potential as a measure of intelligence.

There is discussion of the research findings in relation to effective communication between lecturers and students and further areas of research are suggested.

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AN INVESTIGATION OF THE CONCEPT OF COGNITIVE SIMILARITY

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P R E F A C E.

This study is an investigation of the concept of cognitive similarity as a facilitating mechanism in communication between lecturers and students.

Section 1. contains 5 Chapters. It describes the educational importance of the research area and defines the problem to be investigated, i.e., effective communication between lecturers and students. Factors in the processes of communication are discussed in relation to research in social psychology. Detailed reviews are given of research by Runkel (1956) and Triandis (1959, 1960) in relation to cognitive similarity and effective communication. There is discussion of research by Bartlett (1958) which is relevant to an exploratory measure of cognitive similarity.

Section 2. contains 4 Chapters. These include a statement of the problem based upon a critique of Runkel's research. There is an explanation of the experimental design and the statistical methods used in the analysis of data. The sample of subjects used in the study is described. There is also a description of the methods and measures used in testing hypotheses.

Section 3. contains 3 Chapters, It gives an account of the analysis of data and the results of the various hypotheses tested.

The conclusion discusses the research findings and the implications of these in relation to the problem of effective communication between lecturers and students.

SECTION 1.

(a) The educational importance of the research area.

(b) Factors in the processes of communication.

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S E C T I O N 1 (a)

THE EDUCATIONAL IMPORTANCE OF THE RESEARCH AREA

Psychology is sometimes described as a service discipline which, as a behavioural science, has methods, techniques and measures which can help resolve problems generated in other disciplines. Many problems exist in the field of education which can be investigated by psychological techniques. The present investigation is an attempt to use such techniques in examining the problem of effective communication between lecturers and students. This Chapter will discuss the educational importance of the area of research, define the problem to be investigated, examine criteria related to the problem and, with reference to research by Runkel (1956), outline the direction of the present investigation.

In recent years, there has been considerable growth and expansion in colleges of education. Interest and concern in this area partly reflects a state of necessity brought about by an increasing demand for more teachers. It is realised that a shortage of teachers has a crippling effect upon creating an effective educational system. This situation was stressed in the Robbins Report (1963). The Committee found that there was a grave teacher shortage and there appeared little hope of reducing classes to a proper size for several decades. Still less would it be possible to implement certain educational reforms, e.g. the raising of the school leaving age to sixteen years, increased provision of Nursery Schools or the reduction of the approved size of classes in Primary Schools. Obviously, from

the schools' point of view the more rapidly expansion in colleges of education took place, the better. The Robbins Committee (1963) recommended that by 1976 the number of places in colleges of education should be increased to 130,000 - more than two and a half times the number available in 1962/63.

Interest and concern in this area also reflects a proper anxiety for quality and standard in the education of teachers. The problem is not merely quantitative but also qualitative. There is a need for teachers who are well educated and professionally well equipped. This aspect was also stressed in the Robbins Report (1963). It was recommended that colleges of education should explore the possibility of granting degrees for four years of training and that there should be an even closer link between colleges and universities than previously existed. The B.Ed. degree is now established in almost all University Institutes of Education.

The period of great interest in the education of teachers since the 1950's is closely linked with the concern to provide more effective and improved education in schools. Although the basic aim in teaching is still to bring about an increase in knowledge and skills, the methods and approaches by which it is hoped to accomplish this have changed considerably. This is seen in specific aspects of the school programme, e.g., new approaches to the teaching of Mathematics and Science. Also, particularly in Primary Schools, the general ethos has changed considerably from a syllabus-oriented programme to one which is oriented towards a recognition of developmental trends in children

and the ways in which they learn. This, of course, is no new concept in education. However, it is one which since the war years has become increasingly less of a pious hope and more of a reality. It is a situation which makes great demands upon teachers. Obviously, progress towards enlightened education and any educational improvements or innovations will depend basically on the development of teacher competence through effective teacher education.

Yet Openshaw (1965) draws attention to what he terms the paradox of our time, stating that the education of teachers continues to be viewed as a baseless art rather than an area for careful and intensive research. Undoubtedly a proportion of research in this area has consisted of a comparison of methods, practices or programmes and has included many normative surveys. Many studies have been descriptive rather than attempts to define or resolve basic problems. Nevertheless, such studies add to the sum of knowledge. Such sources as the review of the research literature by Cyphert & Spaights (1964) indicate the extensive nature of research in this area and the complexity of problems existing in the field of teacher education, e.g., the problem of defining desirable content in courses for education students. Other reviews, such as that of Barr (1961) or Ryans (1960), indicate the research within specific areas of the extensive field. Barr's review summarises research in teacher effectiveness and that of Ryans deals with the characteristics of teachers. From an examination of both general and specific reviews it would seem that research in the education of teachers has centred around the following areas of concern:-

(i) present practices in teacher education,

(ii) the comparative effects of different training systems,

(iii) the nature and selection of desirable content in courses,

(iv) personality variables associated with different types of teaching behaviour and effective teaching.

More recent research has shown interest in comparative studies giving international perspective, e.g., the study of Dickson et al (1965) into characteristics of education students in Britain and the United States.

Thus existing research covers a wide field. It reflects concern that the education of teachers should function with maximal efficiency and should be of a high quality. However, underlying this diversity is the problem of developing student competence in an effective way.

If more teachers of high quality are required this necessitates the effective development of the potential of students. In considering any student population there is a problem in terms of the need to consider why some students achieve greater success than others in the course. This implies concern that all students should be helped to reach optimum achievement. There is also the realisation that if there was greater understanding of the variables involved, there would be the possibility of aiding the unsuccessful towards better achievement. This question obviously involves a multiplicity of variables and potential hypotheses. However, it would seem that any attempt to answer the question must relate to basic processes in the education of students.

Whatever the organisational or content features of the course, basically the training of teachers becomes an act of communication between lecturers and students. Lecturers and students come together in what is essentially a learning situation where the lecturer is an influential agent in changing or modifying the ways in which students can or will behave or think. This influence may be manifest in a variety of ways, e.g., direct transmission of fact, knowledge or ideas through lectures, discussions, through the use of various media or tutorials related to independent work. All these approaches involve communication. Their effectiveness is dependent on the effectiveness of communication, i.e., how effectively the lecturer can "inform" or communicate and how effectively the student can appreciate the communication. The act of communication is basic to any course regardless of its structure or content. If such communication is ineffective it is not likely that students will develop their full potential. Thus an area of research can be narrowed to an investigation of variables relative to the processes of communication.

In deciding whether or not communication between lecturers and students has been effective, it is necessary to establish criteria. Effective communication may be revealed in the student's success in teaching situations per se as shown in school practice periods. It may also be interpreted as success in course work with more emphasis on academic achievement. Often one aspect presupposes the other, but this is not always necessarily so. The two aspects while not being mutually exclusive are equally not synonymous, though it would be hoped that professionally both would be regarded as desirable.

The problem of determining success in teaching practice situations impinges on research in the area of teacher effectiveness and is often the more difficult to determine. The main problems are those of criteria and prediction. In 1939, Stevens indicated the inevitability of these problems. He stated that the concept of teacher effectiveness could not be divorced from measurement and operational definitions of success with their contingent problems of reliability, relevance, freedom from bias and practicality. Most research in the area has concerned investigations of personality characteristics which are predicted as being important in teaching situations. For instance, examples would include the development of the Minnesota Teacher Attitude Inventory (1950) which found a significant correlation between teachers' attitudes to children and work and the pupil-teacher relations in their classrooms. Difficulties, of course, lie in defining the characteristics to be studied.

Assessing achievement in course work would appear to be more easily defined. Such evaluations may be by continuous assessment although written examinations have long and commonly been regarded as the chief evaluative device. However, similar problems exist. Basically, a major problem exists because of the close link between objectives and evaluation. The construction and type of examination is important in giving operational definition to objectives which are more usually stated in general and somewhat ambiguous terms. A study by Merkhofer (1954) has revealed the effect of the type of examination upon student behaviour prior to the examination and during the course. There was effort after memorisation of fact rather than application

of principle related to the type of examination expected. More memorisation of fact was evident when a multiple choice rather than a discursive esssay-type examination was expected. In this sense, examinations are a dependent as well as an independent variable. They influence what is taught and how. They influence what is learnt and how this is done. Perhaps lecturers should give more thought to what evidence is secured in assessment, how this should affect instructional techniques and how it can be used to help the student, being functional rather than terminal in its value.

Always assuming that one has established criteria for effective communication between lecturer and student, there is the problem of how the communication process is to be studied. Often educational research in this area has been concerned with the form of the communication rather than with the nature of the process itself. This is evident in research into the method of the communication, e.g., the effectiveness of discussion groups compared with formal lecturing sessions. Such research into form is important in revealing how different students react to different approaches. The research of Calvin et al (1957) has shown that less intelligent students did consistently better in authoritarian rather than in permissive situations. The form of the communication and the nature of the communication process are not mutually exclusive. Sargants "Battle for the Mind" (1957) illustrates how understanding the nature of the processes of communication influences the form and method of communication, e.g., the use of heightened suggestibility in

techniques of political indoctrination. Although research into the form of the communication is important, it is also necessary to understand the underlying processes in communication which function in interpersonal relationships.

Thus problems in communication between lecturers and students are directly related to research in social psychology which investigates such processes in interpersonal communication. This research investigates variables in the processes of communication and models, e.g., the interaction model of Newcomb (1953), are suggested which build these various factors into an operational unity. Of particular interest is research by Runkel (1956) which postulates that cognitive similarity is a facilitating mechanism in communication. This research is discussed in detail in Section 1 (c). In brief, Runkel (1956) suggests that when individuals have a similar cognitive structure, i.e., when they approach significant aspects of their environment in similar ways, then communication between these individuals will be more effective than communication between individuals who are not cognitively similar. In operational terms, Runkel found that students in a psychology course who were cognitively similar to the lecturer achieved greater success in the course than students who were cognitively dissimilar to the lecturer. Runkel measured cognitive similarity by means of an index of co-linearity, i.e., a technique which showed whether students organised responses to stimuli in a linear order similar to that of the lecturer. The criterion of greater success in academic course work gave a measure of the effectiveness of the communication, i.e. showing that the lecturer

had effectively imparted information to the student. The greater success of the cognitively similar group seemed to be achieved regardless of other variables operating in the situation, e.g., the variable of scholastic aptitude. However, research in industry by Triandis (1959, 1960) has investigated other indices of cognitive similarity. A detailed review is given in Section 1 (d). Triandis appears to have established a link between cognitive similarity and similarities on intrapersonal variables between individuals. Responses to the indices of cognitive similarity indicate the presence of a group norm which reflects the influence of similarities in the attitudes, beliefs etc., of those within the group. Thus there is the possibility of cognitive similarity being explained in terms of variables other than that suggested by Runkel.

Runkel's results are interesting and suggest implications for education. For instance, if cognitive similarity is a facilitating mechanism in communication which leads to the greater success of students then, by greater understanding of this mechanism, it may be possible for the lecturer to increase the number of students with whom he is cognitively similar. The implications of the research are discussed fully in Section 1 (c). Although the writer has a special interest in problems related to the effective education of teachers, it is obvious that effective communication in any subject area would be advantageous. Runkel's results have a general as well as a specific application.

The proposed investigation may be summarised in this way:- There is both a quantitative and qualitative need for the effective

education of teachers. Basically this education involves lecturer-student interaction. The processes of communication are basic to this interaction and effective communication is necessary in lecturing situations. Research in social psychology considers the processes of communication. Within this field, research by Runkel (1956) and Triandis (1959, 1960) indicates that cognitive similarity appears to be a significant factor in the effectiveness of communication and achievement. Cognitive similarity involves cognitive functioning; but also, as seen in the research of Triandis, appears to be related to similarities on other intrapersonal variables. It would seem necessary to have a greater understanding of these variables before the implications of cognitive similarity for the lecturing situation could become a practical possibility.

Further Chapters in this section will examine factors in the processes of interaction and communication in general and discuss in detail research by Runkel and Triandis related to cognitive similarity and effective communication.

SECTION 1 (b)

FACTORS IN THE PROCESSES OF COMMUNICATION

The concept of cognitive similarity in relation to effective communication has certain implications for education. However, problems of communication in lecturing situations have their context within the wider field of research into interaction and communication processes in general. There is a sense in which both educationalists and psychologists interested in the area are attempting to answer the classical question, "Who says what to whom, with what effect?". The former may attempt to answer this in an empirical way, through observation and experience attempting to describe the variables operating in their interaction with students. Such descriptive approaches are inadequate and it is necessary to look for models and research within social psychology relating to investigations of interaction systems. This Chapter will attempt to describe a frame of reference for investigating communication within lecturing situations by examining the dimensions of interpersonal relationships and processes in communication.

Rokeach (1960) has stated that before it is possible to explain a phenomenon, "we must first know what it is we want to explain", (p. 11.). In this instance an explanation is being sought as to why, in the lecturing situation, communication is effective for some individuals but not for others. Obviously, there are different criteria of effectiveness. Measures of effectiveness will relate to these criteria. Some criteria are more easily measurable than others, e.g., it is simpler to measure increase in knowledge than to define

and measure changes in attitudes within or towards a particular subject area. It would seem that whatever criteria are established that the idea of change is a central concept in all.

Research into the processes of communication has diverse approaches and objectives but all research concerns the measurement of change, e.g., the Yale Studies (1953) have been concerned with factors in opinion and attitude change. This does not mean such research imposes an additional variable but it utilises an integral part of the communication situation. In all communication there is a state before communication takes place, the actual transfer of knowledge, information or ideas then a subsequent state when communication ceases. It could be said that the primary function of communication is to prompt and bring about change.

Such change may be manifest in many diverse ways. Change may relate to overt behavioural change and modification of behaviour. It may relate to the amount of knowledge possessed or the understanding and appreciation of a topic. There are varying degrees of change. Change may be minimal or it may involve the drastic re-orientation of attitudes. Certain changes are immediately apparent. Others are only manifest over a period of time. Also, as shown in the Yale Studies (1953), the passage of time has the effect of modifying changes brought about by persuasive communications.

The factor of change, which is such an integral part of any communication, would seem to be particularly important in the lecturing situation. This is also specifically a learning situation. There are many varied definitions of learning. All stress the factor

of change or modification of behaviour as a result of training or experience. For instance, Hilgard (1948) speaks of learning as "the process by which an activity originates or is changed through training procedures (whether in the laboratory or the natural environment) as distinguishable from changes which are not attributable to training." (p.4.) Within the lecturing situation some changes are more easily established than others. Some are more acceptable than others. A lecturer would feel he had failed if the attitude of his students changed from one of interest to apathy towards his subject area.

In attempting to explain why communication is effective for some students but not for others, the following problem exists. One is seeking to explain why, by whatever criteria or measurement of change, communication in the lecturing situation has brought about this change in some students but not in others. This implies that there will be differing degrees of change both in direction and extent. The problem also implies that there should be understanding of the processes in individuals which mediate between any communication and its effects.

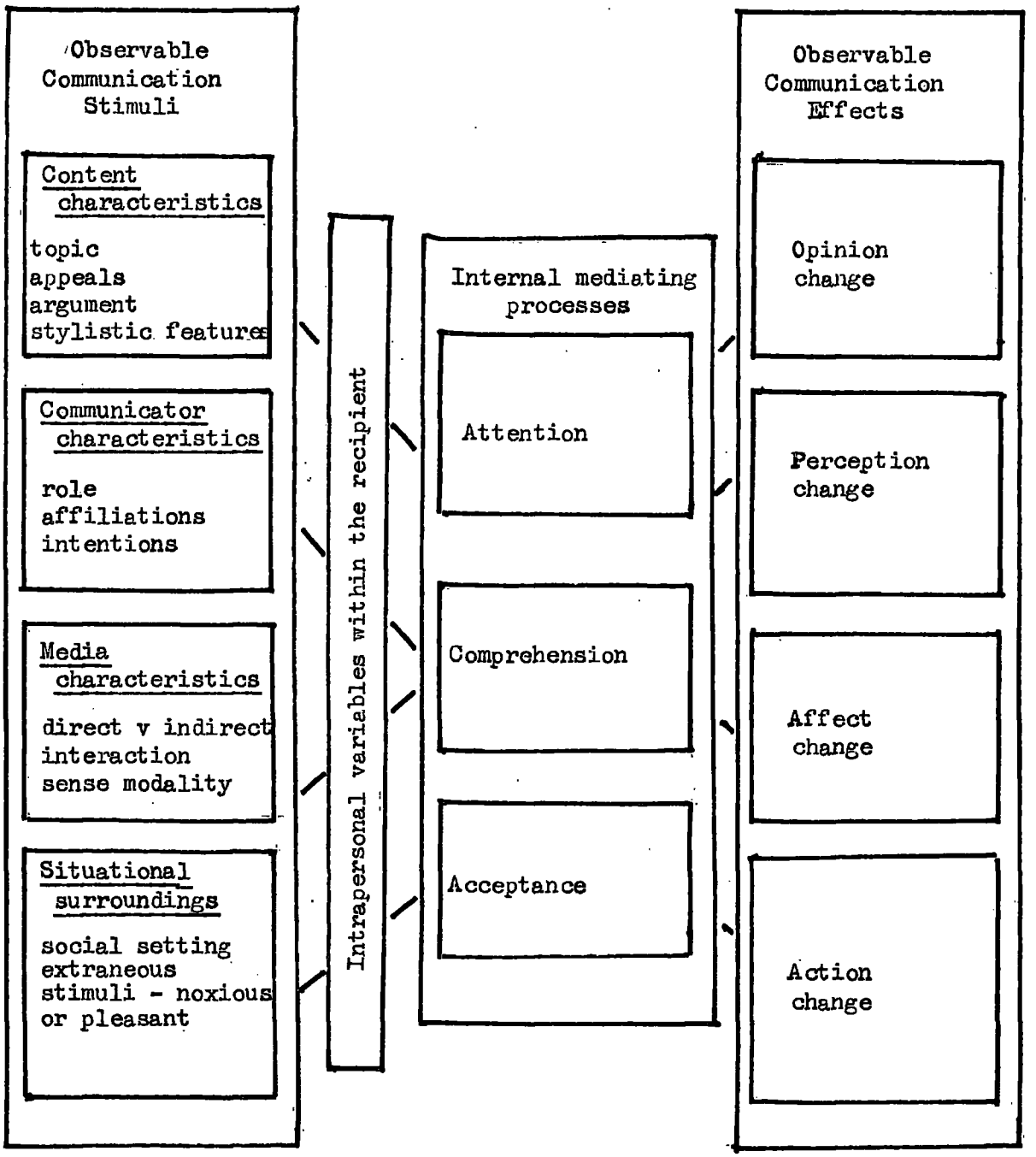
One approach to the problem would be to study the components of the question "Who says what to whom, with what effect?" - the components being the lecturer, student and communication. For instance, lecturers will differ in their interest in students and in sympathy with and appreciation of their problems. They will vary in their ability to code information and present difficult information with clarity and precision. They will differ in cognitive style,

experience and background. Unlike the laboratory situation where the subjects are presumably willing participants, the lecturer must "firstcatch his hare" - to secure and hold an audience is a primary and crucial phase in communication. Lecturers will differ in their ability to achieve this contact and to maintain it. They may vary in their responsiveness to feed-back from the audience. However, given a particular lecturer and a particular communication, these constants will have differing effects on individuals. As Janis et al (1959) point out, "constructs are needed to account for the different effects observed in different people who have been exposed to the same communication." (p.4.)

Therefore there is a sense in which the question, "Who says what to whom, with what effect?" is misleading since it implies that it is possible to partial out the various components of the question and study these in isolation. The components are not independent nor can they be studied systematically one at a time. Examination of the discrete parts cannot explain processes which rely upon the interaction of variables within the components. Any explanation of communication effects must take into account the total interaction situation.

Table 1. (b) 1. presents a symbolic representation showing the relationship of factors within the communication situation. This representation is an adaptation of the analysis given by Janis et al (1959) in "Personality and Persuasibility". As they point out, the categories and subcategories are not necessarily exhaustive but are intended to highlight the main types of stimulus variables which play a role in communication.

TABLE 1(b) 1.


Observable Communication Stimuli
Content characteristics
topic
appeals
argument
stylistic features
Communicator characteristics
role
affiliations
intentions
Media characteristics
direct v indirect interaction
sense modality
Situational surroundings
social setting
extraneous stimuli - noxious or pleasant
Intrapersonal variables within the recipient
Internal mediating processes
Attention
Comprehension
Acceptance
Observable Communication Effects
Opinion change
Perception change
Affect change
Action change

Basically there is interaction between variables within the communication stimuli and variables within the recipient. These variables within the individual, i.e., intrapersonal variables, act as a filtering mechanism. They influence what shall be accepted or rejected as the individual selects his responses to the communication. It is not the specific variables themselves but this interaction which produces the effects of the communication. As Sherif (1965) states, psychological selectivity is a general phenomena and "In any specific situation the individual's selective attention to particular aspects of his environment is a product of the joint operation of interacting factors from within himself, as he is at the time, and from the external situation." (p. 172).

Some degree of similar selectivity must be applied in this situation for an exhaustive account of every combination of possible variables would be a practical impossibility. Therefore, the interrelationship of variables will be illustrated with examples of research related to the classification of communication stimuli given in Table 1 (b) 1., i.e.,

(a) content characteristics

(b) communicator characteristics

(c) media characteristics

(d) situational surroundings

(a) Content characteristics

As indicated in the previous diagram, there are many variables within the content characteristics of any communication. Some are

related to style. For instance, there will be individual differences as to whether individuals are irritated or reassured by a "grass roots" style of presentation. Certain politicians have long relied upon an "up from the shop floor" approach even though the subject matter may not warrant the "us" and "them" assumption.

Certain variables relate to the order of presentation of argument; whether there should be presentation of one side of the issue as contrasted with the presentation of both sides and their particular order. These variables were investigated by Hovland, Janis & Kelley (1953). It was found that change was more effective if the initial communication presented both positive and negative arguments and reached a positive conclusion. "When the listener is then subsequently exposed to the presentation of negative arguments in the counter propaganda, he is less likely to be influenced in the negative direction." (p. 111) The listener is already familiar with the opposing arguments and despite them has been led to a positive conclusion. Such research would seem to indicate the need for balanced presentation of controversial subject matter in the lecturing situation.

There are, however, intrapersonal variables which affect this general position. Luchins (1958) has shown that responsiveness to order of presentation of argument is more likely to occur when the topic is unfamiliar to individuals. Lana's research (1964) found that when the material was familiar, the more individuals were involved in the topic the less likely they were to be affected by the order of the argument. Those with medium interest were sometimes

responsive to the last communication and sometimes unresponsive to order.

Other variables may relate to the emotional nature of the content. Such characteristics have been investigated by Janis & Feshbach (1953) in relation to the effects of fear-arousing appeals. They found, for instance, that when the topic induced intense feelings of anxiety, the audience sometimes failed to pay attention to what was said. They state, "Inattentiveness may be a motivated effort to avoid thoughts which evoke anxiety." (p. 78) Sometimes individuals react to fear-arousing appeals by becoming aggressive towards the communicator. Janis & Feshbach (1953) postulate that if tension is not reduced by re-assurance, the individual may learn to avoid subsequent exposures to the content. Their findings indicate that whereas minimal appeals can be effective, the inclusion of additional fear-arousing material not only fails to increase the effectiveness of the communication but actually decreases its success. This research has implications for any teaching situation. The teacher who creates a relationship with students based upon fear and threat of punishment is not likely to communicate effectively.

Within these effects there are individual differences. Different types of personality have different thresholds for the arousal of guilt, fear, shame and other emotions which can be aroused by special appeals. For instance, Janis & Feshbach (1954) have found that the unfavourable effects of a strong appeal occurred predominantly among those chronically most anxious, e.g., as manifest by overt excitability and psychoneurotic complaints. Most research seems to have concerned

the manipulation of the negative emotions - one wonders what the results would be if the positive emotions were investigated, e. g., induced states of pleasant euphoria.

Although it has been seen that other variables operate, the basic variable in content characteristics relates to the content itself. Different effects will result depending on whether the subject matter is acceptable or viewed with suspicion - whether it is consistent with already established beliefs or whether its message is counter to existing attitudes. The content may be the same for all individuals but its effect will differ according to the attitudes of the individuals involved. As Sherif (1965) states, "Characteristics of a communication do affect the selective attention of individuals, e.g., its prominence, intensity, novelty, repetition and organisation..... A person's attitude towards the issue is more typically than not the central factor in his frame of reference affecting what he selects, what he attends to and what he heeds." (p. 172.) Attitudes are important variables within the filtering mechanism of individuals.

Attitudes refer to the stand an individual upholds and cherishes about his environment - objects, issues, persons, groups or institutions. Sherif (1965) states that referents of a person's attitudes may be a "way of life, including economic, political or religious institutions, family, school or government." (p. 4.) Attitudes are acquired and learnt either formally or informally from the individual's environment. There is a sense in which they define the individual's concept of Self - of the kind of individual he is, with whom he belongs, and is accepted, with whom he identifies. As such, attitudes are not

transitory and to change basic attitudes is requiring the individual to change himself. Attitudes are not purely cognitive but related to motivational and affective states. They may be inferred from behaviour and result in characteristic ways of behaviour towards objects, issues, events etc., in the environment.

Assuming individuals have certain attitudes, what does this imply? The implication is that they are prepared to take a stand. They are not in a neutral position but positively or negatively inclined. This implies evaluation and the judgement and selection of what they will and will not attend to. There is also the implication that there are certain expectancies within the individual and that he will be "set" to respond in a particular way. It should be remembered that whereas "set" can be induced and can be momentary, attitudes are more permanent and stable.

According to Sherif (1965), attitudes cannot be represented by a point along a continuum. Although they may provide an anchoring point, they define categories for the evaluation of new information. Thus they define latitudes of acceptance and rejection. Individuals may have similar attitudes but, according to their limits of tolerance, their latitudes of acceptance or rejection may differ. If a communication does not fall appreciably beyond the range of acceptance, the discrepancy is likely to be minimised and the communication assimilated into the range of acceptance. Alternatively, if the content is well beyond the latitude of acceptance, it may be appraised as more discrepant than it actually is. There will be a contrast effect proportional to the divergence of the communication

from the accepted range.

Just as individuals differ in their attitudes, so they differ in their degree of ego-involvement related to these attitudes and the value they place upon them. The variable of ego-involvement has proved important in responsiveness to communication. In highly ego-involving issues, e.g., religious beliefs, the individual's entrenched position may override situational variables and appeals to tolerance. In a sense these issues are a challenge to the individual's self-identity. Hovland & Weiss (1951) have shown that the more ego-involving the communication, the less the incidence of change. Other studies have attempted to manipulate and control the amount of ego-involvement. Research by Elbing (1962) induced involvement through role playing sessions. The subject was a right-to-work issue used with students in business administration. The susceptibility to change related to the initial extremeness of attitudes. Of those with moderate positions, 75% changed after role playing. Of those with initially extreme stands, 46% did not change. It would seem that in the lecturing situation a certain amount of ego-involvement on the part of students would be advantageous. For instance, the success of the Case Study Method lies partly in the sense of involvement it induces in students. Interest can be increased and communication become more effective when the student is involved and actively participating.

Other intrapersonal variables affecting attitudes to content concern personality characteristics. For instance, the study of Bettelheim & Janowitz (1950), showed that Anti-Semitic propaganda was most likely to be approved by those who had already acquired an

intolerant attitude towards Jews and were insecure personalities with a great deal of undischarged hostility. Much research in this area has sprung from studies of the authoritarian personality (Adorno et al, 1950). Weiss & Fine (1955) investigated readiness to accept communications involving a strict punitive stand to social deviates. Those individuals with high aggression needs plus strong extrapunitive tendencies were most prone to accept such communications.

There are thus variables within the characteristics of the communication. There are also variables within the filtering mechanism of individuals. It is the interplay of these which result in the differential effects of communication. This interplay is similarly seen in relation to communicator characteristics.

(b) Communicator characteristics

It is often difficult to make a clear dichotomy between the substance of a communication and what is known of the characteristics, expertness, affiliations etc., of the source. Much research into communicator characteristics has concerned the variable of source credibility. Why is a source perceived as acceptable and how far does this influence, for instance, attitude change?

In general, Hovland, Janis & Kelley (1953), have found that change is more likely to occur when individuals receive a communication from a source of high rather than low credibility. However, individuals differ as to what constitutes a credible source of information.

One variable concerns the group membership of the speaker.

Kelley & Volkart (1952) have shown that a communicator who is a member of a group to which the recipient is also affiliated will on the average be more effective than a communicator who is perceived as an outsider or who is a member of a rival group.

Certain variables relate to the expertness of the source. Much early research considered this factor. The work of Bowden, Caldwell & West (1934) concerned an issue relating to an appropriate monetary standard for the United States. Statements were most frequently approved when attributed to business men or educators. Statements were least frequently approved when attributed to clergymen - in view of the topic this reflects a nice distinction between God and Mammon.

Research has related the variable of credibility to trustworthiness of source. For instance, research by Hovland & Weiss (1951) concerns the source of publications. Low credibility sources were represented by, for example, gossip columnists and picture magazines. High credibility sources included the New England Journal of Biology and Medicine. Issues involved, for instance, the use of antihistamine drugs. The effects of opinion change were investigated over a period of time, i.e., an interval of four weeks. Hovland & Weiss showed that over time there was an increase in the change of opinion of those exposed to the low credibility sources. They suggest that the negative effects of an "untrustworthy" source wore off and permitted the arguments presented to produce a delayed positive effect. They conclude that the effect of the source is maximal at the time of the communication but decreases with the passage of time more rapidly than the effects of the content. Similar results showing these effects

were found by Kellman & Hovland (1953). This issue concerned leniency in the treatment of juvenile delinquents. Although the communication was the same, the introduction varied and described the source as:-

(a) a judge in a juvenile court (positive source),

(b) a neutral member of the studio audience, and

(c) a former delinquent now on bail (negative source).

As well as reinforcing the findings of Hovland & Weiss (1951) the evaluations of the presentation were interesting. Although the substance was the same for all the positive source was viewed as giving the most fair presentation of argument.

Other research has investigated the age of the communicator in relation to credibility. However, this variable only appears to be important with children and is not viewed by adults as necessarily indicative of trustworthiness, expertness, etc. The work of Berenda (1950), with length judging situations showed that young children were consistently influenced by the judgements of older children.

Hovland, Janis & Kelley (1953) observed two main effects of source credibility. Recipients were not motivated to accept the communications of sources to which they had unfavourable attitudes. The second effect has particular application for the lecturing situation. If the source is not credible and the recipients have unfavourable attitudes towards the sources, they do not pay close attention to the content and/or do not attempt to comprehend the exact meaning of what is said. "As a result they learn material less well than when it is presented by a favourable source". (p. 37)

No lecturer can be equally credible to all students and there is the problem of how it is possible to increase one's acceptance as a credible source. This seems to imply greater understanding of the dimensions used by students in their judgement of credibility.

As in the consideration of content characteristics, the attitudes of individuals constitute an important factor in their filtering mechanism. Hovland, Janis & Kelley (1953) state, "The various effects of the communicator are mediated by the attitudes towards him held by members of the audience. Any number of different attitudes may underlie the influence exerted by a given communicator. Some may have to do with feelings of affection and admiration and stem in part from desires to be like him. Others may involve awe and fear of the communicator based on perceptions of his power to reward or punish according to one's adherence to his recommendations and demands".(p. 20) It would seem that there is more likelihood of the source being effective when the individual feels that the views, attitudes and values of the source are compatible with his own, in other words that some rapport and similarity is felt to exist. It should be remembered that credibility is not a tag attached to a source but is the evaluative assessment and judgement of individuals depending mainly upon their attitudes towards the communicator.

Other intrapersonal variables are influential in the situation. Some are related to personality characteristics. For instance, Berkowitz & Lundy (1957) have shown that individuals with strong authoritarian tendencies are more likely to be influenced by authority figures. Janis et al (1959) have investigated the variable of

persuasibility showing that there are consistent individual differences in susceptibility to respond to a communication. They found, for instance, that the most persuasible individuals were those with adequate abilities to comprehend and attend, coupled with low critical ability and weak motivation to evaluate critically. The factor of persuasibility seems to include both personality and cognitive variables.

Obviously, one can make a false dichotomy between such variables. As Rokeach (1960) points out, an individual's cognitive functioning is not set apart from his affective or emotional functioning. Authoritarianism as an affective personality state can also be conceived in terms of cognitive beliefs about the nature of authority. Similarly any affective state can have its cognitive counterpart within the belief-disbelief systems of individuals. In "The Open and Closed Mind", Rokeach (1960) explores the nature of such systems. He categorises their organisation and characteristics into open and closed belief systems. In his view, dogmatism can be defined as a closed way of thinking which could be associated with any ideology regardless of content, an authoritarian outlook on life, intolerance of those with opposing beliefs and sufferance of those with similar beliefs. Open ways of thinking would represent bi-polarity in these concepts. To say that a person is dogmatic is to say something about what he believes; also, as Rokeach points out, it is to say something about the way in which he thinks and about his cognitive structure. Rokeach's primary concern was to explore cognitive levels, e.g., reliance on authority, resistance to change,

conformance - all of which in his view have the same cognitive basis, "namely the inability to discriminate substantive information from information about the source and assess the two separately" (p. 60.) In relation to the research of Hovland, Janis & Kelley (1953), this would imply that the more closed a person's belief system the more he would be likely to confuse substance and source and be influenced by communicator variables. Also individual differences in belief systems would be related to the attitudes which affect the filtering mechanism of individuals.

(c) Media characteristics

As Janis et al (1959) state, there have been few systematic investigations of intrapersonal variables in relation to variables within media. Just as there are different media and modalities, undoubtedly individuals vary in their responsiveness to these characteristics.

In education it has become customary to speak of children as visiles or audiles, i.e. some children learn more easily in one modality than in another. For instance, the work of Jenkinson (1962) shows the existence of such characteristic styles or modes of perception among children. Similarly as Hunter (1963) has shown, responsiveness to different modalities has an effect upon memory. Some individuals have a strong visual memory while others rely more upon auditory cues. Klapper's summary (1949) seems to suggest that individuals with less education are more influenced by aural presentations than by printed media. This is not surprising since

the less educated have in all probability experienced difficulties in learning to read initially and for many the printed word has a bad affect.

There also appear to be individual differences in responsiveness to direct contact as opposed to mass media. Relevant research by Lazersfeld, Berelson & Gaudet (1944) has investigated the psychological differences between propaganda from mass media and from informal social contacts. In general, the latter were found to be more effective. As the researchers point out, it could be that casual and non purposive conversations derive part of their effectiveness from the fact that the recipient does not have a critical and defensive mental set. They feel that there is less attempt to persuade and manipulate. One wonders if the same results would hold to-day since individuals have been soothed into accepting "manipulation" by advertising and television to a greater degree than was apparent twenty years ago. On the other hand, these results may suggest that television is less likely to be effective in lecturing situations than personal contact. Do the results also suggest that the lecturer's style in the classroom should be more discursive?

Undoubtedly there is scope for interesting research into the differential effects of media. The writings of McLuhan (1964) state that "the medium is the message." In terms of the electronic age a totally new environment has been created. This needs to be understood for the "message" of any medium, according to McLuhan, is the change of scale or pace or pattern that it introduces into human affairs.

(d) Situational surroundings

The human group is necessarily part of the frame of reference in any study of communication. Klapper (1960) has emphasised the way in which research in communication has "re-discovered" the group as the context for changes in attitude etc. Some groups may be referred to as reference groups, i.e., the individual is not a member of these groups but they exert an influence upon his opinions. Other groups of which the individual is a member and participant exert a greater influence.

Groups are created by individuals acting together over a period of time. Individuals become part of group structure and are affected by this structure and their place within it. As such they develop a variety of practices, attitudes, and behaviour. Such shared practices are the norms of the group and give rise to feelings of group solidarity. Groups may fluctuate in their stability, organisation or purpose. Individuals within the group will also vary in the way in which they are responsive to group situations and social incentives.

One variable concerns the value placed by individuals on their membership of a group. Kelley & Volkart (1952) have investigated whether high valuation members, i.e. those who place high value on the group, would be less influenced by a communication contrary to the norms of the group than would low valuation members. In this research communications and questionnaires were given to 12 Boy Scout troops. The pertinent norm consisted of the positive attitudes they would be likely to have towards woodcraft, camping

activities, etc. Before the communication S's answered a questionnaire relating to:-

(a) how highly they valued their membership of the troop, and

(b) their attitude to woodcraft activities compared with activities characteristic of city life.

An outside adult gave a standardised communication criticising scouting and woodcraft activities. It was suggested that boys in the modern world would be more profitably employed in learning about their cities. Post communication attitudes were determined. Results showed that low valuation members tended to change in the direction advocated by the communicator. Those who placed most value on their group membership were least influenced to change in the advocated direction. Similar results are reported by Kelley (1955) in relation to the salience of group membership. College students of the Catholic faith answered questionnaires on items relating to Catholic norms. They received a communication about the alleged responses of other students which diverged from opinions most acceptable to Catholics. Again it was found that the group who most highly valued their membership were least influenced by a counter norm communication. Considering the topic one is a little sceptical of any evidence of change - one wonders how the alleged responses of students achieved what the Reformation failed to accomplish.

However, these variables were studied in conditions which allowed for anonymity. There is the question of whether individuals would be prepared to change under conditions which were likely to put their

group membership "at risk" by public declaration. This is demonstrated in a study by De Fleur & Westie (1958). Subjects were classified by paper and pencil tests as prejudiced or unprejudiced towards Negroes. They were asked to agree to have a photograph taken with a Negro of the opposite sex for use in future sessions of the experiment. They were then asked to sign a release to make the photograph available for public exposure, e.g. in a nation wide publicity campaign or in a student newspaper. Fourteen of the 46 S's responded in a way logically inconsistent with their prior responses to the attitude test. It is also interesting that in 72% of the cases the reason for signing or not signing release forms referred to some reference group.

Individuals will also vary in the way in which they value their status within the group. This factor was investigated by Newcomb (1943) and is reported in "Personality and Social Change". Newcomb (1943) studied the degree to which members of a college community accepted the norm of liberalism in political and economic attitudes. A measure of community prestige was the number of times an individual was nominated to represent the college at inter-collegiate gatherings. Newcomb found that individuals who attained the highest prestige in the community changed their opinions most in the direction of its norms. He suggests that individuals who were highly desirous of prestige found it necessary to conform to the norms.

Such conformity may reflect other intrapersonal variables. Linton's study (1954a) has shown that susceptibility to conform relates to two main areas of personality functioning - the underlying attitudes to Self and the quality of an individual's response to his environment,

i.e., his ability to cope with it and be responsive to its emotional and personal aspects. Individuals will also differ in the way in which they view the group as capable of rewarding or punishing, in responsiveness to social incentives and in how far they have internalised the values and attitudes of the group.

Naturally group membership fluctuates and the individual adapts to new groups. Newcomb's classic study (1948) traced the changes in a variety of social attitudes as girls from conservative backgrounds adopted the more liberal values of the Bennington community as their own. He found, for instance, that conflicts can arise and that resistance to change towards the values of a new group was closely associated with the salience of other groups whose values were in conflict with it.

As in other aspects of the stimulus situation, the importance of attitudes is evident. Attitudes are formed primarily in interaction with others. "They constitute what makes the individual psychologically a member of groups and institutions in his social world." (Sherif, 1965, p. 5.) Conversely, they define for him what he is not. In responding to social situations and in making social judgements the individual is reflecting the attitudes of the group of which he is a member. Such feelings of group solidarity will affect the filtering mechanism and consequently the evaluation of any communication.

It would therefore seem that educational institutions are potentially influential agents in establishing attitudes and affecting change. Also, those in the lecturing situation could capitalise on available research material and, through the use of groups,

help students develop more positive attitudes to learning. For example, there could be more use of the Case Study Method which successfully uses syndicates or small groups in the learning situation. It would be part of the lecturer's function to structure these groups so that they were positively oriented towards learning and the development of inquiring attitudes.

Throughout all the four stimulus areas previously considered there is the intrapersonal variable of intellectual ability. Obviously this plays an important role in determining what the individual attends to and how he interprets any communication. How much the individual will absorb from any message will depend upon numerous cognitive abilities; ".....the ability to direct and sustain attention, to shift conceptual set, to perceive logical fallacies and contradictions, to detect subtle cues of manipulative intent, to grasp implicit meanings and to imagine hypothetical situations in which alternative course of action are vicariously tried out." (Janis et al 1959, p. 257)

The interplay of all variables within the individual's filter and the stimulus situation will affect the consequent processes and changes indicated in Table 1 (b) 1. Obviously the process of attention is necessary before the processes of comprehension and acceptance can operate. However, the latter processes are not synonymous. Comprehension does not necessarily mean acceptance. Similarly the end-product of change is related to the interaction of previous variables. Different changes in degree and extent will depend upon the degree of attention, comprehension and acceptance. The problem of the lecturing

situation is how to develop comprehension and critical evaluation rather than acceptance and how to make best use of available research material to help bring this about.

So far the interrelationship of intrapersonal variables has been discussed, e.g., those within recipient and source which are influential in source credibility. There are also interaction variables operating within the system. Homans (1950) states that by interaction we refer to activities in one individual being stimulated by the activities of another. Such variables can be studied in terms of frequency, direction, amount, order, duration etc. As Homans (1950) points out, any initial relationship is subsequently related to frequency and amount of contact. This is stressed in his hypothesis that as frequency of interaction increases, the activities and sentiments of individuals tend to become more alike and greater liking exists. Frequency of interaction between A and B is, of course, related to and influenced by spatial proximity. Homans (1950) views interpersonal relationships in terms of profit and loss. In his terminology, the greater the proximity the greater the profit situation, i.e., there is little expenditure of effort in establishing contact therefore any benefits of the relationship are pure profit to the individuals. Perhaps this suggests that a collegiate system with extended opportunities for contact between staff and students would be advantageous. Alternatively, if effort is required for contact, Homans believes part of the loss could be recovered or offset for A if B were of perceived higher status. This asymmetrical relationship could be

viewed by A as a long term gain. Thus there is also the factor of psychological proximity, i.e., the effect of perceived closeness or remoteness related to status.

Throughout the interrelationship of all variables within the processes of communication there is the insistent theme of attitudes - attitudes towards the topic, source, media or situation. They are the individual's anchor in evaluating and forming judgements and in orienting towards his environment. As Sherif (1965) has shown, they influence the formation of the individual's latitudes of acceptance or rejection, providing a framework into which new information is received.

Throughout the processes of communication there appears to be a continual matching or meshing process as the individual judges communication stimuli in terms of like or unlike, similar or dissimilar - "like my beliefs" "like my views", "like the attitudes of my group", "acceptable to the cognitions I already possess". New information is seen as consonant or dissonant with existing beliefs. This is not peculiar to communication but is characteristic of the whole system of interaction. Newcomb (1953) describes it as a "strain towards symmetry." Communication does not stand in isolation but is part of a total situation involving, according to Newcomb, a cyclical process in which communication, similarity and interaction are all reinforcing parts. Newcomb's theory will be discussed fully in Section 1 (c).

However, not all communications and not all situations are consonant with one's beliefs. Some run sharply counter to firmly

established attitudes. Such imbalance can create states of conflict and tension. Individuals must therefore come to terms with the discrepancy and there appears to be a constant process of adaptation, - either adapting one's views or adapting the situation to achieve more balance and symmetry. Such mechanisms are discussed in cognitive-consistency theories which attempt to describe models which illustrate the process by which "balance" between cognitions is maintained.

"The Theory of Cognitive Dissonance", proposed by Festinger (1957) attempts to show how discrepant communications create tensions and how this "dissonance" is reduced through one of several alternatives which modify existing frames of reference. In general terms there are three main alternatives:-

(a) change of one's position to that recommended by the communicator,

(b) attempt to change the communicator's position,

(c) debunking the communication and source to reduce unpleasant tensions.

As with all theories there are opposing points of view. For instance, Sherif (1965) postulates that there are indeed no alternatives. By evaluating in a certain way alternatives are precluded, e.g., if the communication fell well beyond the latitudes of acceptance one would never admit or consider the possibility of changing to the position recommended by the communicator. Sherif (1965) states that he does not view evaluation, categorisation and subsequent behaviour as events that are independent of one another.

They are constituent aspects of an interrelated pattern.

Other theories stress the interrelationship of variables within communication and interaction. They attempt to explain processes whereby balance and symmetry based on perceived similarities is established. This striving for balance functions almost like the concept of Pragnanz in perception. The effect of this is stressed in the Balance Model of Heider (1958). Heider presents a cognitive-balance hypothesis based on the concept of the cognitive fields of individuals being organised into "unit formations." Such units may relate to Self, groups, objects, ideas and other cognisable aspects of the total environment. The determinants of such formations include many of the organising factors in perception as defined by Gestalt psychology, e.g., similarity, proximity. Thus when the individual encounters new stimuli these are scanned in a search for similarities to existing structures or "unit formations." When such similarities exist the new stimuli are then seen as part of the existing unit structures of the individual's cognitive field. Balance theory predicts a tendency towards positive evaluation of other individuals who are perceived as part of the unit formation. Similarly, the reverse effect would be seen in the negative evaluation of those not part of the unit structure. Presumably in this instance communication would be less likely to be effective. Consequently the communication and interaction between individuals would be more rewarding when positive evaluation and "meshing" of unit structures exists.

This striving for balance is also seen in the Congruity Model of

Osgood & Tannenbaum (1955) which discusses variables in attitude change. The basic idea of the congruity model is simple. If the attitudes toward the object and toward the source who positively endorses the object are located at different positions along a scale, a state of disequilibrium is assumed to exist. Pressures toward making the attitude congruent arise in an amount equal to the size of this discrepancy. The more extreme the attitude, the greater the relative resistance it offers to congruity pressure. In addition to inducing attitude change, congruity pressure can increase liking between individuals and thus presumably increase the effectiveness of communication. For example, A may not particularly like B. B strongly claims that Make X is the finest car on the road. A also has a very positive opinion about this car. It is claimed that congruity pressure should cause A to look more favourably upon B. Indeed, because of the less extreme attitude towards him, the colleague will become more attractive than the car will become unattractive. It is thus seen that congruity pressure affects both sets of attitudes. The exception occurs when one of the attitudes is at zero point, in which case it is the neutral attitude which does all the changing. Many comparisons and criticisms have been made of the various cognitive consistency models, e.g., the balance model is more flexible whereas the congruity model has the advantage of being more precise and quantitative. A comprehensive and lively discussion of the various models is given by Brown in "Social Psychology" (1965). However, all theories stress that balance or symmetry can only be achieved via recognition of like and unlike, i.e. by a process of

differentiation into similar and dissimilar categories. Does this imply that the lecturer should always endeavour to give balanced arguments? If he is a credible source this is giving opportunities for all students to shape their attitudes to achieve balance, thus establishing, strengthening or maintaining their link with the lecturer.

In summary, research indicates that in any interaction or communication situation the effectiveness of communication and the amount or direction of change produced does not rely solely upon one variable or one particular set of variables. The effects are achieved by the interrelationship of variables within the characteristics of the communication and variables affecting the filtering mechanism of individuals. Throughout this interplay of variables there is an attempt to achieve symmetry and balance based upon similarities which can be perceived and established. An overview of the field of research in communication indicates a vast number of variables and potential hypotheses, some of which have been indicated. Of particular interest within this range is the variable of cognitive similarity investigated by Runkel (1956) and Triandis (1959, 1960.) Further chapters will examine this research in detail since these investigations provide the basis for the present study.

S E C T I O N 1 (c)

A REVIEW OF RESEARCH BY RUNKEL IN RELATION TO COGNITIVE SIMILARITY

Runkel (1956) has investigated the concept of cognitive similarity as a facilitating mechanism in communication. This research has not been concerned with the form of the communication, i.e., whether information was conveyed through formal lecture or in discussion groups. Instead, it has attempted to establish the nature of the communication process by considering the "cognitive fields" of lecturers and students in interaction. Runkel (1956) postulates that similarities in the organisation of these fields will subsequently lead to greater communication effectiveness. This Chapter will review the theoretical framework underlying Runkel's research, his methods, findings and conclusions and will discuss the implications of this research for education.

The theoretical framework of Runkel's research is based upon two theories:-

(a) Newcomb's Theory of Communicative Acts (1953)

(b) Coombs' Theory of Data (1955)

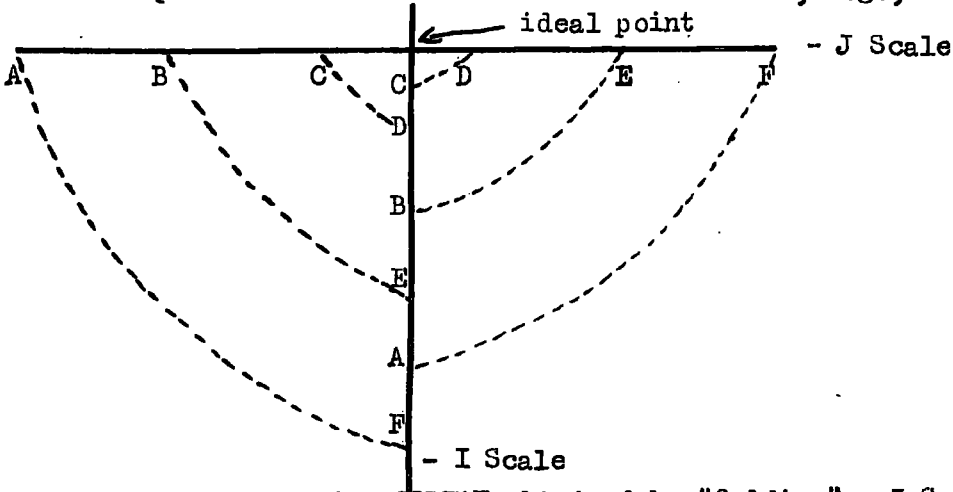
Both theories will be discussed briefly then it will be shown how Runkel has integrated these theories to obtain an index of cognitive similarity.

Newcomb's Theory of Communicative Acts (1953) postulates that communication between individuals is mediated by the cognitive structure of these individuals. In Newcomb's theory, cognitive structure may be stated simply as the characteristic ways in which individuals organise their responses to their environment. Individuals who have similar cognitive structures may be said to be cognitively similar, i.e., orient towards significant aspects of their environment in

similar ways. Newcomb suggests the following model - if A and B are cognitively similar and there is opportunity for communication, the communication will be more effective, the relationship between A and B will be more rewarding and A and B will therefore like each other more than if A and B were not cognitively similar. In Newcomb's A-B-X model, cognitive similarity implies a similar orientation to X. Increased liking will lead to higher rates of interaction between A and B. This will in turn permit greater cognitive similarity and so the cycle is re-initiated. Newcomb considers the interrelationship of many variables in cognitive structure, presenting a social interaction system rather than a purely cognitive model. He is not so much concerned with the actual processes of thinking and remembering as with the impact of intrapersonal variables, e.g., similarities of attitude and value systems upon the individual's orientation to his environment. Newcomb (1961) found it possible to predict the friendships of students who had not met, from prior data which indicated similarities of attitudes, interests, background, etc., and thus a degree of cognitive similarity. Friendship implies communication effectiveness. Although Runkel has taken his basic concept from Newcomb's theory, their ideas of cognitive similarity are not identical. Newcomb's theory encompasses more dimensions and stresses the importance of intrapersonal variables in communication, e.g., similarities of value and belief systems etc. Thus his theory is more closely allied to cognitive-consistency models of interpersonal relationships, e.g., the model of Heider (1958), discussed in Section 1 (b). Runkel's concept

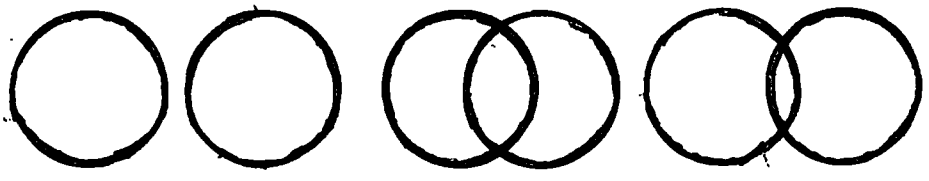
is more restrictive. He views cognitive similarity as similarity between individuals in the linear ordering of the space of potential responses associated with any communication. Thus cognitive similarity becomes equated, for Runkel, with the concept of co-linearity. In order to establish an index of co-linearity, Runkel has attempted to integrate Newcomb's theory with a method of measurement devised by Coombs (1955). Basically, Runkel's research involves an elaboration of Coombs' "unfolding technique."

Coombs' Theory of Data (1955) leads to an algorithm for constructing psychological space from the data of preferential choice behaviour. This algorithm is known as the "unfolding technique". It is both a scaling criterion and a scaling method. In a choice situation each individual and each stimulus can be ordered along a common dimension, i.e., the J. Scale. A basic assumption of Coombs' Theory is that in any choice situation there will be a point which represents the ideal. Thus preferences of stimuli can be ranked as near or far from this ideal point, the nearest being the most preferred. By "folding" the J Scale at this ideal point, an individual's preference order of stimuli can be inferred. This preference order is known as the I Scale, e.g.,



An I Scale preference ordering CDBEAF obtained by "folding" a J Scale.

The technique gives more information than simple rank order. Individuals will have different I Scales in response to certain stimuli. Just as it is possible to discover these scales by folding, so it is possible by the "unfolding" technique" to recover the J Scale, i.e., to discover whether there is a common latent attribute underlying the preferences of these individuals. Runkel uses the terms co-linear and non co-linear to denote whether or not such a common underlying attribute exists. If individuals are not using the same J Scale then their I Scales will be non co-linear with each other. On the surface it would appear that if responses were not co-linear then individuals must be co-linear and therefore necessarily using the same J Scale. However, there is not such a simple dichotomy. Unfortunately two I Scales may be generated from different J Scales and not detected as non co-linear. So, although the category of co-linear includes all pairs of I Scales generated by a common J Scale, it may also contain some which have been generated from different J Scales. This point may be illustrated in the following way:-



a b c

(a) No common attribute exists and no common J Scale is shared. The I Scales are non co-linear.

(b) A common J Scale is shared. The I Scales are co-linear.

(c) There is sufficient point of contact to make I Scales compatible even though no common J Scale is shared. The I Scales are co-linear.

Thus the term co-linearity implies compatability rather than the straight opposite of non co-linearity. Coombs' (1955) Theory is much more complicated and complex than this brief outline suggests. However, in relation to Runkel's research, the most important point is that this technique does not give rank orders. It gives an indication as to whether individuals are or are not using the same attribute to organise their preferences in a choice situation and of whether or not their I Scales are compatible.

Basically, Runkel's research assumes that the meaning of a communication to an individual is dependent on the communication fitting into the individual's cognitive structure. Each individual has a cognitive field which Runkel likens to his map of his world. When individuals receive a communication, the meaning it has is a consequence of how it can be fitted into this map. In line with Newcomb's theory (1953), Runkel takes the view that efficiency of a communication, i.e., whether ot not it is imparting what it intends to impart, depends on the similarity of the cognitive maps of the communicators. The question still remains of how one establishes similarity of cognitive structure and of defining specifically criteria and forms of measurement. It is here that Runkel integrates Newcomb's theory (1953) with that of Coombs (1955).

In any communication situation, the stimulus carries with it or implies a number of related attributes relevant to it or the stimulus situation. An individual's potential responses are thus determined by

the particular space defined by these attributes. However, individuals need to order, simplify and select from the availability of potential responses. Thus there exists a choice situation where it is possible that one dimension will dominate. Stimuli can be ordered along this dimension according to an underlying ordering attribute. Multidimensional cognitive space can thus be organised into a simple linear order. Individuals may or may not share this dimension. It follows that if they do share the dimension and use the same underlying attribute, their linear ordering of stimuli will be related though not necessarily identical, i.e., in Coombs' theory their I Scales will be compatible. Runkel postulates that when individuals organise their cognitive fields in a similar way, i.e. when they organise multi-dimensional cognitive space into a similar undimensional order, such individuals may be said to be co-linear and thus cognitively similar. Runkel suggests that when co-linearity exists communication between these individuals is more effective than communication between individuals who are not co-linear, i.e. who do not organise potential responses in similar and compatible ways. Expressed simply, communication will be more effective when individuals are "on the same wave length."

Perhaps the concept of co-linearity is best illustrated by a simple though somewhat extreme example. A customer buying a suit may try size 20. The salesman, naturally applying the attribute of correct fit will order his potential responses in a certain way, i.e. if size 20 is too large then size 22 will certainly not be a

better fit. His preference of sizes will fold in a certain order according to the underlying organising attribute of correct fit. If, however, the customer is wanting to present a bizarre appearance for fancy dress purpose, then his linear ordering of sizes will be entirely different. He is using a different attribute to organise his responses. Salesman and customer will be on orthogonal dimensions and unless they acquaint each other with their respective criteria, communication will be ineffective. In this extreme situation it would be relatively simple for salesman or customer to re-orientate their position if one acquainted the other with the attribute underlying his responses. However, in relation to cognitive similarity and the total communication situation, such a procedure would be more complex. Yet it would be highly important to understand the variables involved if one wished to increase the number of individuals with whom one was cognitively similar.

Runkel makes the important point that much information is conveyed implicitly . Had salesman and customer been on the same dimension then the statement that "I think size 20 is too large" would also convey the information that sizes 22 and 24 would be considered too large also. Thus, according to Runkel, more information is conveyed if the two communicators are using the same J Scale or their responses are compatible. If cognitive similarity exists, communication between individuals may transmit information about the stimuli in addition to that information which is explicitly mentioned. In essence, this is Runkel's general hypothesis which, in the lecturing

situation he found supported by experimental evidence which measured co-linearity and effective communication.

Runkel's method for testing his hypothesis involved the application of Coombs' technique. Students in an introductory course in psychology were presented with combinations of 5 statements arranged in triads, i.e. groups of three. All of the ten possible combinations were used, e.g.

ABC, ABD, ABE, ACD, ACE, ADE, BCD, BCE, BDE, CDE.

The statements were such that could be seen as related to the content of the course but "not assertions of the kind that would be made as part of the course or given as items in tests" (p. 182.) The 5 statements used were:-

A. The conditions of living in the United States tend to narrow the range of things we are able to do, think about, etc.

B. People who have a firm moral code are better adjusted than those who have not.

C. The biggest weakness in present-day psychology is that it is too theoretical.

D. Individuals could be changed in practically any way one might wish if the environment could be appropriately controlled.

E. The strongest influence in shaping a person into the kind of person he becomes is his mother.

The statements were chosen with the criterion that they could be judged on the basis of a variety of attributes. Thus, the order of preference given by S's reflects the attributes used and the weighting of these in the stimulus situation. The statements give a highly heterogeneous rather than a homogeneous set of items.

In each triad students were asked to select the statements with

which they most and least agreed. Lecturers also reacted to these statements. The statements were given as pre and post tests at the beginning and end of the course. From selected preferences, rank orders were inferred and responses categorised as co-linear or non co-linear with that of the lecturer. Coombs' "unfolding technique" was used to establish these categories. S's were omitted who gave responses of a 30% degree of inconsistency or whose responses were intransitive, i.e. S's who were "unwilling" to compose the stimuli in a simple order. Results of quizzes on the course work, set and marked by the lecturer, were taken as a measure of the degree to which students had received effectively the information given by the lecturer.

Runkel's general hypothesis is thus stated in these operational terms:

Hypothesis 1. Among students who yield reliable rank orders of attitude items pertinent to the course, those who from pre test to post test maintain rank orders compatible with that of the lecturer will receive higher grades on quizzes than those whose rank orders remain non co-linear with that of the lecturer.

Hypothesis 2. The difference in quiz grades predicted in Hypothesis 1 will be at least as pronounced when only those students are considered whose pre test and post test rank orders are compatible.

Runkel's findings indicated that students who from pre to post test maintained rank orders co-linear with the lecturer achieved higher grades than those whose rank orders remained non co-linear. There were 21 students in each group and the finding was in the proper direction of Hypothesis 1 (t test satisfies $p < .07$) In the test of Hypothesis 2, 17 S's were in the group compatible with the lecturer and 19 were in the non co-linear group. The t test applied to the quiz scores of these

two groups gave a significance level beyond .05. As Runkel points out, the t test was not entirely appropriate. As previously explained, co-linearity indicates only that it cannot be said that the S's viewpoint is non co-linear with that of another person. Yet non co-linearity indicates that I Scales decidedly do not unfold according to the same attribute underlying the response. Hence a test of co-variation, e.g., χ^2 or t test demands more of the data than can be predicted. For this reason therefore the t test treats data very stringently and thus Runkel asserts that the probability of .07 in Hypothesis 1 becomes more acceptable.

Alternative hypotheses were tested in relation to:-

(a) the similarity of the S's most preferred statements with those of the lecturer,

(b) the existence of an attitude norm,

(c) differences in scholastic aptitude.

In relation to (a) it could be argued that compatible persons are those who agree that certain stimuli are most preferable. Runkel measured the degree to which students and lecturers who were co-linear selected the same stimulus statements as the most preferable. The product-moment correlation figure was .23 for 34 degrees of freedom which is far short of significance value. Runkel indicates that it was not important that students should agree with the lecturer in preferring the same stimulus statements. The important finding was that students who were most successful used the same dimension with the lecturer in judging statements according to the same underlying attribute. Those who structured the field in a way cognitively similar to that of the lecturer achieved higher grades. This attribute was not

known to Runkel or of interest to him, the emphasis lay on how cognitive space was structured.

In relation to (b) there was the possibility that co-linearity or non co-linearity was not in relation to a particular lecturer but rather in relation to a normative ordering of the stimuli, i.e. students may have been sensitive to a general "cultural" frame of reference mediated by the lecturer. However, the data does not show a tendency for mutual compatability among the responses of the lecturers.

In relation to (c), in any investigation of symbolic responses, there is always the possibility that performance may be related to some measure of symbolic skill, e.g., tests of intelligence or scholastic aptitude. A t test was carried out to see whether the index of co-linearity selected groups which differed on ACE scores (The American Council on Education Test of Scholastic Aptitude). No significant difference was obtained. To check whether scholastic aptitude would in any case have differentiated among quiz grades, Runkel correlated ACE scores for the 100 available cases with quiz grades and a positive correlation of .42 was found (significant beyond the .05 level). Thus it would seem that the higher quiz grades achieved by the co-linear groups was not due to differential selection on scholastic ability.

Runkel concludes that "whatever the abilities of the individuals, the effects of communication also depend on the structural similarity of viewpoints which mediate "sending" and "receiving" in communicative interaction." (p.190) In essence, Runkel is implying that when such co-linearity exists, communication is more effective regardless of other variables. In fact, Runkel makes a great distinction between

what he terms interaction and experimental variables. He defines interaction variables as those variables operating between individuals in the communication process itself, e.g., cognitive similarity. Experimental variables refer to those variables operating within each individual and which are used to compare individuals on specific attributes, e.g., authoritarianism. In making this distinction, Runkel states that the latter lead to hypotheses that individuals will show certain behaviours rather than others when in communication depending on whether they are the same or correspondingly high or low on attribute X. Interaction variables lead to hypotheses that individuals will show certain behaviours rather than others, regardless of whether they are the same or correspondingly high or low on attribute X, so long as it is used as the basis of communication between them.

Runkel may be making a false dichotomy. If attribute X is used as the basis for communication then an awareness of this attribute from other potential responses must exist. It must be a variable operating to greater or lesser degree in both individuals. As well as using it as the basis to organise their responses, individuals may be simultaneously high or low on this attribute dimension. The two aspects would not seem to be mutually exclusive and there is a central question as to whether cognitive similarity is a general characteristic or whether it can be explained in terms of other variables which Runkel would describe as experimental.

However, if cognitive similarity is a facilitating mechanism in communication which leads to greater effectiveness of communication and, in educational situations to greater achievement and success, then

Runkel's findings have implications for education. If such similarity of structure exists, there is the problem of whether a lecturer can communicate his cognitive structure to students who do not possess it or whether it is possible to increase the number of people with whom one is cognitively similar. This, of course, implies a factor of change and it would seem necessary to determine variables in the situation which may influence a change from a position of cognitive dissimilarity towards one of cognitive similarity. It also implies a full understanding of the variables involved in cognitive similarity before there can be manipulation of any of these to produce change.

There is also a less practical implication though nevertheless one which is theoretically possible. Students either in colleges or schools have traditionally been grouped on a variety of dimensions, e.g., age, ability, major subject area, common course structure, etc. Each method of grouping has its own advocates and much research has been generated in seeking to establish which grouping is most effective, e.g., the controversy into the advantages of "streamed" and "unstreamed" classes. If cognitive similarity could be firmly established as a general characteristic with clear criteria and reliable and valid methods of measurement, then it would be theoretically possible for students to be grouped on the basis of cognitive similarity with a given instructor. One would assume that if students were working with an instructor with whom they were cognitively similar, there would be greater likelihood of success.

In considering the educational implications of Runkel's research the writer has made many qualified statements. Undoubtedly Runkel's

research raises many questions. A full critique is given in Section 2 which deals with the experimental design and methods of the present study.

S E C T I O N 1 (d)

A REVIEW OF RESEARCH BY TRIANDIS IN RELATION TO COGNITIVE SIMILARITY

As described in Section 1 (c), research by Runkel (1956) has investigated cognitive similarity as a facilitating mechanism in communication. Further research by Triandis, (1959, 1960) has extended the concept of cognitive similarity in relation to interpersonal liking and effective communication. Triandis has attempted to discover whether different types of cognitive similarity exist, to establish measures of these and investigate their relationship to each other and to communication. His investigations relate to:-

(a) categoric similarity,

(b) attribute similarity,

(c) syndetic similarity,

(d) D matrix similarity,

(e) symbaditic similarity.

This Chapter will describe the types of cognitive similarity investigated by Triandis, the methods used and his findings in relation to effective communication and interpersonal liking.

Categoric similarity is explored by Triandis (1959a), in relation to interpersonal communication between supervisors and subordinates in industry. The concept of categoric similarity is related to the work of Hayek (1952) in perception and Bruner, Austin & Goodnow (1956) in thinking which is based upon the function of categorisation in these processes. It would seem that if categorisation were an integral and central concept in these processes that it would also be an important factor in communication. If two individuals A and B categorise concepts, events, objects, etc., in similar ways then they should be able to communicate more effectively. Similarity in categorisation implies that

A and B use the same or similar dimensions in judging whether or not concepts X_1 X_2 X_3 ..... X_n belong together. A measure of the categorisation of S's was obtained by an adaptation of the now widely used Kelly Role Repertory Test, (1955). Twelve triads of jobs, e.g., welder, teacher, clerk, and twelve triads of people, e.g., workers and supervisors in the employees division, were presented to S's. They were asked:-

(1) Which one of these three jobs (people) is more different from the other two?

(2) Why?

(3) What is the logical opposite of the characteristic that makes it different?

Lists of characteristics of jobs and people were obtained for each subject. These lists were subjected to comparative content analysis and rated as to their similarity by two judges. As a measure of effective communication, successive interval scales on perceived communication effectiveness and liking between boss-subordinate pairs were constructed.

Attribute similarity is very closely allied to categoric similarity. Both spring from a consideration of the research by Hayek (1952) and Bruner Austin & Goodnow (1956). Both are measured by an adaptation of the Kelly Role Repertory Test, (1955). Both relate to similarity in the dimensions used by A and B when examining events in their environment. It is difficult to understand why Triandis (1960a) makes a distinction. In some of his research categoric and attribute similarity are regarded as synonymous. However, attribute similarity was investigated in relation to dyadic communication. As defined by Sears (1951), dyadic

relationships are such as those between parent-child, teacher-student, therapist-patient, or supervisor-subordinate. Since Triandis (1960a) used 40 undergraduates of presumably equal standing, in this instance it is perhaps best interpreted as communication between two individuals. Attribute similarity was measured by an adaptation of the Kelly Role Repertory Tests (1955). 12 triads of pictures were presented to S's. These were pictures of emotional expression from the Engen, Levy & Schlosberg set available in Morgan's (1956) workbook for introductory psychology. S's were asked:-

(1) Which of these three pictures is more different from the other two?

(2) Which of its characteristics makes it different?

(3) What is the opposite of the characteristic that makes it different?

A list of dimensions was obtained for each subject. Lists from subjects were subjected to comparative content analysis using a scoring key, e.g., 10 points when A's dimension was identical with that of B, 8 points when the dimension consisted of synonyms, etc. The measure of effective communication was based upon 6 "games" played by pairs of S's. S's could not see each other although they could communicate and each had two pictures, one of which was the same for both subjects. The task was to discover which was the common picture (they were the same pictures as used in the measurement of attribute similarity). "Messages" between A and B consisted of pairs of polar opposites, e.g., depressed-excited, intelligent-unintelligent, and a number, 1 - 7, signifying the degree to which the first adjective described the picture. An operational measure of communication effectiveness was given by the number of Games

won by pairs of S's.

The remaining three types of cognitive similarity, syndetic, D matrix and symbaditic, are all based upon research by Osgood et al, (1957). In this research, attitudes and communication are related to the concept of semantic space, i.e., that the meaning of a sign is constructed by the space defined by semantic scales (polar adjective scales) which describe the sign. As Triandis (1960b) points out, all three types of cognitive similarity are based on the same data but are simply different ways of computing similarity. Osgood's Semantic Differential is the instrument used to measure these types of cognitive similarity. This instrument, consisting of a series of polar adjective scales on which a concept is rated, will give a semantic differential profile.

In investigating syndetic similarity, Triandis argued that cognitive similarity would exist and communication be more effective when there was similarity in the semantic differential profiles produced by individuals. Triandis constructed a 14 scale semantic differential. This used factors which had been identified by the Thesaurus Factor Analysis (Osgood et al 1957) as defining the dimensionality of semantic space. Triandis' measure consisted of 4 evaluative (good-bad), 3 potency (strong-weak), and 2 activity (fast-slow). One scale for each of the 5 remaining factors was used, i.e., stability, tautness, novelty, receptivity, aggressiveness. The number of scales used to represent each factor was proportional to its importance as measured by the percentage of common variance attributed to that factor in the Thesaurus Factor Analysis. The scale was used in relation to the

following 10 concepts: Art, Friend, God, Power, Science, Church, Money, Sex and Theory. In syndetic similarity, similarity of profile was used to establish cognitive similarity.

D matrix similarity uses the same data but measures similarity in the grouping of concepts in the semantic space of individuals. The name derives from Osgood's procedure for the measurement of distance between concepts which used the D statistic. For instance, A may consider God and Church to be close together in his semantic space. He may consider Art and Literature to be close together too. However, the first "group", i.e., God and Church may be relatively far from the second two. On the other hand, B might group God and Literature and Art and Church together. In this event, A and B would be low on D matrix similarity. This type of cognitive similarity is thus a measure of interconcept distance.

Symbaditic similarity, as defined by Triandis, measures the extent to which various scales on differentials are intercorrelated in the perception of the communicators. For instance, A might class together the scales good-bad and moral-immoral. If B can be supposed to be a criminal then acts which are against the moral code may be perceived as good. Therefore, the dimensional correlations between A and B would be low. Triandis postulates that the greater the intercorrelation of these scales, the greater the communication effectiveness.

Effectiveness of communication related to syndetic, D matrix and symbaditic similarity was measured in the following way. The S who completed the semantic differential profile was known as the "encoder". The "decoder" was the S presented with the profile produced by the

"encoder" and required to "decode" the information. For instance, the semantic profile produced by a given encoder while judging the word "Church" was presented with the words Church-Friend-Science. The decoder was judged correct if he chose the word Church from the triad of words presented to him in the message. Each subject functioned as a decoder for semantic differential messages produced by 4 different encoders. The encoders were chosen so that they were cognitively similar to the decoder in various combinations of types of cognitive similarity. Thus all three types of cognitive similarity were related to this measure of communication effectiveness. The operational measure of effective communication was the number of profiles correctly decoded. In one of Triandis' industrial studies (1959c) syndetic similarity was also related to the criterion of perceived liking and communication effectiveness between supervisor and subordinate (see categoric similarity).

In Triandis research, the central hypothesis is that cognitive similarity (as measured by the various indices he investigated) would lead to greater effectiveness of communication. In considering the relationship between syndetic, D matrix and symbaditic similarity and communication effectiveness, Triandis (1960b) tested a variety of hypotheses. In summary, Triandis found that of the three types of cognitive similarity tested, only syndetic similarity was significantly related to communication effectiveness. D matrix and symbaditic similarity gave no significant results although the trends in the means of communication scores were in the predicted direction. Syndetic similarity would seem to give a general index of overall similarity between the profiles of the two S's. However, Triandis does point out

that the other types of similarity may have proved to be important with a more heterogeneous sample of S's, concepts or both.

Triandis (1960a) investigated the relationship between attribute similarity and effective communication. This was based on the adaptation of the Kelly Repertory Test which used pictures and where effective communication was measured by "games" where S's were required to identify pictures. Triandis' main hypothesis was supported, i.e., the greater the attribute similarity the greater the communication effectiveness in a dyad.

Triandis (1959c) also investigated the relationship between categoric and syndetic similarity and communication effectiveness. It will be remembered that categoric similarity involved an adaptation of the Kelly Repertory Test which used characteristics of jobs and people. Since long standing permanent relationships were necessary to the study, supervisors and subordinates in industry were used as S's. Here Triandis found two significant relationships:-

(1) Categoric similarity based upon people was significantly related to communication effectiveness and liking for supervisors.

(2) Syndetic similarity based upon jobs was significantly related to communication effectiveness and liking for supervisors.

There was no significant relationship between effective communication and liking and categoric similarity based upon jobs or syndetic similarity based upon people. As Osgood showed, this may have been due to the difference in the representativeness of the concepts rated, e.g., in rating syndetic similarity based upon jobs, the range was more diverse and representative while the range of "people" was more

homogeneous with the possibility of all falling into the supervisory class. As Triandis points out, an extension of this explanation could account for the greater effectiveness of categoric similarity based upon people. As well as establishing a relationship with effective communication, Triandis also related cognitive similarity to perceived liking. He found that the greater the categoric or syndetic similarity between supervisor and subordinate, the greater the probability that the supervisor would choose that subordinate in a sociometric test. Triandis concluded that there was evidence supporting the hypothesis that cognitive similarity is a significant variable in interpersonal communication and liking.

It would seem therefore that Triandis has extended Runkel's concept of cognitive similarity and established that this can be determined by a variety of indices and is indeed significantly related to a variety of measures of the effectiveness of communication. One would seem to be on less firm ground in establishing a relationship between cognitive similarity and liking. Certainly it is via interaction and presumably effective communication that perceived liking can be observed. But perhaps it should be remembered that effective communication can reveal antipathy too. The escapee freezes to immobility when the guard shouts "Stop or I shoot". There has certainly been effective communication but liking is probably non-existent. Less extreme examples may probably be given at a common sense level from examples among one's acquaintances. However, as most research in social psychology indicates and as is shown in Newcomb's model (1953), there appears to be a cycle involving cognitive similarity-communication-liking. It would appear

that when one of these exists in greater degree then there will tend to be a greater degree of "meshing" on the other dimensions. As Newcomb (1953) suggests, the main thread running through these interpersonal relationships is similarity - similarity of values, beliefs, attitudes, etc., which tend to affect the characteristic ways in which individuals orient towards each other and their environment. These similarities affect the relationships and are in turn affected by them. It is along this dimension that Triandis' thinking is more closely allied to that of Newcomb rather than that of Runkel. As has been shown, Runkel tends to minimise the importance of intrapersonal variables. Triandis' research tends to show strongly the effects of group solidarity and group norms upon cognitive similarity.

Group solidarity appears to involve similarities of personal characteristics, value systems, beliefs, etc., as well as relying upon such conditions as spatial proximity and amount of interaction. In his research, Triandis (1959a,b, 1960a) showed that natural groups, e.g., managers, workers, clerks, use in addition to sets of similar dimensions in the categorisation of stimuli, dimensions idiosyncratic for that particular group. There is greater attribute similarity within these groups than between these groups. There is also greater syndetic similarity within groups than between groups. It would seem that each person employs a number of dimensions when he considers a particular event. Which dimension he employs depends to some extent on his membership in various groups. Also the position assigned to the particular event on chosen dimensions also seems to reflect and be determined by group membership. The individual's responses therefore

are partly idiosyncratic and partly reflect a group norm. He is responding to similarities generated by group solidarity. Triandis (1960a) suggests the following model - when people form groups they develop common norms. This increases their cognitive similarity. Greater cognitive similarity results in greater communication effectiveness within the group, which in turn facilitates the attainment of group goals. The attainment of these group goals reinforces the members of the group. This in turn leads to increased liking between the members and this will increase the interaction rate. This higher interaction rate will lead to further increase in cognitive similarity and so the cycle is reinitiated. This model appears to be well supported by theoretical and experimental evidence in social psychology.

Throughout Triandis' research there emerges the idea of similarities on a variety of dimensions being built into cognitive similarity. Does cognitive similarity operate as Runkel (1956) suggests or is it a total reflection of other similarities on other intrapersonal variables? Triandis' research, unlike that of Runkel, seems to suggest the latter situation and hence is following more closely the model outlined by Newcomb.

Triandis' research also has implications for education in that his findings are relevant to studies of attitude change. Attitude change can be regarded as an important part of the lecturing situation. Triandis (1960b) suggests that if the communicator can familiarise himself with the audience's dimensions and can construct his messages so that they are channelled within the dimensions used by his audience,

S E C T I O N 1 (e)

COGNITIVE SIMILARITY IN RELATION TO THE WORK OF BARTLETT

then he will increase the probability of his success in changing the attitudes of his audience. However, it would seem that until a great deal of further research is done, Triandis' suggestion is a theoretical rather than a practical proposition.

In summary, Triandis' research has shown significant relationships between various kinds of cognitive similarity and effective communication and liking between individuals. In contrast to Runkel's research, he has also shown the importance of intrapersonal variables. As discussed in Section 1 (b) other research has shown the importance of such variables in communication. An individual's attitudes, beliefs, values, etc., affect the reception of new information, e.g. Campbell's (1950) research into attitudes towards Communism has shown how pro or anti Communist attitudes affect the rejection or acceptance of information received. Such variables were operating in the measures of both Runkel and Triandis. In ordering statements in the index of co-linearity, subjects were required to make value judgements of the content. Certain of Triandis' measures related to attitudes towards categories of people and jobs. Although attitudes are obviously part of cognitive functioning, Runkel emphasises that it is similarity of cognitive structure which is important. Is there a measure which could attempt to reveal structure per se rather than attitudes linked to specific content? The following Chapter will discuss the work of Bartlett (1958) on Thinking as this research may be regarded as providing an exploratory measure of cognitive structure.

Research by Runkel, Triandis, has explored certain measures of cognitive similarity. Other indices may exist which can give effective measures of other types of cognitive similarity. One possible index of cognitive similarity may be related to the work of Bartlett (1958) which investigates the use of gap-filling strategies in thinking. This Chapter will describe Bartlett's general theory, with particular reference to thinking within closed systems and discuss the implications of this work in relation to cognitive similarity.

Bartlett points out that the term "thinking" has become a polymorphous concept. Sometimes it is used as a synonym for remembering, believing or doubting, etc. Often it implies more than a simple response to the environment. Indeed most psychologists, e.g. Hebb (1949) regard thinking as the ability to add something to whatever can be learned from the environment. However, Bartlett believes that this can, in general, be said of all cognitive processes and does not define the particular characteristic of thinking. According to Bartlett, this characteristic is "the use of any contributary sources of evidence that are available to reach a terminal point which is treated as if it had not been achieved before", (p. 74) The phrase "treated as if it had not been achieved before" is of particular importance. The terminal is treated as inherent in or necessitated by the evidence. It is never merely recalled as having been achieved before. Hence, for Bartlett, thinking is not simply the description by perception or recall of what is present - but rather the use of information about something present to reach somewhere else. The thinking person responds to these two points as being linked in some way. Therefore there is

always present the possibility of a succession or series of interconnected steps between information present and a terminal point. Thus Bartlett views thinking as "the extension of evidence in accord with that evidence so as to fill up gaps in the evidence; this is done by moving through a succession of interconnected steps which may be stated at the time or left till later to be stated." (p. 75) As Bartlett has shown, it is through the gap-filling nature of thinking and the employment of steps to reach a terminal point that an experimental approach to thinking is possible.

Bartlett views thinking as a complex high level skill which it is possible to study by simple but related behaviour. Like thinking, bodily skills are based upon stimuli impinging directly or indirectly from the environment. In these skills, many different effector and receptor functions combine into a significant succession which has the inherent characteristic of direction and moves to an outcome regarded as a natural terminus.

Bartlett defines the characteristics of bodily skills and suggests that basically four main properties are involved - timing, stationary phases, a point of no return and directionality. Timing has little to do with absolute speed. Efficient bodily skills depend more upon a smooth regulated flow of movement and often involve a degree of anticipation. Such skilled movement also depends upon stationary phases when stimuli have to be perceived, e.g., size, exact position, shape, etc. These "halts" regulate the timing and flow of movements. There also appears to be a point of no return when further input of signals cannot produce a result because it is ignored or fails to be

noticed. If an attempt is made to incorporate the new stimuli and the movement is modified, then error usually occurs. Directionality is, of course, a property which can belong objectively to the movements themselves. It is also a property which is perceived and acknowledged by the operator while he works. These basic properties in skilled performance have all been shown to be measurable, e.g., timing has been measured in threshold tracking and reaction time experiments.

Bartlett believed that thinking as a skill could be investigated in relation to the properties of skilled bodily performance. In an experimental situation, one could observe instances of thinking where gaps could be filled by a series of interconnected and articulated steps. One could be objective and not rely, as so much previous research had done, upon what the thinker could say about his own performance. It would thus be possible to see whether, like lower forms of skill, thinking had, for instance, its point of no return or when appreciation of directionality became important. In essence, this appears to be Bartlett's central thesis; he views thinking as a natural development from earlier established forms of bodily skilled behaviour.

Bartlett investigates many interesting features of what he defines as adventurous thinking and thinking in open systems. However, of particular relevance to this present study are his investigations of thinking within closed systems, i.e., systems with a limited number of units or items where properties are known and do not change as thinking proceeds. These units may be arranged in a variety of orders or relations. Thinking within closed systems is not the commonest or simplest form

of thinking but is the most amenable to controlled investigation. It can be investigated by three gap-filling processes:-

(a) interpolation,

(b) extrapolation,

(c) re-interpretation.

All thinking can be illustrated by one or more of these processes.

The use of interpolation in gap-filling is based upon instances where information is given, then more information and between there is a gap. This gap requires to be filled with whatever evidence is available from the information supplied. This can be illustrated by simple numerical or verbal systems, e.g.,

1 17

"Take 1 as the first and 17 as the last number and fill up the gap between them in any way that seems to be indicated."

It would be possible for S's to respond, e.g.,

1 3 5 7 9 11 13 15 17

or

1 9 17

or in any one of a number of ways of their individual choice.

Similarly in a verbal system, e.g.,

A, BY HORRIBLE

"Look at the terminal words and fill up the gap in any way that you think to be indicated."

It would be possible for S's to attempt to fill the gap in a number of ways even though it is possible to extract a rule, i.e., alphabetical progression and numerical increase. Usually ingenious attempts are made

to construct a sentence from the material.

In extrapolative thinking, the way to a solution is provided but the rest of the route and terminal points have to be constructed or discovered. As with interpolative thinking, a few steps of related sequence are given and it is necessary to shape further steps, e.g.,

A, GATE, NO, I, DUTY, IN, CAT, BO, EAR,

O, TRAVEL, ERASE, BOTH, GET, HO, FATE.

E R A S E
F A T E

"Complete the vertical arrangement taking "erase" as the middle word." This resolves into a numerical and alphabetical progression, i.e., it is possible to extract a rule

A
B O
C A T
D U T Y
E R A S E
F A T E
G E T
H O
I

Again, the ways in which individuals can respond to the stimuli are varied. One or other of the two dimensions, numerical or alphabetical, may be ignored. Often S's will attempt to construct sentences from the material. Other examples include for instance,

1234, 2134, 2143 .....

"Change the position of the numbers in successive steps until you reach an arrangement where it seems natural or sensible to stop." Again it is possible to extrapolate a rule but S's respond in individual ways. They often continue simply to change the numbers in haphazard

fashion.

In instances of re-interpretation, all available items are present but need to be re-examined in different or unusual ways. As Bartlett points out, because the disguise has to be penetrated, the solution involves a problem solving process. Examples would include interpretation of anagrams, scale drawings etc., or, as cited by Bartlett, an example of simple arithmetic in disguise, e.g.,

DONALD
GERALD

ROBERT D = 5.

The problem implies, of course, a right or wrong solution. However, as Bartlett remarks, there is no evidence that thinking only exists when the right solution is reached. Here the key step is E = 9. Even after discovery of this step, Bartlett found great variations in the route taken to a terminal point. Usual processes included analysis with all moves formulated or alternatively a "leap" to a conclusion with no moves formulated till the conclusion had been reached.

Obviously many of Bartlett's findings concerning thinking within closed systems relate to his central hypothesis, e.g., an appreciation of directionality was found to be important in the Donald/Gerald problem and instances of a point of no return were evident in interpolative thinking. However, many of Bartlett's general findings have implications in relation to viewing his work as a possible index of cognitive similarity. The important characteristic of the thinking process as defined by Bartlett is that evidence or information is present which is treated as possessing gaps or being incomplete. These gaps are filled by extending or supplementing evidence and so use is

made of sources of information besides those which initiate the process. Between initial information and a terminal point there is always theoretically a succession of interconnected steps which can be described before or after the terminal point is reached. It cannot be assumed that these steps are the same steps in the same order or even that the terminal point will be the same. Thus, in Bartlett's instances of interpolative, extrapolative and re-interpretative thinking within closed systems, S's are presented with stimuli to which they must respond by organising available data. From a multiplicity of potential responses they select those which are seen as linking terminal points or even select terminal points. It may be that individuals who are cognitively similar employ similar gap-filling techniques, thus organising cognitive fields in a similar way.

In establishing an index of cognitive similarity, it would seem that essentially the following situation and conditions must exist. There must be a situation where S's receive the same stimuli and have opportunities to react to these and organise their responses in individual ways. It must also be a situation which will give evidence for comparison so that it is possible to establish similarities or dissimilarities in the individual responses of S's. How do Bartlett's findings in general provide for these conditions?

(1) In Bartlett's examples of thinking within closed systems, all S's are given the same stimuli but there is ample scope for individual response. As Bartlett points out, there are always many more ways in which it is theoretically possible to fill gaps on evidence than the gap-filling techniques which are generally employed. However, gap-filling

techniques are still diverse and can be very idiosyncratic.

(2) There is, of course, a minimal amount of information below which there is greater scope for individual response, i.e.,

A HORRIBLE

gives greater scope than the maximal information contained in, e.g.,

A, BY, COW, DATE, EVERY HORRIBLE.

Here the situation is obviously more structured. Thus uniformity of response increases with the number of items given. However, by gradully increasing the number of clues, i.e., A, A BY, A BY COW, etc., it would be possible to establish similarities in the appreciation of a point of no return when the solution becomes inevitable. Even when the rule dictates the inevitability of the next step, there will be differences in when this is appreciated. Bartlett's S's varied in the number of clues they needed to appreciate the direction to the terminal point.

(3) Bartlett found that in gap-filling, the number of steps was more easily defined than the order but that the order varied more than the number of steps. On both dimensions it would be possible to establish similarities or dissimilarities in the responses of S's.

(4) It was found that the direct "leap" to a conclusion was less common than an analytical approach. This in itself would provide evidence of similarities. But regardless of which approach is used, moves are formulated either before or after the terminal point is reached. These steps would provide evidence for similarities or otherwise in the gap-filling technique used.

(5) Bartlett found that immediate transfer was not guaranteed, i.e., there was little transfer from a numerical system involving extrapolation

of a rule to a verbal system requiring extrapolation of a similar rule. Often, if the rule was discovered, S's would break the rule. Thus there is no guarantee that S's would respond in the same way if given similar problems in either system. Again, points of similarity could be established as to whether or when transfer apparently did or did not occur.

Thus there exists a situation where there is not only scope for individual response but also, because of the gap-filling techniques which it is necessary for S's to employ, a comparison can be made of responses of S's and similarities or dissimilarities established.

Appendix A gives an example of the instrument used to establish cognitive similarity based upon Bartlett's concept of gap-filling. This technique integrates and adapts Bartlett's examples which give opportunities for interpolative, extrapolative and re-interpretative thinking processes. In contrast with the indices of Runkel and Triandis, this provides not only a measure of similarity but gives an indication of how responses are structured. From their measures Runkel (1956) and Triandis (1959, 1960) knew if the responses were similar but had little indication of how this arose. Also the re-interpretative process is tapping a problem solving dimension which was not possible in the indices used by either Runkel or Triandis. The measure also has the advantage of not being tied to specific content thus reducing the opportunity for other intrapersonal variables to operate, e.g., responses will not reflect attitudes towards the material used as a stimulus.

As this technique has not been used before to establish cognitive

similarity, it is impossible to say how effective it will prove to be. One would optimistically expect that it would give as good an indication of cognitive similarity and communication effectiveness as the index used by Runkel (1956). However, unlike Runkel's findings, it could also be anticipated that the variable of intelligence would be highly important. Although Bartlett did not test this hypothesis he observed that there appeared to be a relationship between high intelligence and the ability to use minimal information effectively in gap-filling. Obviously, there was less opportunity for this variable to operate strongly in the indices of either Runkel or Triandis. It may be that in using Bartlett's technique, those cognitively similar or dissimilar are differentiated on the basis of intelligence. However, since no other research has related intelligence to the ability to use minimal information in gap-filling, this would be an interesting finding in itself.

Section 1 has attempted to relate problems of effective communication between lecturers and students to a wider background of research into interaction and communication processes generally. Within this context the concept of cognitive similarity has been discussed in detail in relation to the measures of this variable suggested by Runkel and Triandis. A further exploratory measure of cognitive similarity has been suggested. Examination of the research reveals the need for further investigation since many problems are generated by the research of Runkel. These form the basis of the present study and will be discussed in the following section.

S E C T I O N 2.

(a) Statement of the problem.

(b) Experimental design and statistical methods.

(c) Experimental sample.

(d) Methods and Measures.

SECTION 2(a)

STATEMENT OF THE PROBLEM

In the previous section it was seen that research by Runkel (1956) and Triandis (1959, 1960) has attempted to establish cognitive similarity as a phenomenon which does exist and which is measurable by a variety of indices, e.g., linear ordering of statements, semantic profiles, categorisation etc. Both researchers conclude that cognitive similarity leads to greater communication effectiveness and, in the case of Runkel, this is equated with greater efficiency in the transfer of information as seen in the achievement of higher grades by students cognitively similar to the lecturer. Obviously, if cognitive similarity is a facilitating mechanism in communication between lecturers and students, the research has implications for education. This Chapter will therefore examine problems raised by Runkel's research in relation to his general and specific findings and suggest how further investigation may lead to greater understanding of the concept involved.

Basically, the following situation exists. Individuals are given 5 stimulus statements. They are asked to select those with which they most and least agree in triadic arrangements of these statements. Individuals may respond in one of any number of ways, i.e., they select from the availability of potential responses. In essence, they are making value judgements and organising the statements into a certain preferential order, i.e., statements are given a certain weighting and a priority order established. From these preferential orders groups can be differentiated. Certain individuals whose preferential order is compatible with that of a given lecturer are known as cognitively similar to that lecturer. Others who react in a different way and show

no compatibility of response to that of the lecturer are known as cognitively dissimilar. On this basis Runkel argues that because they have selected and ordered statements in a similar manner they will communicate more effectively because they have similar response patterns, i.e., they have structured cognitive space in a similar way. Thus, presumably, individuals would communicate more information if they were cognitively similar than if they were dissimilar. One would suppose that in the lecturing situation all students would attempt to appreciate the lecturer's frame of reference, those cognitively similar being more successful in this than those dissimilar. Therefore, according to Runkel, those cognitively similar with the lecturer would achieve higher grades.

Examination of the basic situation raises two main areas of concern:-

(a) cognitive similarity in relation to the total communication situation,

(b) cognitive similarity in relation to the communication situation as a dynamic situation.

These areas are, of course, interrelated, i.e., in taking cognizance of the total situation this must necessarily be recognised as being dynamic. However, for present purposes some categorisation of argument is necessary and problems will be discussed in relation to the above areas.

(a) <u>Cognitive similarity in relation to the total communication situation.</u>

It would seem that Runkel's research does not take cognizance of the total learning situation and communication processes implicit in lecturer-student interaction. It is scarcely possible to attribute the

achievement of higher grades wholly to cognitive similarity without investigation of the total situation - either holding other variables constant, randomising their effects and/or investigating those considered of most importance. Runkel does investigate two possibilities:-

(a) the effect of differential scholastic aptitude,
(b) the effect of the existence of an attitude norm.

The effect of ACE scores on grouping and achievement was investigated and no significant correlation found. However, S's were required to express an opinion and make value judgements in response to the stimulus statements. There is no suggestion of a right or wrong response or of one response being more intelligent or more acceptable than another. Since the index was scarcely likely to differentiate groups on the basis of scholastic aptitude when this was not built into the situation, it is scarcely likely that the end product, i.e. achievement of the groups, would be related to this factor either. Undoubtedly in Runkel's research the cognitively similar group were significantly greater in achievement. This may have been due to other variables operating in the total situation either related to or apart from cognitive similarity. It may be that since value judgements were required, students cognitively similar to the lecturer shared similar value systems in general with this lecturer. In the lecturing situation they may have been more appreciative of his frame of reference and achieved higher grades because of this variable. It may be that in accepting certain stimulus statements and rejecting others, S's were revealing something of the structure of their belief systems and a degree of open or closed-mindedness of such systems in their preferential ordering. If groups were differentiated on this basis

then the cognitively similar group may have been more open-minded, more responsive to the ideas put forward by the lecturer and this factor may have affected their achievement of higher grades. As Runkel rightly points out, in any situation involving achievement it is always advisable to check whether the results reflect the influence of symbolic skill related to intelligence and scholastic aptitude. Since there is a predominance of verbal content in academic instruction and reading comprehension is important in all course, one might have imagined that Runkel would have given particular attention to the verbal component of the ACE test.

Runkel also investigated the possibility of students who were cognitively similar to the lecturer responding to a general "cultural frame of reference", i.e., an attitude norm could exist if lecturers were all cognitively similar to each other. The question raised is attitude to what? Attitudes exist with regard to attributes related to persons, objects, situations, events, etc. Runkel categorically stated that the attributes used in ordering statements the stimulus situation were not known or of interest. Therefore, one cannot say precisely which attribute influenced the responses of which lecturers, particularly since the stimulus statements represented a highly heterogeneous rather than a homogeneous set of items. The most that can be said is that as measured by the ordering of statements related to their subject area, the attitudes of 5 lecturers to 5 highly diverse statements about psychology did not concur. This is hardly surprising - indeed it would have been more surprising had there been general agreement in their preferential ranking of these statements. In fact

Runkel appears to be arguing against his own thesis. Either the index of co-linearity measures cognitive structure or it measures cognitive structure plus other variables. One cannot say that grouping might well reflect attitudes and simultaneously attribute all effects to cognitive similarity on the basis of the same measure for both. However, this is not to say that individuals who are cognitively similar do not share similar attitudes of wider and definable compass. Such similarities may or may not exist and could have been explored with the use of any one of a number of standardised tests.

Although Runkel investigated two variables, there is a sense in which even these did not recognise the total learning situation. The variable of scholastic aptitude was related to the students themselves. The possibility of the existence of an attitude norm related to the lecturers themselves. Neither concerned lecturer and students in interaction.

In such interaction, i.e., in the total communication situation, there exists a wide diversity of variables. Such variables have been investigated by research in social psychology which deals specifically with interaction situations. Some variables are interpersonal, e.g., spatial proximity, amount, frequency and type of interaction. Others are intrapersonal and refer to, for example, the personal characteristics and experience of the individuals involved. As described by Brown (1965) any relationship involves interplay of these variables. There is meshing of both sets of variables, each influencing the effect of the other. This can be illustrated by specific research, e.g., the effect of intrapersonal variables related to projection on the inter-

personal variable of person perception (Chowdry & Newcomb 1952). This interplay affects the quality and kind of relationships which develop between individuals and is related to the effectiveness of communication between them.

This interaction of variables seems to involve and depend upon a search for similarities, either perceived or actual. Newcomb (1953) describes this as a "strain towards symmetry". This tendency appears to act as a kind of protective mechanism as individuals attempt to simplify and organise their environment into a coherent structure, seeking to preserve or restore consistency among their cognitions. The search for similarities and the mechanisms used to reduce imbalance is central to many theories of interaction. For instance, the theories of Heider, (1958), Osgood & Tannenbaum (1955) and Festinger (1957) all stress the importance of similarities on a variety of dimensions in relation to effective relationships and communication. Such theories were discussed in Section 1 (b). They suggest that relationships do not depend upon one type of similarity, but that a complex of similarities exists. Any communication is received into this complex. Its reception will depend partly on the perceived similarity of its content to that which already exists in the individual's cognitions and, since communication is inseparable from source, upon perceived similarities to the communicator.

Thus, in communication between lecturers and students there is both complexity of interacting variables and the complexity of a network of similarities based upon the interplay of these variables. Further, the total situation is not static. It is not a situation in

which similarity is established then the process of interaction grinds to a halt. As Newcomb (1953) suggests, the process is cyclic - similarity, interaction and effectiveness of communication can all reinforce and reinitiate the process of interaction. Cognitive similarity is not the summation of interaction but part of a self-perpetuating cycle. Processes within the cycle involve constant adaptation.

Within the complexity of the total situation can one really say that the value judgements of individuals in response to 5 stimulus statements gives a reliable or valid measure of similarities which do exist between individuals and which are important in interaction and communication? Even assuming that the index of co-linearity does give a measure of the total complexity there is - still a question as to whether cognitive similarity so defined is a composite of similarities on other variables or whether it exists apart from other similarities.

Both Newcomb and Triandis seem to suggest that cognitive similarities arises from similarities on other variables. For example, in "The Acquaintance Process" (1961), Newcomb found that cognitive similarity and communication effectiveness could be predicted from similarities on other variables, e.g., personal characteristics, background, interests, etc., of the students involved. Triandis noted that individuals who were cognitively similar gave, not only idiosyncratic responses, but responses which showed the presence of a group norm. These responses reflected the effect of similarities which both arose from and gave rise to group solidarity among managers, clerks and workers (1959c).

Yet Runkel's view is that the index of co-linearity not only measures similarity of cognitive structure but that such cognitive similarity exists independently of other variables. Consequently it would seem necessary to investigate cognitive similarity as defined by Runkel in relation to intrapersonal variables in the total situation. This would give an indication of whether those cognitively similar as defined by Runkel were similar on other dimensions too, and of whether the success of the cognitively similar group was wholly attributable to cognitive similarity.

(b) Cognitive similarity in a dynamic situation.

While it is necessary to recognise that communication between lecturer and student has its context in the total situation, it should also be recognised that this is a dynamic situation. It is one which is geared to generate change for it is both a communication and a learning situation.

There is a sense in which the prime function of communication is to bring about change. It could be said that communication has only been effective if change has taken place. This may be manifest in overt behavioural change, e.g., even the simplest communication "attention" brings about immediate change in physical behaviour. There may also be change in the sense that communication adds to existing knowledge and changes the sum of knowledge possessed about a given topic. There may be change in the deepening appreciation and understanding of this topic. Since any communication is integrated into an already existing framework of knowledge and ideas, there may be modification of existing opinions and attitude change. This latter aspect is relevant to the lecturing situation too, and has generated a great deal of

research in communication effectiveness, e.g., the Yale studies (1953) have investigated the effectiveness of communication with particular reference to attitude change. Such research has investigated the nature of the communication itself, e.g., the effect of order of presentation of argument, fear arousal appeals, etc. But most important has been the understanding that a communication is linked with its source. For instance, there is the interaction variable of source credibility, i.e., the effectiveness of a communication depends on the recipient's evaluation of the speaker. This, of course, requires a meshing of intrapersonal variables, e.g., the source is held as credible if it represents values and beliefs similar to one's own. Individuals will differ in their assessment of what constitutes a credible source. Research (Hovland, Janis & Kelley, 1953) has shown that change is more likely if the communication is perceived as originating from a source of high credibility. Mellinger (1956) found similar results in relation to the similar concept of trustworthiness of source. Other intrapersonal variables are also involved. For example, research by Janis & Field (1956), has been concerned with individual differences in responsiveness to persuasive communication and investigates the general factor of susceptibility to persuasion or "persuasability". In summary, the communication situation is one which promotes change and relies on the interplay of interpersonal and intrapersonal variables to bring this about.

The lecturing situation is also specifically a learning situation and this in itself implies change or modification of behaviour. Learning has been defined in many diverse ways. In general, all definitions refer to learning as changes in behaviour or performance as a consequencce

of training or experience. The lecturer acts as an instrument for change - provoking thought about his subject area, adding to the knowledge students possess about his own field and/or changing attitudes towards this subject area. Most lecturers feel some enthusiasm for their subject and are anxious to pass on knowledge and the results of experience to their students, encouraging further understanding and responsible thought about their area of interest.

Within this situation the students themselves are predisposed to change. However, there will be individual differences on a variety of intrapersonal variables which will affect interaction variables in the situation. Obviously, although all students will be predisposed to change, the intrinsic motivation of students will differ, e.g., some may be impelled by the strictly utilitarian motive of passing examinations or the motivating factor may be quite unrelated to the learning situation per se. Students will also differ in their capacity to change. Such capacity may be related to factors of intelligence, particularly the factor of verbal intelligence in a predominantly verbal situation. Alternatively, this capacity may be related to cognitive style and personality variables. Some students are more adaptable and flexible in their thinking than others and more willing to approach and accept new ideas. Such dimensions have been explored by Rokeach (1960) in relation to open and closed belief systems, (see Section 1 (b)). However, whatever individual differences exist affecting either capacity or willingness to change, or appreciation of the learning situation, predisposition to change is general to all students. To put the situation at its lowest level, it is in their own best interest to try to appreciate the lecturer's frame of reference

and accommodate to the situation.

Yet the importance of change seems to have been ignored by Runkel in his research. In the final sample only those students were considered who maintained a position of cognitive similarity or dissimilarity to the lecturer or to themselves. Runkel appears to have jettisoned the responses of students who changed throughout the course despite the fact that the whole situation militates towards change. There is the implication that cognitive similarity is only useful if it is fixed, permanent and stable, nicely definable like red hair and blue eyes. There is no recognition of different levels of cognitive similarity or that such levels could perhaps change in changing situations.

Although Runkel did not investigate students who changed their orientation, by using pre tests and post tests he presumably anticipated change in response. There is, however, no way of knowing whether Runkel anticipated change in only one direction. If, as according to Runkel, the index of co-linearity gives a measure of similar ways of thinking, then one would expect that the greater the interaction with the lecturer, the more S's would remain cognitively similar to that lecturer. Also, if cognitive similarity is an interaction variable as Runkel proposes, then responses should show a move towards an increase in the number of students who are cognitively similar. However, Runkel's results show an opposite tendency, i.e., some students who were initally cognitively similar move to a position of dissimilarity at the post test. Is this simply that the first result was wrong and that the measuring device was unreliable? One suspects the use of pre and post tests as being a concealed form of

testing the reliability of the index of co-linearity, i.e. testing consistency of response. Yet, having found that a considerable percentage of students changed their orientation, no further investigation of this change occurred.

If S's change from a position of cognitive similarity to cognitive dissimilarity or vice versa, over a relatively short period of time, then there are certain possibilities:-

(a) the measure of cognitive similarity, i.e., the index of co-linearity is unreliable,

(b) if the measure is reliable then cognitive similarity is an unstable variable which is liable to change. If so, Runkel might have asked himself why and investigated situational variables.

Another possibility, and the possibility which is most likely, is that it is the change which is important. If cognitive similarity is an interaction variable, then it will be affected by variables in the interaction situation.

The communication and learning situation is one which promotes change. Change in cognitive similarity takes place over this period of interaction. Therefore, it would seem necessary to understand the variables, either inter or intra-personal which influence change in the interaction situation. This is particularly important; if cognitive similarity is a facilitating mechanism which leads to greater communication effectiveness and greater achievement, then it would be desirable to increase the number of students with whom the lecturer is cognitively similar. To bring about this increase there must obviously be understanding of the variables involved and of whether the groups who change have certain characteristics in common. Why are some students susceptible to change their position of cognitive

similarity and why are some resistant? Why should there be change in one direction rather than another?

Examination of the total situation thus reveals a multiplicity of interrelated variables operating in communication between lecturers and students. The whole complex situation involves interplay and interaction of a diversity of variables. This is what one would expect. Even the simplest experiments in discrimination in psychophysics must take cognizance of a number of variables and their relationship, e.g., the effects of hue, intensity, surface texture etc., in colour discrimination. One would expect the number of variables and their interrelationships to be amplified considerably in the complex situation of personal relationships. Consequently, it is surprising that the complexity of such interaction receives little attention from Runkel. Runkel appears to reduce the situation to an incredible level of simplicity - even though there is an apparent awareness of the relationship between cognitive similarity and interaction. A great deal of Runkel's theoretical explanation centres upon an emphatic distinction between experimental and interaction variables and his proposal that cognitive similarity falls into the latter category.

Although he worked broadly within the framework of Newcomb's (1953) theory, Runkel's own explanation of cognitive similarity becomes enmeshed in an ambiguous dichotomy between interaction and experimental variables. His distinction may be summarised in this way. Experimental variables are those constructed by comparing individuals on certain dimensions. The assumption is that if individuals are correspondingly high, low or the same on these attributes, e.g., years of schooling,

authoritarianism, then they will show certain behaviours rather than others when in communication with each other. This in itself is a somewhat unusual definition of experimental variables which usually imply, rather than simple comparison, manipulation and modification of certain conditions within the experimental situation, e.g., the manipulation of the variable of frustration in relation to the dependent variable of aggressive behaviour. However, interaction variables, as defined by Runkel, are independent of whether individuals are correspondingly high, low or the same on certain attributes so long as the attribute in question is used as the basis for communication between them. Some interpretation is necessary since Runkel appears to use the term attribute with a variety of connotations. Presumably, it may be interpreted to mean that if individuals are judging stimulus statements according to, for instance, the attribute of authoritarianism then, regardless of whether they are correspondingly high, low or the same on this attribute, communication would be effective since in Coombs' terms, authoritarianism would constitute a mutual J Scale. Yet, contrary to this view, other research has shown that position of S's on an attribute dimension could be a vital and significant factor in effective communication. For instance, Campbell's (1950) research into attitudes to Communism has shown how pro or anti-Communist attitudes affect the rejection or acceptance of information received. Thus, it is difficult to accept the distinction made by Runkel, especially since his argument cannot be verified by the facts in his experimental situation.

In Runkel's experimental situation there is no way of knowing

whether an attribute is used as the basis for communication since no communication in relation to the attribute is known to exist. In obtaining a measure of cognitive similarity, lecturers and students are asked to respond to a stimulus quite divorced from the lecturing situation and from any interaction and communication. In judging statements, individuals may or may not use a common attribute but they are not in communication with each other. Further, there is no way of knowing if this attribute, whatever it may be, is important in the actual communication situation. Runkel states quite definitively that the attributes actually used in judging stimulus statements were not known or of interest to him. His interest lay, he states, in the structural similarity of orientations not their content. One wonders how it is possible to separate the two - especially when both are obscured by the vagueness of attributes anonymous.

It would seem, despite Runkel's emphasis upon cognitive similarity as an interaction variable, that the following situation exists. There is a measure of cognitive similarity which will later later be related to communication effectiveness but which is quite divorced from any interaction. The multiplicity of variables operating where there is indeed interaction is virtually ignored. Further, the measure of whether cognitive similarity has facilitated communication is one which could be measuring a number of variables arising from this interaction besides any effects of cognitive similarity. It would seem that Runkel regards the measure of cognitive similarity, the situation where it is operant and the measure of whether or not it had facilitated communication as operationally discrete although theoretically linked.

In summary it appears that Runkel has oversimplified a highly

complex situation. Such an oversimplification may be misleading as a model since, as has been seen, it proposes an interaction variable contrary to general findings in social psychology. Further, although Runkel may have defined cognitive similarity operationally, he offers little satisfactory theoretical explanation. Runkel appears to be suggesting that responses to the index of co-linearity are symptomatic of an overall cognitive orientation. Because S's make similar value judgements with regard to 5 statements, this similarity is a measure of their characteristic ways of structuring their environment in all situations. Further, there is the implication that similarities of value judgements in relation to the 5 statements override whatever other variables are operating in and between individuals in the actual communication situation itself. This would seem to be an extraordinarily naive assumption based upon an equally naive measure - and indeed a rather suspect measure since only 26% of Runkel's original population gave responses which could be used in the final analysis of data. However, the fact remains that although Runkel's explanation of his results may be unsatisfactory, the results themselves are interesting and have prompted the present study.

Despite the queries raised by Runkel's research, it is not possible to negate the existence or importance of cognitive similarity. Obviously, in the lecturing situation students are receiving new information and its reception is influenced by how well this can be integrated into already existing cognitive maps and how well it is "subsumable and relatable to stable elements in existing cognitive structure." (Ausubel, 1963), p. 105. It may very well be that

similarity of structure between individuals facilitates this process. Alternatively, although similarity of structure may tend to increase the effectiveness of communication, this effect may be offset if there are stronger opposite effects from other variables. In the total lecturing situation there is the question whether the facilitating effects of cognitive similarity and the higher grades achieved by those cognitively similar to the lecturer depend upon this mechanism being related to other similarities on intrapersonal dimensions. Basically there is also the problem of determining a valid and reliable measure of similarity of cognitive structure.

Runkel's results seem to suggest that the index of co-linearity is such a measure. One would maintain certain reservations until this measure was subjected to more comprehensive investigation. The measures used in the research by Triandis (1959, 1960), appear to have been equally effective. However, it should be remembered that such measures were directly related to Triandis' measures of communication effectiveness, e.g., this was measured by the ability of S's to decode semantic profiles produced in establishing cognitive similarity. Triandis' research represented an experimental and not a field situation. Perhaps in the total lecturing situation more stringent measures of cognitive similarity are necessary. The possibility exists of regarding an adaptation of the work of Bartlett (1958) as such an exploratory measure. The implications of Bartlett's work were described in detail in Section 1 (e). Although such a measure may be found to be "contaminated" by the variable of intelligence, it poses situations which reveal the gap-filling strategies of individuals and thus their cognitive structure in thinking within closed systems.

It may afford a more valid measure of cognitive structure per se than value judgements made in relation to stimulus statements.

There is also the question of whether it is really necessary to devise a measure which is outside the normal interaction situation. Runkel suggests that cognitive similarity is a general characteristic but other research seems to indicate that it is explainable in terms of other variables. An effective measure of cognitive similarity may be as easily obtained by seeking to establish similarities on cognitive dimensions basic to the interaction situation. Belief systems are central to cognitive functioning and provide the basis for the attitudes and values which influence how new information is modified and adapted for integration into already existing cognitive structures. Further, according to Rokeach, (1960) the organisation of belief systems shapes cognitive style in that open or closed belief systems can give rise to either rigid or flexible modes of thinking. An effective measure of cognitive similarity may therefore be found in the D Scale constructed by Rokeach. Similarly, another effective measure may relate to the Study of Values (Allport, Vernon and Lindzey, 1951), which would indicate similarities in the value systems of individuals. In the index of co-linearity, S's were required to make value judgements in relation to the stimulus statements. The Study of Values would sample a wider range of values and, unlike the stimulus statements, have the advantage of not being tied to a specific content area. Since values spring from beliefs there is a sense in which they Study of Values would also be an indirect measure of similarities of belief systems of individuals. Also, since both beliefs and values are

important in cognition, one would expect groups differentiated on the basis of the index of co-linearity to show similarities on both these dimensions if the index is indeed tapping cognitive structure.

In summary, because of the interesting nature of Runkel's results, it appears that the concept of cognitive similarity has implications for education. However, the queries raised by Runkel's research indicate the need for further investigation of the concept. Therefore, within the limits of the present study, it is proposed to:-

(1) Investigate the existence of cognitive similarity as defined by Runkel in lecturer-student relationships over a variety of subject areas in relation to communication effectiveness and achievement and test whether the results obtained by Runkel can be repeated.

(2) Now according to Runkel, communication is facilitated if students are cognitively similar to the lecturer. By this, Runkel presumably means that information is more readily transferred from lecturers to cognitively similar students than to cognitively dissimilar students. If Runkel's dimension of cognitive similarity is valid it would be reasonable to suppose that of the students who can be classified into co-linear or non co-linear groups then those who score highly on achievement during the course will be mainly co-linear with the lecturer.

(3) Investigate the possibility of cognitive similarity existing independently of or in conjunction with other variables and use other measures to examine groups established as cognitively similar or dissimilar by the index of co-linearity. Measures will be related to the variables of intelligence, scholastic aptitude,

belief systems, value systems and personal background.

(4) In relation to the variables listed in (3) to examine the characteristics of the transfer groups, i.e. those students who throughout the course change from their initial position of cognitive similarity or dissimilarity to the lecturer. Although Runkel's research did not include such an examination, it is felt that investigation of these groups is most important.

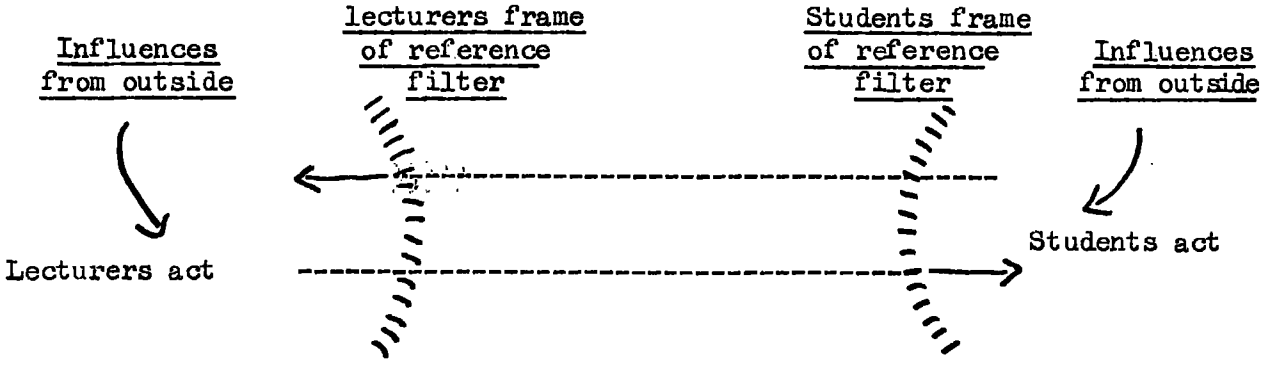
(5) Investigate the possibility of the existence of another measure of cognitive similarity in relation to the work of Bartlett on Thinking.

Further Chapters in this section will discuss the experimental design and statistical techniques and describe the sample of subjects and methods and measures used.

S E C T I O N 2 (b)

EXPERIMENTAL DESIGN AND STATISTICAL METHODS

The following is a symbolic representation of the foregoing Chapter to aid a more precise development of the experimental design. Runkel proposes the following paradigm as a model for interaction between lecturers and students.



Influences outside the immediate interpersonal 'system' include, for example, the individual's personal history, immediate environmental happenings, etc.

Solid lines represent intrapersonal communication via the nervous system etc.

Dashed lines represent interpersonal communication via speech etc., as indicated in the feed-back circuit.

From an examination of this paradigm the following questions arise:-

(1) Do the filters dictate the interaction?

(2) Does the interaction dictate the filters?

Obviously there is no definitive answer and any attempt at explanation must take cognizance of intrapersonal and interpersonal variables and their interrelationship.

In defining the components of both systems -

Let F represent variables in the frame of reference filter, i.e. intrapersonal variables,

Let I represent interaction variables, i.e., interpersonal variables.

Thus F = e.g., personality, background, attitudes, values, beliefs, need for achievement, cognition, intelligence, etc.

I = e.g., person perception, proximity, frequency of contact. According to Runkel I variables would also include cognitive similarity.

I variables represent lecturer and student in interaction,

$\therefore$ $I = L \longleftrightarrow S$ = amount and type of interaction.

In the total communication situation it follows that when

I_{min} then F_{max}

I_{max} then F_{min}

Thus the influence of either F or I would dominate depending upon which was operating maximally in the total situation.

Therefore, it follows that the effects of cognitive similarity should be greater when I variables are operating maximally.

However, research shows that the greater the I variables, the greater possibility of F similarities operating, e.g., Homans (1950) shows a relationship between frequency of interaction and similarity, and suggests that the more frequently persons interact with one another the more alike in some respects both their activities and their sentiments become. Similar evidence is given by Heider (1958) who found proximity and frequency related to similarity and positive sentiments or liking. Also, it should be remembered that the greater the I variables the more all students would have opportunities to appreciate the lecturer's frame of reference and answer questions in the way in which he would prefer. Also the student may change his frame of reference towards that of the lecturer.

From this analysis it seems more consistent with other work in psychology to treat Runkel's variable, cognitive similarity, as an F variable rather than an I variable for in addition to the above work, it may be observed that:-

(a) The cognitive structure of a person exists independently of a particular interaction. The term interaction in this study is interpreted as it is operationally defined by Homans (1950, p. 35-36), i.e., "When we refer to the fact that some unit of activity of one man follows or is stimulated by some unit of activity of another, aside from any questions of what these units may be, then we are referring to interaction."

(b) Initial measurement of co-linearity is obtained independently of the interaction situation.

(c) Co-linearity refers to similar cognitive structures which are, in effect, arrangements of the F variables.

Therefore it follows that:-

(a) If I variables are operating maximally then the difference between co-linear and non co-linear groups should be minimal,

(b) if I variables are operating minimally, then the difference between co-linear and non co-linear groups should be maximal.

In this research project, I variables would be functioning minimally and the amount and type of interaction would be constant for all groups. Contact between lecturers and students was restricted to three formal lecture sessions per week. No tutorial or group seminar system operated. There were no societies or clubs related to subject areas. Thus, in the experimental situation, the difference between co-linear and non co-linear groups should be at a maximum.

In this lecturing situation, lecturers were assigned to students, i.e.,

Lecturers	A	B	C
Students	X_{a_1}	X_{b_1}	X_{c_1}
	⋮	⋮	⋮
	X_{a_n}	X_{b_n}	X_{c_n}

Using an index of cognitive similarity, the following grouping of students would be obtained:-

Cognitively similar	X_{a_1} ⋮ $X_{a_{m-1}}$	X_{b_1} ⋮ $X_{b_{m-1}}$	X_{c_1} ⋮ $X_{c_{m-1}}$
Cognitively dissimilar	X_{a_m} ⋮ X_{a_n}	X_{b_m} ⋮ X_{b_n}	X_{c_m} ⋮ X_{c_n}

X_1 = student 1

X_m = student m

Thus there are two groups of students:-

(a) those cognitively similar to the lecturer,
(b) those cognitively dissimilar to the lecturer.

On the dimension of achievement there are a number of possible outcomes:-

(1) there is no significant difference in the attainment of cognitively

similar or cognitively dissimilar groups,

(2) there is a significant difference in the attainment of cognitively similar and cognitively dissimilar groups,

(3) there is a predominance of cognitively similar students in the high attainment group,

(4) there is no predominance of cognitively similar students in the high attainment group.

The influence of the F variables can be investigated in relation to the following outcomes:-

(a) if there is no significant difference in the attainment of the cognitively similar group, then the grouping of those cognitively similar could be explained in terms of F variables,

(b) if there is a significant difference in the attainment of the cognitively similar group, then the grouping of those cognitively similar could STILL be explained in terms of F. variables.

To show that cognitive similarity was a variable which functioned independently of other variables, there would have to be no significant difference on the F scores of the two groups. Even so, it would still be theoretically possible to explain cognitive similarity in terms of F variables which have not been measured. Of the possible outcomes, 1 and 3 would support Runkel, but 2 and 4 would contradict his findings.

In the ideal study it is necessary to compare the performance of the groups with the performances of the lecturers on F variables, i.e., if lecturers and students who are cognitively similar show similarities on F variable scores, then the effects of lecturer-student interaction on grouping and attainment could be attributable to F variables. If lecturers and students who are cognitively similar show no similarity

on F variables then the effects of lecturer-student interaction on grouping and attainment could be attributable to a process of thinking which it had been impossible to isolate and which could be cognitively similarity. The practical difficulty of designing this type of experiment is that one must use the performance of the lecturer as a criterion for cognitive similarity. This means finding a group of lecturers who are cognitively similar to the same group of students. With such a group of lecturers it would be possible to investigate F variables and ascertain unequivocally whether or not they could explain cognitive similarity.

In the present study this was not possible, therefore the groups delineated as cognitively similar or dissimilar will be investigated with regard to the F variables using the lecturer as criteria for selection of the group.

The students who changed their position of cognitive similarity during the course will be investigated as a group in an attempt to determine whether or not they have any characteristics in common. This will involve the measurement of the F variables used in this study, (see Section 2(a)).

In order to investigate the alternative measure of cognitive similarity suggested by the work of Bartlett, groups will be differentiated on their responses to items in this measure. They will be differentiated into two groups - a popular response group and an atypical response group. These groups will be compared with the groups established by the Runkel measure to determine whether the two measures are comparable. Each group will be investigated in terms of achievement in the course. The groups will also be investigated in relation to the F variables used in this study.

STATISTICAL METHODS

From the description of the design it will be clear that the main comparisons are between groups, therefore it was necessary to select statistical tests that could determine if there was any significant difference between the performance of the various groups. Since a number of the measures used could only give rankings of performance, any test should take this into account.

A study of the various statistical tests suggested that the most versatile and powerful test for this purpose was the Mann-Whitney U Test. It had two main factors in its favour as far as the present study was concerned.

(a) it was 95% as powerful as a t test,

(b) it could be used on ranks and interval scales.

From these considerations, the Mann-Whitney U Test was selected as the main test to be used for the comparison of independent samples.

Part of the investigation was to study change in individuals. The only test available for this purpose was the McNemar test which was subsequently used.

To indicate levels of performance of the various groups on different measures the arithmetic mean and standard deviation were used wherever possible.

S E C T I O N 2 (c)

EXPERIMENTAL SAMPLE

The sample of subjects used in this study was drawn from students and lecturers in the Faculty of Education, University of Alberta, Edmonton, Alta, Canada.

The eight lecturers who co-operated represented a cross section of several subject areas, i.e., Maths., Social Studies, Music, Art and Reading. Their ages ranged from 28 - 69 years, with a range of 3 - 25 years of lecturing experience. The sample included 3 female and 5 male lecturers.

The initial sample of students included the entire second year population, i.e., 500 students. Data was collected during the second semester of the academic year 1966 - 1967. Roughly 50% of the student population tested initially were following a "Maths" route, i.e. they had already completed courses in Music, Art, etc. Their studies for the second semester thus included courses in Maths., and Physical and Social Sciences. The other 50% had completed studies in these subject areas during the first semester and were following an "Arts" route, including courses in Music, Art, Reading and Language Arts. All students had completed courses in Educational Philosophy, History and Psychology during their first year at University. Curriculum studies in the 2nd Year emphasised the application of principles derived from these previous courses to approaches used in teaching particular subject areas in classroom situations. The 2nd Year programme also included two teaching practices, each of three weeks' duration.

This initial sample of subjects was considerably greater than the final sample represented in the analysis of data. The loss of data was due to a variety of reasons. Some students withdrew from the course. Many students, because of illness or absence, did not complete the pre

or post tests used to establish cognitive similarity based upon Runkel's index of co-linearity. Some responses had to be rejected as incomplete. Also, as Runkel found in his research, many responses had to be rejected as inconsistent. No data was included where the experimenter felt any hesitancy in the interpretation of responses. Pre tests and post tests were given by lecturers during their course but the remainder of the data had to be collected in the students' free time. This inevitably led to further loss because of the necessarily voluntary nature of these sessions.

Numbers of students included in the final analysis are shown in the appropriate tables in the relevant sections of Part 3 which deals with the analysis of data. Throughout the analysis it will be seen that numbers vary slightly in relation to the various tests. This was inevitable since some students did not attend all voluntary sessions when data was collected.

In general, the age range of the students extended from 18 - 27 years. A small number of mature students were included in the sample. The sample includes many more female students than male students. Approximately one quarter of the S's in the final sample were male. Since the students were studying Education, the preponderance of female S's is not surprising.

S E C T I O N 2 (d)

METHODS AND MEASURES

In the present study a variety of methods and measures are used to establish cognitive similarity, investigate cognitive similarity in relation to communication effectiveness and consider certain intrapersonal variables in relation to the concept. This Chapter outlines the methods and measures used in relation to:-

(a) cognitive similarity as established by the index of co-linearity, (Runkel, 1956).

(b) cognitive similarity as established by an exploratory measure based upon Bartlett's work, (1958)

(c) achievement in course work as a criteria of communication effectiveness,

(d) intelligence,

(e) scholastic aptitude,

(f) belief systems,

(g) value systems,

(h) personal background.

(a) Runkel's index of cognitive similarity

The original experiments by Runkel (1956) were conducted with students in an introductory course in psychology. Therefore, the statements used in Runkel's index to establish cognitive similarity were related to this subject area. A list of the five statements was given in Section 1 (c).

Runkel had certain criteria for the selection of these statements. The statements selected had to be seen as related to the content of the course. However, they were not assertions of the kind that would be made as part of the material to be learnt in the course or given as items in tests. Further, it was necessary that the statements should be interpretable from more than one viewpoint. Thus, it would be possible

for one subject to judge them on the basis of one attribute and for another subject to judge them on the basis of another attribute. Thus, with such stimuli, the order of preference given by the subject could reflect the attributes and his weighting of them, that he brought to the stimulus situation.

Runkel's method of selecting statements followed this procedure. A long list of statements was compiled, which, in the judgement of the experimenter, could be viewed as interpretable from more than one standpoint. These statements were presented to a number of lecturers involved in the psychology course. Lecturers were asked to state reasons students might have for agreeing or disagreeing with the statements. From the long list of statements it was hoped to select those which could be judged on the basis of a variety of reasons or viewpoints and which could be discriminated from each other in regard to agreement or disagreement with the statement. The aim was to select a highly heterogeneous rather than a homogeneous set of items. The final selection rested on the judgements of experimenter and lecturers.

Therefore Runkel's criteria and method of choosing statements was applied to the selection of statements relevant to the subject areas in which lecturers were co-operating in the present investigation. These subject areas were, Maths., Social Studies, Reading, Art and Music. By following the procedure outlined by Runkel, five statements were selected relevant to each subject area. Lists of these statements are given in Appendix B.

It should be noted that according to the theory and as stated by Runkel, any set of statements would have served as well as those chosen.

The main point was that the set of stimulus statements should be representative and discriminable.

Data was collected in the following way - for each subject area the five statements were presented in triads, i.e., groups of three, all of the ten possible combinations being used, i.e.,

ABC, ABD, ABE, ACD, ACE, ADE, BCD, BCE, BDE, CDE.

These combinations were presented in random order. As in the Runkel experiment, the Method of Triads was used rather than the Method of Rank Order (see Section 1(c). Subjects were instructed to mark in each triad,

(a) the statement with which they MOST agreed,

(b) the statement with which they LEAST agreed.

A sample pro-forma is given in Appendix C.

Data was collected from students in the classes of the eight co-operative lecturers. This was done at the first lecture of the course and the last lecture of the course. The course extended over a period of 15 weeks. Thus, as in the Runkel experiment, data was collected as pre and post tests. Data was also collected at this time from each of the eight lecturers.

In Runkel's research, the index of co-linearity was based upon Coombs' " unfolding technique", i.e., given attribute X most preferences would "unfold" in a certain order of the five stimuli. (See Section 1(c)). Orders of stimuli which can "unfold" with ABCDE into NO underlying order are given in Table 2(d) 1. (See p. 108.) These rank orders are non co-linear with the rank order ABCDE.

Preferences of lecturers and students among the five statements were tallied and a rank order inferred. Responses were rejected where

there was evidence of intransitivity or inconsistency, i.e., unwillingness or uncertainty on the part of subjects to compose the stimuli in a simple order. As in Runkel's research, the responses of subjects who gave inconsistencies in 30% or more of the pairs of stimuli were rejected. In each subject area, the lecturer's rank order was compared with that of each of the students by means of the co-linearity Table (See Table 2 (d) 1.) Each lecturer and student pair was categorised as co-linear or non co-linear at pre and post test.

T A B L E 2(d) 1.

Given two rank orders, re-label the stimuli of one rank order ABCDE respectively. Then label each stimulus of the second order with the letter assigned to that stimulus in the first order. If the resulting second rank order appears below, the two given rank orders are non co-linear.

ABEDC	CEDBA
ACEDB	DACBE
ADCBE	DACEB
ADCEB	DAECB
ADECB	DBCAE
AEBDC	DBCEA
AECBD	DBECA
AECDB	DEACB
AEDBC	DEBCA
AEDCB	EABDC
BAEDC	EACBD
BCEDA	EACDB
BDCAE	EADBC
BDCEA	EADCB
BDECA	EBADC
BEADC	EBCAD
BECAD	EBCDA
BECDA	EBDAC
BEDAC	EBDCA
BEDCA	ECADB
CAEDB	ECBDA
CBEDA	ECDAB
CEADB	ECDBA
CEBDA	EDACB
CEDAB	EDBCA

(b) An exploratory measure of cognitive similarity based on the work of Bartlett.

Section 1 (e) outlined the work of Bartlett in relation to gap-filling strategies in examples which necessitated interpolative, extrapolative or reinterpretative thinking. The possibility existed of viewing these gap-filling strategies as potential indices of cognitive similarity. Individuals who are cognitively similar may select from the availability of potential responses and adopt similar strategies in linking initial and terminal points of information, e.g., in filling the gap between:-

A, BY HORRIBLE

Individuals who employ similar gap-filling strategies may thus organise their cognitive fields in similar ways.

Using Bartlett's research as a basis, an exploratory measure was devised which incorporated his examples illustrative of interpolative, extrapolative and re-interpretative thinking. An example of this measure is given in Appendix A.

This exploratory measure incorporated the same instructions and procedures as employed by Bartlett (see Appendix A.)

Data for this measure was collected at voluntary sessions during the course. Data was collected from both students and co-operating lecturers.

The classification of responses as cognitively similar or dissimilar is discussed in detail in the analysis of data, Section 3 (c).

(c) Communication effectiveness in relation to achievement in course work.

In each class, students remained with the same lecturer throughout the course. This lecturer was solely responsible for lectures and for

the allocation and marking of work during the course. The lecturers also set and marked Mid Term and Final examinations. Thus there was no "contamination" in lecturing or assessment, i.e. there was a consistent relationship between students and the lecturer with whom they were cognitively or dissimilar.

As a measure of communication effectiveness, the criteria of achievement on course work and examination was considered preferable to the criteria ofmachievement on Teaching Practice. In this way it was possible to replicate as nearly as possible the work of Runkel. The Teaching Practice assessment was arrived at by joint consultation between lecturers, principals of schools and class teachers. Thus such an assessment would be "contaminated" by the judgements of individuals other than the lecturer with whom the student was cognitively similar or dissimilar. Also, lecturers did not supervise the teaching practice of all the students in their course. Each lecturer had a small number of students for whom he was responsible on teaching practice and such students were not necessarily members of the lecturers' own course.

Runkel's criteria for achievement, reflecting communication effectiveness, was based upon quiz scores. However, the criteria used here should give a more representative and comprehensive picture of communication effectiveness. Also, quizzes were not included in the normal programmes of departments.

The marking system for course work and examination was based upon a 9 point scale. The final mark for the course is given as an aggregate mark. This represents a composite of achievement on course work and the results of Mid Term and Final examinations. The weighting for these marks varied slightly from one course to another. This is shown in

Table 2 (d) 2. The weighting reflects the emphasis placed by particular departments on course work or examination.

T A B L E 2(d) 2.

SUBJECT	COURSE WORK 1 MID-TERM EXAM.	FINAL EXAM.
Social Studies	55	45
Art	60	40
Music	60	40
Reading	50	50
Maths	50	50

Course work in Music and Art included assessments for practical work as well as for term papers and assignments. Examinations included multiple choice as well as essay-type questions.

It would have been a worthwhile refinement to have had an external assessment for course work and examination for the classes involved. The advisability of such a procedure was considered. However, within the limits of the situation this was a practical impossibility and the idea had to be rejected.

(d) Intelligence

The study investigated whether indices of cognitive similarity differentiated groups on the basis of intelligence or whether the variable of intelligence was related to achievement in course work. The measure selected was the AH4 Group Test of General Intelligence. This test is for use with adult populations. It contains verbal and non-verbal

components and incorporates many different biases and principles. The test is divided into two parts.

PART 1. Verbal and Number Bias

This incorporates the following principles:- directions, opposites, series, analogies, synonyms and computations.

PART 2. Diagrammatic or Spatial Bias

The following principles are included:- analogies, sames, subtractions, series and superimpositions.

In both parts principles are presented cyclically. Problems are arranged in roughly ascending order of difficulty. The test stresses deductive reasoning.

The test was administered as a group test to classes during lecture periods "donated" by the co-operating lecturers. Procedure was followed and instructions given as outlined in the Manual for the test. Grade scores were calculated on University norms.

As Heim (1947) points out, at this level the test may be one of speed rather than of intelligence. However, this limitation had to be accepted since the test selected had to be capable of group administration and be within the experience of the experimenter to administer.

(e) Scholastic Aptitude.

As Runkel (1956) stated, the importance of his findings would have been weakened had the greater achievement of the cognitively similar group of students been related to their performance on some measure of symbolic skill. Runkel's research investigated whether the index of co-linearity differentiated groups on the basis of scholastic aptitude and whether this variable was related to the greater achievement of the

cognitively similar group. The present research also considered this variable, and, as in Runkel's research, the measure selected was the ACE Test of Scholastic Aptitude.

This is possibly the most widely used psychological test administered to college freshmen in North America. Current forms of the ACE contain six tests. These are so combined as to give a Quantitative Score (Q) and a Linguistic Score (L). The Q tests include Arithmetical Reasoning, Number Series and Figure Analogies. The three L tests consist of Same-Opposite, Completion and Verbal Analogies.

Scores for this test were made available by the University of Alberta Records Office. The test is administered as part of a battery of tests given to students on admission to the University. Unfortunately, for a variety of reasons, scores were not available for all students, e.g., transfer of students from other Universities or late entry.

(f) Belief Systems

The present study investigated whether cognitive similarity could be explained in terms of similarities between individuals on intrapersonal variables. Thus, certain other intrapersonal variables, e.g., belief and value systems, were considered in relation to cognitive similarity, (see Section 2 (a)). The Dogmatism Scale was selected as a measure of belief systems.

The D Scale constructed by Rokeach (1960) measures open-ness and closed-ness of belief systems and serves as a measure of general authoritarianism and intolerance. Closed belief systems are indicative of authoritarianism and intolerance. As such a measure, the scale is free of ideological content. Rokeach believed general authoritarianism was best conceived as a mode of thought rather than as a set of beliefs.

Rokeach labelled this cognitive style as Dogmatism. The general theory of Rokeach and the characteristics of open and closed belief systems were discussed in Section 1 (b).

The Dogmatism Scale is a Likert-type scale consisting of 40 items, (FormE). The items within the scale relate to certain dimensions believed by Rokeach to be important as defining characteristics of open and closed belief systems. For instance, some items relate to isolation within and between belief-disbelief systems, others relate to central or peripheral areas of belief. Other items relate to the time-perspective dimension, i.e., the more closed the belief system, the more its organisation will be future or past orientated. An example of the D Scale with instructions to subjects is given in Appendix D.

For all statements, agreement is scored as closed and disagreement as open. The total score is the sum of scores obtained on all items. Thus, a positive total score would indicate a closed belief system and a positive measure of general authoritarianism. A negative total score would indicate an open belief system.

The test was administered with procedure and instructions as detailed by Rokeach.

Value Systems

As previously indicated, (Section 2 (a)), the present study investigated cognitive similarity in relation to certain other intra-personal variables. The Study of Values was used as a measure indicating the value systems of individuals.

The Allport-Vernon-Lindzey Study of Values (1951) was designed to measure the relative prominence of the six basic interests, motives or evaluative attitudes. Originally suggested by Spranger's Types of

Man (1928), these value categories may be briefly described as follows:-

THEORETICAL - characterised by a critical rational "intellectual" approach.

ECONOMIC- emphasises useful and practical values.

AESTHETIC - placing highest value on form and harmony.

SOCIAL - originally defined as love of people but in revised forms has been narrowed to altruism and philanthropy.

POLITICAL - emphasises interest in personal power, influence and renown, not necessarily linked to the field of politics.

RELIGIOUS - The emphasis is mystical rather than ideological, defined by Anastasi (1954) as "concerned with the unity of all experience and seeking to comprehend the cosmos as a whole." (p. 589)

Items relevant to these areas are arranged in random order in a test booklet, with no clue regarding the categories according to which they will be scored. Each item requires the preferential rating or either two or four alternatives falling in different value categories. The 3rd Edition of the Scale was used (1960).

The Study of Values was administered and scored according to instructions given in the Manual for the test. Total scores on the six values could be plotted in the form of a profile. These scores reflect the relative strength in the six areas.

Personal Background

In investigating intrapersonal variables in relation to cognitive similarity, data was collected which gave an indication of the personal background of subjects. Subjects were asked to complete a questionnaire designed to give the following types of information.

Personal data - age, sex, marital status, position in family, religion.

Academic background - major subjects, awards, qualifications.

Activities - university or extramural activities, vacation employment, etc.

Study Habits

Professional level of aspiration

An example of the questionnaire is given in Appendix E.

Data for the D Scale, Study of Values and Questionnaire was collected when students attended voluntary sessions in their free time. A number of such sessions were held throughout the course and data was also collected then from the eight lecturers.

Throughout the collection of all data, students were assured that their responses would in no way affect their progress or results during the course. As a further re-assurance they knew that the data was being sent out of the country immediately it was collected. Thus it was hoped that as far as possible, the responses were "honest" rather than attempts to please or give "acceptable" responses.

SECTION 3.

Section 3 of the thesis deals with the analysis of data. This section is subdivided into three parts.

Section 3 (a) deals with the analysis of data relating to S's established as cognitively similar or dissimilar to a lecturer using Runkel's (1956) index of co-linearity.

Section 3 (b) deals with the analysis of data relating to S's referred to as transfer groups, i.e., S's who during the course changed from a position of cognitive similarity to cognitive dissimilarity or vice-versa.

Section 3 (c) deals with the analysis of data relating to cognitive similarity as established an adaptation of Bartlett's (1958) work in relation to thinking within closed systems.

S E C T I O N 3 (a)

ANALYSIS OF DATA RELATING TO COGNITIVELY SIMILAR OR DISSIMILAR GROUPS

As reported on Section 2 (d), cognitive similarity was established by the index of co-linearity proposed by Runkel (1956). This involved the ordering of statements relating to the following subject areas:- Music, Reading, Maths., Social Studies and Art. (Details of these statements are to be found in Appendix B). Subjects were established as co-linear or non co-linear with a particular lecturer at pre and post tests at the beginning and end of the course. In giving the results of the analysis of data the following abbreviations will be used:-

CL - denotes S's co-linear with the lecturer,

$\overline{CL}$ - denotes S's non co-linear with the lecturer.

Three lecturers teaching Maths. courses participated in the investigation. Groups of S's in these courses will be differentiated by referring to these courses as Maths. A, Maths. B, and Maths. C. Similarly, the courses of the two lecturers in Social Studies will be referred to as Social Studies X and Social Studies Y. Only one lecturer was involved for each of the other subject areas. Results of analysis of research data will be discussed in relation to the following methods and measures:-

(a) experimental sample,

(b) achievement related to course work,

(c) ACE Test of Scholastic Aptitude,

(d) AH4 Group Test of General Intelligence,

(e) D Scale,

(f) Study of Values.

Research by Runkel (1956) also investigated whether, regardless of cognitive similarity, high achievement could be significantly related

to scholastic aptitude (see Section 1 (c)). Therefore, S's defined as high achievers or low achievers, regardless of their position of cognitive similarity, will be investigated in relation to:-

(a) ACE Test of Scholastic Aptitude,

(b) AH4 Group Test of General Intelligence,

(c) the preponderance of those cognitively similar in each group.

(a) EXPERIMENTAL SAMPLE

Using the index of co-linearity related to subject area statements, (Section 2 (d)), it was established that at pre test the responses of the following S's were co-linear or non co-linear with those of a particular lecturer. Table 3 (a) 1 also indicates the number of inconsistent or intransitive responses at pre test. S's were rejected where the level of inconsistency in response was greater than 30% or where responses were intransitive, i.e., where S's were, as Runkel expressed it, "unwilling" to compose the stimuli in a simple order.

TABLE 3(a) 1.

	CL	$\overline{CL}$	Inconsistent	Total
MUSIC	49	10	36	95
READING	41	9	14	64
MATHS. A	10	7	16	33
MATHS. B	14	34	9	57
MATHS. C	41	13	10	64
Social STUDIES X	24	9	22	55
Social STUDIES Y	46	16	35	97
ART	4	5	8	17
TOTAL	229	103	150	482

At pre test 47.5% of all S's were CL, 21.4% were $\overline{CL}$, 31.1% gave inconsistent or intransitive responses. Whatever the educational implications of Runkel's research, in its present form the index of co-linearity would scarcely seem to be a practical proposition when 31.1% of one's initial sample must immediately be rejected. Since in his research Runkel had to reject 47.5% of his population because of inconsistency or intransitivity, the "fall out" in the present investigation does not seem to be unusual. Table 3(a) 2 indicates that an even greater "fall out" occurs when co-linearity or non co-linearity was established at post test.

TABLE 3(a) 2.

	CL	$\overline{CL}$	Inconsistent	Total
MUSIC	39	3	53	95
READING	34	4	26	64
MATHS. A	8	8	17	33
MATHS. B	37	4	16	57
MATHS. C	39	6	19	64
SOCIAL STUDIES X	15	10	30	55
Social STUDIES Y	29	16	52	97
ART	5	1	11	17
TOTAL	206	52	224	482

At post test 42.7% of all S's were CL, 10.8% were $\overline{CL}$ and 46.5% gave inconsistent or intransitive responses which had to be rejected.

In Runkel's research only those S's were used who from pre to post test maintained rank orders co-linear or non co-linear with that of the lecturer. This meant a further "fall out" in his population. However, as was discussed in Section 2(a), one would query the necessity or usefulness of the post test, e.g., was Runkel testing the reliability of the measure of cognitive similarity in relation to consistency of response? If the device was tapping similarities in cognitive structure this would hardly be a dimension unstable enough to change within ten weeks. Is the change a chance occurrence, or is the test really showing

inconsistency? Runkel did not answer this question. The McNemar test for the significance of changes was used to establish whether it was necessary to consider post test as well as pre test results. The results of this test are given in Table 3(a) 3.

TABLE 3(a) 3.

	CL - CL	$\overline{CL}$ - $\overline{CL}$	CL - $\overline{CL}$	$\overline{CL}$ - CL	χ^2
MUSIC	23	1	2	6	1.125
READING	28	1	3	6	0.44
MATHS. A	4	3	5	4	0
MATHS. B	13	4	0	24	24
MATHS. C	32	3	3	7	1.6
SOCIAL STUDIES X	22	8	8	7	0.066
SOCIAL STUDIES Y	11	3	7	4	0.82
ART	4	1	0	2	0.5

The results indicate that a consideration of the post test results is unnecessary. Except in one instance, no significance of change is evident. The significant result would have arisen by chance. Unfortunately, because it is not possible to use analysis of variance on the data, no check could be made on the probability of this significant figure occurring by chance. Therefore, results which will be subsequently reported refer to groups CL or $\overline{CL}$ with a particular

lecturer at pre test.

(a) ACHIEVEMENT RELATED TO COURSE WORK

Runkel claimed that cognitive similarity led to greater communication effectiveness. His criterion for this was the success achieved by students in the course as measured by quiz scores. As previously discussed (Section 1(c)), it was found that students cognitively similar to a lecturer achieved higher grades than those cognitively dissimilar. A relationship was investigated in the present study. The achievement of S's was shown by a final grade mark for term papers presented during the course, and the results of mid-term and final examinations. The marking system was based upon a 9 point scale. Table 3(a) 4. gives the mean and standard deviation of grades for CL and $\overline{CL}$ groups in each subject area.

T A B L E 3(a) 4.

	CL			$\overline{CL}$		
	n	$\bar{x}$	σ	n	$\bar{x}$	σ
MUSIC	35	6.05	0.761	7	6.57	0.781
READING	31	6.41	1.431	7	5.42	1.272
MATHS. A	9	6.66	1.732	7	6.71	1.705
MATHS. B	13	5.31	1.60	28	6.35	1.311
MATHS. C	35	6.48	1.292	10	5.6	1.264
SOCIAL STUDIES X	18	6.72	0.953	7	6.85	1.345
SOCIAL STUDIES Y	30	6.00	1.860	15	5.86	1.244
ART	4	7.75	1.256	3	6.33	1.526

It would appear that where differences exist they are not always in the direction predicted by Runkel. The Mann-Whitney U Test was used to establish any significance of difference in the achievement of the two groups. The following table gives the results of the test.

TABLE 3(a) 5.

	n_1	n_2	U	U'	sig.
MUSIC	7	35	76	169	0.0582
READING	7	31	150.5	66.5	0.0571
MATHS. A	7	9	31	32	n.s.
MATHS. B	13	28	251	113	0.0268
MATHS. C	10	35	240.5	109.5	0.0375
SOCIAL STUDIES X	7	18	60	66	n.s.
SOCIAL STUDIES Y	15	30	231	219	n.s.
ART	3	4	9.5	2.5	n.s.

In 4 courses (Maths. A, Social Studies X, Social Studies Y, and Art), there is no significant difference in the achievement of the CL or $\overline{CL}$ groups. In 2 courses (Reading and Maths. C), there is a significant difference at the .06 level in the direction indicated by Runkel, i.e., the CL group shows significantly greater achievement than the $\overline{CL}$ group. In 2 courses (Music and Maths. B), there is a significant difference at the .06 level in the direction of the $\overline{CL}$ group, i.e., contrary to Runkel's findings the $\overline{CL}$ group shows significantly greater achievement

than the CL group.

Therefore in 6 out of 8 groups, Runkel's findings have not been substantiated. The relation-ship between cognitive similarity and achievement is either not significant or shows significance in the opposite direction to that indicated by Runkel. In this particular investigation there is little evidence supporting the view that cognitive similarity leads to greater communication effectiveness as shown in the achievement of higher grades by students who are cognitively similar to the lecturer. The results do not show a tendency for the subject areas per se to affect the findings, i.e. the more "verbal" areas like Reading do not show a positive relationship and the "non verbal" areas like Maths., a negative relationship. Of the three Maths. courses one shows no significant difference in achievement, one shows a significant difference in the direction of the CL group and the other a significant difference in the direction of the $\overline{CL}$ group. These results may be taken to be more representative than the Runkel study, since they sample more subject areas. Runkel only sampled one subject area and it is possible that the results could have arisen by chance.

(c) ACE TEST OF SCHOLASTIC APTITUDE.

Runkel's research investigated the possibility of the higher grades of the cognitively similar group being explained by the variable of scholastic aptitude, i.e., there was the possibility that the index of co-linearity differentiated groups according to this variable. Runkel found no significant difference between the performance of cognitively similar or dissimilar groups on the ACE Test of Scholastic Aptitude. The present investigation also examined the performance of cognitively similar or dissimilar groups relative to this test. Runkel's research

only reported the total scores. The following table indicates the means for the two groups for Q scores (non verbal), L scores (verbal), and total scores.

TABLE 3(a) 6.

		n	Q	L	Total
MUSIC	CL	21	42.76	70.14	112.91
MUSIC	$\overline{CL}$	4	46.75	69.75	114.5
READING	CL	19	43.42	70.63	114.05
READING	$\overline{CL}$	4	44	76	120
MATHS. A	CL	6	48.16	75.33	123.5
MATHS. A	$\overline{CL}$	4	46.25	67.5	113.75
MATHS. B	CL	7	42	71.85	113.85
MATHS. B	$\overline{CL}$	16	45.25	70.43	115.68
MATHS. C	CL	26	44.46	68.81	113.26
MATHS. C	$\overline{CL}$	5	50.2	61.4	111.6
SOCIAL STUDIES X	CL	14	44.07	69.92	114
SOCIAL STUDIES X	$\overline{CL}$	3	44.33	74	118.33
SOCIAL STUDIES Y	CL	17	44.47	65.82	110.29
SOCIAL STUDIES Y	$\overline{CL}$	9	46.88	72.33	119.22

The Mann-Whitney U Test was used to establish any significant difference between the two groups for Q, L or Total scores. The results of significance of difference in Q scores are given in Table 3(a) 7.

T A B L E 3(a) 7.

	n_1	n_2	U	U'	sig.
MUSIC	4	21	31	53	n.s.
READING	4	19	37	39	n.s.
MATHS. A	4	6	15	9	n.s.
MATHS. B	7	16	72.5	39.5	n.s.
MATHS. C	5	26	49.5	89.5	n.s.
SOCIAL STUDIES X	3	14	21.5	20.5	n.s.
SOCIAL STUDIES Y	9	17	67	86	n.s.

There is no significant difference at the .05 level between the two groups in relation to Q scores. Table 3(a) 8 gives the results of significance of difference in L scores.

T A B L E 3(a) 8.

	n_1	n_2	U	U'	sig.
MUSIC	4	21	42.5	41.5	n.s.
READING	4	19	29	47	n.s.
MATHS. A	4	6	16	8	n.s.
MATHS. B	7	16	53	59	n.s.
MATHS. C	5	26	99.5	40.5	n.s.
SOCIAL STUDIES X	3	14	16.5	31.5	n.s.
SOCIAL STUDIES Y	9	17	64	89	n.s.

Again, no result attains significance at the .05 level. Table 3(a) 9. gives the results of the test for significance of difference in relation to the total scores for the two groups.

TABLE 3(a) 9.

	n_1	n_2	U	U'	sig.
MUSIC	4	21	37.5	46.5	n.s.
READING	4	19	32	44	n.s.
MATHS. A	4	6	19	5	n.s.
MATHS. B	7	16	71	41	n.s.
MATHS. C	5	26	69	61	n.s.
SOCIAL STUDIES X	3	14	19.5	22.5	n.s.
SOCIAL STUDIES Y	9	17	47	106	n.s.

Again, there is no significant difference at the .05 level.

In the relationship between cognitive similarity and ACE scores, Runkel's findings have been substantiated. In Runkel's research, this indicated that difference in achievement by the two groups could not be accounted for by this variable. However, in the present research there was no significant difference in the achievement of those CL or $\overline{CL}$ in any case.

(d) AH4 GROUP TEST OF GENERAL INTELLIGENCE

The CL and $\overline{CL}$ groups were compared for performance on the AH4 Group Test of General Intelligence. Runkel did not investigate the variable of intelligence per se. However, in seeking to establish whether the index of co-linearity differentiated groups on the basis

of intelligence, the performance of the two groups was compared on the AH4. The Mann-Whitney U Test was used to establish any significance of difference in the scores of the groups. Table 3(a) 10. shows the results in relation to the verbal section of the test.

TABLE 3(a) 10.

	n_1	n_2	U	U'	sig.
MUSIC	7	34	84.5	153.5	n.s.
READING	5	29	57.5	87.5	n.s.
MATHS. A	7	7	29.5	19.5	n.s.
MATHS. B	9	25	113.5	111.5	n.s.
MATHS. C	8	35	137	143	n.s.
SOCIAL STUDIES X	6	16	68.5	27.5	n.s.
SOCIAL STUDIES Y	13	27	165	186	n.s.
ART	2	4	3.5	4.5	n.s.

There is no significant difference between the groups, at the .05 level. Table 3(a) 11. shows the significance of difference between CL and $\overline{CL}$ groups in relation to the non verbal section of the test.

TABLE 3(a) 11.

	n_1	n_2	U	U'	sig.
MUSIC	7	34	119	119	n.s.
READING	5	29	54.5	90.5	n.s.
MATHS. A	7	7	14.5	34.5	n.s.
MATHS. B	9	25	122.5	102.5	n.s.
MATHS. C	8	35	110	170	n.s.
SOCIAL STUDIES X	6	16	61.5	34.5	n.s.
SOCIAL STUDIES Y	13	27	172.5	178.5	n.s.
ART	2	4	5.5	2.5	n.s.

Again, the results show no significant difference at the .05 level in the performance of the two groups. Table 3(a) 12. gives the results for significance of difference related to the total scores of the two groups.

TABLE 3(a) 12.

	n_1	n_2	U	U'	sig.
MUSIC	7	34	103	135	n.s.
READING	5	29	53.5	91.5	n.s.
MATHS. A	7	7	24	25	n.s.
MATHS. B	9	25	116	109	n.s.
MATHS. C	8	35	122	158	n.s.
SOCIAL STUDIES X	6	16	67.5	28.5	n.s.
SOCIAL STUDIES Y	13	27	166	185	n.s.
ART	2	4	5.5	2.5	n.s.

The results show no significant difference in the performance of CL or $\overline{CL}$ groups on Verbal, Non Verbal or Total scores for the AH4 test. Perhaps this result could have been anticipated since research has established correlations (Manual et al (1940), and Anderson (1942) et al), between the ACE test and tests of intelligence and there was no significant difference in the performance of the two groups on the ACE. It would appear that the index of co-linearity does not differentiate groups on the basis of either intelligence or scholastic aptitude.

(e) D SCALE

Runkel made a distinction between interaction and experimental variables. The former operated between individuals regardless of whether individuals showed similarities on certain attributes. The latter, on the other hand, depended upon individuals showing similarities on the dimensions selected for investigation. Runkel proposed that cognitive

similarity was an interaction variable. The present investigation examined the possibility of cognitive similarity being explained in terms of intrapersonal variables and belief and value systems were welected as experimental variables to be investigated in this particular situation. Consequently, CL and $\overline{CL}$ subjects were compared in relation to scores obtained upon the D Scale and The Study of Values.

Table 3(a) 13. shows the mean scores for the CL and $\overline{CL}$ groups upon the D Scale. Positive scores indicate closed belief systems and negative scores indicate open belief systems.

TABLE 3(a) 13.

	CL		$\overline{CL}$	
	n	$\bar{x}$	n	$\bar{x}$
MUSIC	29	-2.55	6	+1.16
READING	29	-3.65	6	-10.66
MATHS. A	8	+11.74	6	+1.33
MATHS. B	6	+2.00	20	-1.8
MATHS. C	29	+0.1	7	-0.57
SOCIAL STUDIES X	12	-5.66	3	+15.66
SOCIAL STUDIES Y	21	-1.33	11	-2.54

In both CL and $\overline{CL}$ groups there are 3 instances where the means show closed systems and in 4 instances the means show open systems. Often the direction is the same for both groups., e.g., in Reading both CL and $\overline{CL}$ groups show open systems and in Maths. A both groups show closed systems. There is no consistency where differences do occur. In Maths. B

the CL group gives a positive score and the $\overline{CL}$ group a negative score. But in Music this pattern of scoring is reversed. The Mann-Whitney U test was used to establish any significance of difference in the scores of the two groups. The results of this test are given in Table 3(a) 14.

TABLE 3(a) 14.

	n_1	n_2	U	U'	sig.
MUSIC	6	29	83	91	n.s.
READING	6	29	96	78	n.s.
MATHS. A	6	8	30.5	9.5	0.041
MATHS. B	6	20	54.5	65.5	n.s.
MATHS. C	7	29	108	95	n.s.
SOCIAL STUDIES X	3	12	4.5	31.5	n.s.
SOCIAL STUDIES Y	11	21	129	102	n.s.

The only result significant at the .05 level is in Maths. A. In this group, since both CL and $\overline{CL}$ S's show closed systems, the result indicates a difference in the degree of closed-ness. The general trend indicates no significant difference in the scores of CL and $\overline{CL}$ groups on the D Scale. On the whole there is a tendency for both CL and $\overline{CL}$ groups to show open-ness in belief systems. It would seem that open-ness and closed-ness of belief systems is not an intrapersonal variable which is important in cognitive similarity as established by the index of co-linearity.

(f) STUDY OF VALUES

The CL and $\overline{CL}$ groups were compared for scores shown in the Study of Values profiles for the groups. These scores reflect the relative prominence of the six value areas. In reporting the results of the analysis of data, initial letters will be used to denote these areas, i.e., Theoretical, Economic, Aesthetic, Social, Political and Religious. Mean scores were calculated for the groups in each of the six areas. None of the scores fall outside the range of limits given by Allport, Vernon & Lindzey for high or low scores or outstandingly high or low scores. The Mann-Whitney U Test was used to establish any significance of difference in the scores of the CL or $\overline{CL}$ groups. Since U tests form lengthy analyses the results are given in Appendix F. It will be seen that apart from isolated instances, the general trend indicates no significant difference in the scores of the two groups. Where instances of significant differences at the .05 level do occur they are not always in the same value area or between groups in the same subject area. The overall trend is towards no significant difference in the relative prominence of the value areas of the CL and $\overline{CL}$ groups.

There is a tendency for the CL groups to give greatest prominence to the Social area. The $\overline{CL}$ groups tend to give greatest prominence to the Aesthetic area. Neither group follows the general norm for college students given by Allport, Vernon & Lindzey, i.e.

TABLE 3(a) 15.

	T	E	A	S	P	R
8369 college students	39.80	39.45	41.29	39.24	40.61	40.51

The order of relative prominence here is P.R.A.T.E.S. However, from research into norms for occupational groups (MacLean, Gowan and Gowan, 1955), it would appear that education students and teachers score more highly than the general population on the Social category. They also score lower than the general population on the Economic category. The prominence of the Social category in the responses of the CL group shows that in this they are following the occupational norm. However, in both cognitively similar and dissimilar groups the trend is towards the Theoretical area being the least preferred. Least prominence is given to this area in 7 out of 8 instances for the CL group and in 5 out of 8 instances for the $\overline{CL}$ group.

It would seem that there are points in common rather than significant differences between the CL and $\overline{CL}$ groups on the Study of Values and that cognitive similarity cannot be explained in terms of similarities or dissimilarities in the value systems of cognitively similar or dissimilar groups.

HIGH AND LOW ACHIEVERS

To check whether, regardless of cognitive similarity, scholastic aptitude could in any case have differentiated among quiz grades, Runkel correlated the ACE scores for 100 cases with quiz grades. He found a positive correlation of .42 which is significant beyond the .05 level. In the present investigation S's were selected who, regardless of cognitive similarity or otherwise to a lecturer, achieved the highest grades or lowest grades possible for their course. This sample included 18 "high achievers", i.e. students who achieved the maximum mark of 9 for any course. The sample also included 14 "low achievers" who were given the lowest mark for any course. Although 1 is the actual lowest mark it is possible to achieve, in practice the lowest mark given was 3.

These S's were compared for performance on the ACE Test of Scholastic Aptitude, (only 19 ACE scores were available for the two groups). The Mann-Whitney U Test was used to test for any significance of difference and the results are given in Table 3(a) 16.

T A B L E 3(a) 16.

	n_1 (L.A.)	n_2 (H.A.)	U	U'	sig.
ACE Q	9	10	40	50	n.s.
ACE L	9	10	45.5	40.5	n.s.
ACE TOTAL	9	10	44.5	45.5	n.s.

There is no significant difference at the .05 level between high achievers or low achievers on Q, L or total scores for the ACE test.

These two groups were also compared for performance on the AH4 Group Test of General Intelligence. Again the Mann-Whitney U Test was used to discover any significant difference in the performance of high achievers or low achievers. The results of this analysis are given in Table 3(a) 17.

T A B L E 3(a) 17.

	n_1 (L.A.)	n_2 (H.A.)	U	U'	sig.
AH4 Verbal	14	18	150.5	101.5	n.s.
AH4 Non-Verbal	14	18	143.5	108.5	n.s.
AH4 Total	14	18	136	116	n.s.

As with the ACE there is no significant difference at the .05 level in the performance of the two groups. Runkel found a positive correlation between achievement and ACE scores and other research, e.g., Evans (1958) has shown a positive correlation between intelligence and achievement in educational theory examinations. In this particular situation there is no significant difference between the scores of high or low achievers on tests of either intelligence or scholastic aptitude, There is a sense in which this result could be expected since the students would represent a fairly homogeneous population with regard to either variable. Thus, in this situation, intelligence or scholastic ability is not linked with cognitive similarity but neither are the variables linked with achievement. It was noted earlier (Section 2(a)) that if cognitive similarity is a valid variable then it would be predicted that the majority of High Achievers would be co-linear with the lecturer. The following results were obtained:-

T A B L E 3(a) 18.

	H.A.	L.A.
C.L.	10.	11.
$\overline{\text{C.L.}}$	6.	3.
Not Available	2.	0.
	18.	14.

It is clear that there is no greater proportion of High Achievers in the cognitively similar group.

In summary, the following points emerge. Contrary to Runkel's findings, cognitive similarity does not appear to lead to greater communication effectiveness as measured by the achievement of higher grades by students cognitively similar to the lecturer. But in support of Runkel's findings, cognitive similarity or cognitive dissimilarity does not appear to be based upon differences in scholastic aptitude as measured by the ACE test. Neither are the groups differentiated on the basis of general intelligence as measured by the AH4. There is no significant difference in the performance of the two groups upon the D Scale or the Study of Values. Indeed, the two groups appear to have little to distinguish them except cognitive similarity - or lack of it - and even being in a position of cognitive similarity to a lecturer appears to bring little advantage. There seem to be three possibilities.

The index of cognitive similarity may select groups on a random basis. However, since the McNemar test established no significance of chance in groups from pre test to post test, this possibility seems unlikely.

Cognitive similarity may not be a general characteristic. It may still be explained in terms of other variables but the variables selected for investigation in the present study may not be the important dimensions. Since these variables were specially selected for their representative nature, this possibility also seems unlikely.

Alternatively, as Runkel suggests, cognitive similarity may indeed be an interaction variable. It may be a general characteristic which is

not explainable in terms of similarities on intrapersonal variables, e.g., similarities in belief and value systems. If this is so, cognitive similarity may or may not be linked with greater communication effectiveness. In Runkel's research this relationship was established. In the present research no significant difference or significant difference in the opposite direction was also found. Although the measure of communication effectiveness appears to have been suitable in Runkel's research, perhaps in this particular situation it was the measure that was at fault. It must be remembered that Triandis (1959,1960), also established that cognitive similarity was a facilitating mechanism in communication effectiveness. Obviously, in a field situation it is more difficult to control a measure of communication effectiveness than it is in the kind of experimental situation reported by Triandis. A consideration of marks for term papers as distinct from examination marks revealed no difference from the results already reported in relation to the aggregate mark.

These findings will be examined further in the Conclusion when they will be discussed in relation to other research reported in Section 3, i.e., the analysis related to transfer groups and the use of Bartlett's work as an index of cognitive similarity.

S E C T I O N 3(b)

ANALYSIS OF DATA RELATING TO TRANSFER GROUPS

The analysis of data in Section 3(b) relates to a consideration of groups which will be referred to as transfer groups. These S's were part of the original sample. Using the index of co-linearity, these S's were established as cognitively similar or dissimilar to a particular lecturer at pre and post tests at the beginning and end of the course. Transfer groups refer to those groups of S's who from pre to post test did not maintain rank orders of statements co-linear or non co-linear with that of the lecturer. During the course they changed from co-linearity to non co-linearity or vice versa. In reporting results of the analysis of data the following abbreviations will be used:-

CL - $\overline{CL}$	denotes those S's who moved from a position of co-linearity with the lecturer to a position of non co-linearity.
$\overline{CL}$ - CL	denotes those S's who moved from non co-linearity to co-linearity.

These groups were not investigated by Runkel in his research. This was restricted to an examination of groups who, throughout the course maintained their similar or dissimilar relationship with a particular lecturer. However, as indicated in Section 2(a), it may very well be that these groups, by virtue of their change in response, are important in an investigation of cognitive similarity. It has been stated that if cognitive similarity were a general characteristic, then it may be possible to increase the number of individuals with whom one is cognitively similar. This would depend upon an understanding of the variables involved in facilitating this change. It may be that groups of S's who move to or from a position of cognitive similarity have certain characteristics in common which are important dimensions in effecting a change in response. By comparing the two groups it may be possible to

gain some indication of the dimensions which appear to influence changes from initial positions of cognitive similarity or otherwise. Results of analysis of research data will be discussed in relation to the following methods and measures:-

(a) size of sample,
(b) achievement related to course work,
(c) ACE Test of Scholastic Aptitude,
(d) AH4 Group Test of General Intelligence,
(e) D Scale,
(f) Study of Values,
(g) Questionnaire providing background information about the S's.

(a) EXPERIMENTAL SAMPLE

From an examination of the results of the index of co-linearity, it was found that the following sample represented those who moved from a position of co-linearity with a lecturer to non co-linearity or from non co-linearity to co-linearity, i.e., CL - $\overline{CL}$, or $\overline{CL}$ - CL.

TABLE 3(b) 1.

	CL - $\overline{CL}$	$\overline{CL}$ - CL
MUSIC	2	6
READING	3	6
MATHS. A	5	4
MATHS. B	0	24
MATHS. C	3	7
Social STUDIES X	7	4
Social STUDIES Y	8	7
ART	0	2
	28	60

Since these S's are being investigated because they have the factor of transfer or change in common, they will be considered as one group rather than as separate groups related to a particular subject area. Thus, the following sample was investigated:-

TABLE 3(b) 2.

	M	F	Total
CL - $\overline{CL}$	5	23	28
$\overline{CL}$ - CL	15	45	60

It is interesting to note that there were varying responses to different lecturers. In 5 out of 8 subject areas a greater number of S's moved to a position of cognitive similarity. The transfer effect is particularly marked in the response of S's in Maths. group B. This may have been a random effect in the distribution of students. However, it is interesting that this group was taken by the most experienced lecturer. The move towards an appreciation of his frame of reference may reflect factors related to his experience and presumed ability to communicate effectively, (although one does not necessarily imply the other). It may be that the determinants of change lie within the communicator as well as communicant or in both.

(b) ACHIEVEMENT IN COURSE WORK

A comparison was made of the achievement of transfer groups in relation to success achieved during the course. As indicated in Section 3(a), the final mark achieved by S's represented an aggregate mark for term papers presented during the course and the results of

mid-term and final examinations. The marking system was based upon a 9 point scale. Table 3(b) 3. shows the Mean and Standard Deviation for the transfer groups in relation to achievement in course work.

TABLE 3(b) 3.

	n	$\bar{x}$	δ
CL - $\overline{CL}$	28	6.25	1.646
$\overline{CL}$ - CL	60	6.22	1.284

Difference in the mean of the two groups is negligible though there would appear to be slightly greater variance in the marks of the CL - $\overline{CL}$ group. The Mann-Whitney U Test was used to establish whether there was any significant difference in the achievement of the transfer groups. The following result was obtained:-

TABLE 3(b) 4.

	n_1	n_2	U	U'	sig.
CL - CL / CL - CL	28	60	824.5	855.5	n.s.

Correction for tied scores produced a negligible difference and the result was not significant at the .05 level. Results of this investigation (Section 3(a)), have already shown that contrary to Runkel's findings, cognitive similarity as measured by the index of

co-linearity was only significantly related to achievement in 2 out of 8 instances. Therefore, perhaps a significant difference in the achievement of the transfer groups could hardly be expected. However, what slight difference exists indicates that this is in favour of the group moving towards an appreciation of the lecturer's frame of reference.

(c) THE ACE TEST OF SCHOLASTIC APTITUDE

An analysis was made of the performance of transfer groups on the ACE Test of Scholastic Aptitude. Table 3(b) 5. shows the mean scores achieved by the groups. These means relate to Q scores (non verbal), L scores (verbal) and total scores.

T A B L E 3(b) 5.

	n	$\bar{x}$ Q	$\bar{x}$ L	$\bar{x}$ Total
CL - $\overline{CL}$	19	46.05	70.21	116.26
$\overline{CL}$ - CL	33	45.5	72.3	117.8

Runkel's results and the results of the present investigation showed no significant difference in the scores on the ACE Test of those cognitively similar or dissimilar. The Mann-Whitney U Test was used to establish any significant difference in the performance of the transfer groups in relation to Q, L and total scores for the test. The results are given in Table 3(b) 6.

TABLE 3(b) 6.

	n_1	n_2	U	U'	sig.
ACE "Q"	19	33	274	353	n.s.
ACE "L"	19	33	402	225	0.0465
ACE Total	19	33	333	294	n.s.

It is interesting that the result which is significant at the .05 level is in the verbal section of the test. It has been shown, e.g., by Barrett (1952) and Macphail (1942), that there are high correlations between L scores and achievement in academic performance and that L scores can be used to predict grades in all types of courses, as well or better than Q scores. As indicated by Anastasi (1954), the high predictive value of the verbal test may be due to the predominantly verbal content of all academic instruction as well as the importance of reading comprehension in all courses. In this particular situation the $\overline{CL}$ - CL group scored more highly than the CL - $\overline{CL}$ group on the verbal section of the ACE. However, as seen by the relative achievement of the two groups this could not be related to a significant difference in success in the course. Although in this instance greater L scores were not related to academic success, it may be that the group which moves towards cognitive similarity does so partly because of verbal proficiency and presumably the ability to appreciate the lecturer's frame of reference in a predominantly verbal situation.

(d) AH4 GROUP TEST OF GENERAL INTELLIGENCE

The transfer groups were compared for performance on the AH4 Group Test of General Intelligence. The scores of the two groups were compared in relation to Verbal, Non Verbal and Total Scores on the test. The following table indicates the mean scores of the two groups.

TABLE 3(b) 7.

	$\bar{x}$ AH4 Verbal	$\bar{x}$ AH4 Non-Verbal	$\bar{x}$ AH4 Total
CL - $\overline{CL}$	44.1	43.8	87.9
$\overline{CL}$ - CL	45.5	44.2	89.7

These means show that slightly greater scores were achieved by the $\overline{CL}$ - CL group. The Mann-Whitney U Test was used to establish any significance of difference in the scores of the two groups. The results of this test are shown in Table 3(b) 8.

TABLE 3(b) 8.

	n_1	n_2	U	U'	sig.
AH4 Verbal	24	49	651	525	n.s.
AH4 Non-Verbal	24	49	580.5	595.5	n.s.
AH4 Total	24	49	581	595	n.s.

Runkel did not investigate intelligence per se in his research but in this investigation no significant difference was found in the verbal, non verbal or total scores of the cognitively similar or dissimilar groups on the AH4. In the investigation of the transfer groups, significance at a reasonable level, (0.23) is only approached in the verbal section of the test. Observations regarding the importance of verbal facility were given in reporting analysis of ACE scores for the transfer groups. It would seem that on both ACE and AH4 tests that the $\overline{CL}$ - CL group shows greater proficiency in verbal areas. It may be that because of this greater verbal proficiency the $\overline{CL}$ - CL group are more adept at picking up the lecturer's frame of reference. This may partly account for a move towards a position of cognitive similarity to the lecturer.

(e) D Scale

The transfer groups were compared for scores on the D scale. Positive scores indicate closed-ness of belief systems and negative scores indicate open-ness. Table 3(b) 9 shows the mean scores for the transfer groups.

TABLE 3(b) 9.

	n	+ scores	- scores	Total	x
CL - $\overline{CL}$	21	218	119	+ 99	+ 4.7
$\overline{CL}$ - CL	45	358	506	-148	- 3.3

The $\overline{CL}$ - CL group shows a tendency towards open-ness of belief systems while the opposite effect is found in the CL - $\overline{CL}$ group. Significance

of difference between the two groups was measured by the Mann-Whitney U Test and the following result obtained:-

TABLE 3(b) 10.

	n_1	n_2	U	U'	sig.
CL - $\overline{CL}$ / $\overline{CL}$ - CL	21	45	401	544	n.s.

Since the figure (0.16) is approaching a reasonable level of significance and the sample distributions were approximately normal, a t test was also applied to the data. The result of the t test gave a significance of difference of .10 at the .05 level. As indicated in Section 3(a) no significant difference on D scale scores was found for cognitively similar or dissimilar groups. The transfer groups however, show an almost significant degree of difference with the $\overline{CL}$ - CL group showing a more open belief system. This finding cannot be linked with intelligence since Rokeach (1960) has shown that open or closed scores on the D Scale cannot be explained in terms of this variable. Correlations between D Scale scores and intelligence are typically close to zero. The result does not indicate that one transfer group was more amenable to change than the other. Obviously change can and did take place in either open or closed systems. But, as Rokeach (1960) indicates, it is the mechanism behind the change which is important, i.e., those with closed systems seem unable to differentiate substance from source, the latter being more influential than the former in bringing about change. In general, it could be said that the $\overline{CL}$ - CL group shows

greater ability to form and adapt new belief systems influenced by the lecturer but not merely because he represents authority.

(f) STUDY OF VALUES

The transfer groups were compared for scores shown in the Study of Values profiles. The scores reflect the relative prominence of six interest areas. As in Section 3(a), initial letters will be used to denote these areas, i.e. -

Theoretical, Economic, Aesthetic, Social, Political and Religious.

The following Table indicates the mean scores for the two groups in the six areas:-

TABLE 3(b) 11.

	n	T	E	A	S	P	R
CL - $\overline{CL}$	22	34.9	38.8	40.2	43.4	40.7	42.00
$\overline{CL}$ - CL	45	35.9	40	42.4	42.5	39.5	39.7

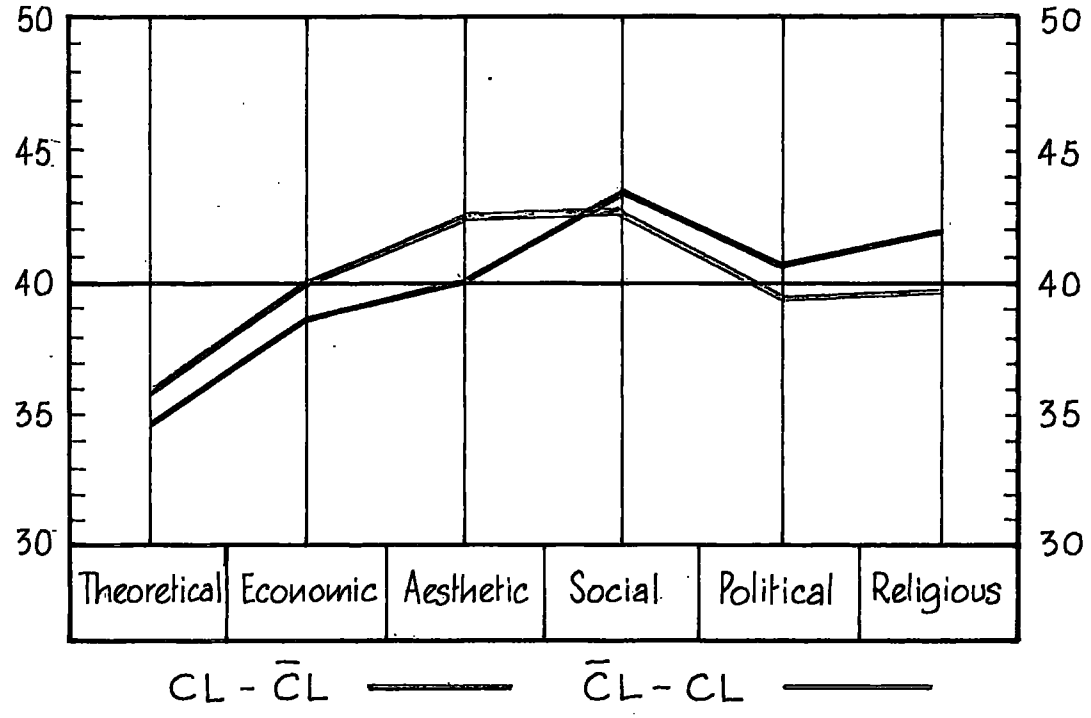
None of the scores may be classed as high or low or outstandingly high or low according to the norms given by Allport, Vernon & Lindzey. Both groups score most highly on the Social value category and give lowest scores on the Theoretical category.

CL - $\overline{CL}$ S R P A E T

$\overline{CL}$ - CL S A E R P T

However, the following graph indicates that apart from this similarity there are differences in the profiles of the two groups.

TABLE 3(b) 12.



The Mann-Whitney U Test was used to establish any significance of difference in the scores of the two groups on the six value areas. The following table indicates the levels of significance.

TABLE 3(b) 13.

	n_1	n_2	U	U'	sig
T	22	45	500.5	489.5	n.s.
E	22	45	525	465	n.s.
A	22	45	567.5	422.5	n.s.
S	22	45	461.5	528.5	n.s.
P	22	45	433.5	556.5	n.s.
R	22	45	416	574	n.s.

As would be expected there is least difference in the Social and Theoretical areas. However, the results which most nearly approach significance are the Aesthetic (0.16) and Religious (0.14) categories with the $\overline{CL}$ - CL group being more orientated towards Aesthetic values.

Analysis of data for cognitively similar or dissimilar groups in Section 3(a) showed no significant difference in the scores of the two groups. However, both groups showed the predominance of Social values with the Theoretical category emerging as the least preferable. The transfer groups appear to be following a norm for this particular population of students and for education students in general. MacLean, Gowan and Gowan (1955), found that education students and teachers score more highly than the general population on the Social category. So the predominance of the Social area in all groups is in line with general findings. One might have expected the Theoretical area to have been given more prominence by at least one of the groups.

However, differences in the transfer groups which approach significance are in the Aesthetic and Religious categories. The CL - $\overline{CL}$ group was also the most closed-minded but Rokeach found no correlation between religion and closed minded-ness since the D scale measures authoritarianism and general intolerance relatively independent of ideological content.

(g) QUESTIONNAIRE

An examination of questionnaires yielded little difference between the transfer groups. Since the students were drawn from a fairly homogeneous population perhaps this could have been expected. There were no significant differences between the groups for the following variables,- age, sex, marital status, country of origin, religion, position in family, major subject, employment, etc. Full details of this comparison

are given in Appendix G. The only differences approaching significance appeared in two areas. The $\overline{CL}$ - CL group appear to have a greater degree of involvement in both university and extramural activities. The following table shows the amount of participation for the two groups in university societies.

TABLE 3(b) 14.

	n	%	χ^2	p
CL - $\overline{CL}$	7	26.9	1.4	.2
$\overline{CL}$ - CL	21	40.4		

Table 3(b) 15. shows the amount of participation by the two groups in other societies and activities outside the university.

TABLE 3(b) 15.

	n	%	χ^2	p
CL - $\overline{CL}$	8	30.7	3.6	.07
$\overline{CL}$ - CL	28	53.8		

It would seem that the $\overline{CL}$ - CL group shows more interest and participation in a variety of activities than the CL - $\overline{CL}$ group.

In summary, the analysis of data related to the transfer groups shows certain trends. As Rokeach (1960) stated, "the trend of results is a more important consideration than the precise level of

significance achieved by a particular set of differences." (p.405). Taken separately the individual results do not achieve high levels of significance but in toto they build into a pattern which defines groups distinguishable by certain characteristics. There is a trend establishing that transfer groups who differ in their move towards or from a position of cognitive similarity also differ in certain other respects. The groups reveal no differences in scholastic achievement but on both ACE and AH4 tests the $\overline{CL}$ - CL group shows a tendency to score more highly than the CL - $\overline{CL}$ group on the verbal sections of these tests. The results of the D Scale analysis show that the $\overline{CL}$ - CL group shows a greater degree of open minded-ness than the CL - $\overline{CL}$ group. An examination of the Study of Values data shows a trend towards significant differences in the prominence of the Aesthetic and Religious value areas in the profiles of the two groups. The $\overline{CL}$ - CL group gives greater prominence to the Aesthetic category and the CL - $\overline{CL}$ group gives greater emphasis to the Religious category. It would appear that the groups differ in the amount of involvement and participation in university and other societies and activities. The $\overline{CL}$ - CL group participate more in a variety of activities. The trend in differences between the two groups shows the following grouping:-

$\overline{CL}$ - CL	CL - $\overline{CL}$
Greater verbal competence	Less verbal competence
Open belief systems	Closed belief systems
Prominence of the Aesthetic value area	Prominence of the Religious value area
Wide participation in social activities	Less involvement in social social activities.

These trends will be examined fully in the conclusion when the implications of the research results will be discussed.

S E C T I O N 3(c)

ANALYSIS OF DATA RELATING TO AN EXPLORATORY MEASURE OF COGNITIVE SIMILARITY

As indicated in Section 1(e) and Section 2(d), this investigation explored the possibility of Bartlett's work (1958) being used as an index of cognitive similarity. Bartlett investigated thinking within closed systems and considered the gap-filling strategies of S's in relation to these systems, i.e., how S's linked initial and terminal information, filling the gap between these two points. These strategies give an indication of how individuals organise their cognitive fields. It was thought that similarities or dissimilarities could be established in the gap filling strategies of individuals, thus giving a measure of cognitive similarity. Bartlett's numerical and verbal examples relating to interpolative, extrapolative and re-interpretative thinking were adapted for use as a measure of cognitive similarity. An example of the instrument used is given in Appendix A. This section will report the analysis of data in relation to cognitive similarity as established by this adaptation of Bartlett's work. The following abbreviations will be used:-

CSB denotes S's established as cognitively similar according to the gap filling strategies they employed in relation to Bartlett's examples illustrative of thinking within closed systems.

$\overline{\text{CSB}}$ denotes S's cognitively dissimilar according to this measure.

The analysis of data will be discussed in relation to:-

(a) experimental sample,
(b) classification of CSB and $\overline{\text{CSB}}$ groups,
(c) achievement in course work,
(d) AH4 Group Test of General Intelligence,
(e) D Scale,
(f) Study of Values.

(a) EXPERIMENTAL SAMPLE

The sample represents a relatively small population of S's. The

data was gathered at a voluntary session and only those S's were considered who from pre to post test maintained rank orders co-linear or non co-linear with that of the lecturer on the index of co-linearity suggested by Runkel. This was done for purposes of comparison, i.e., to compare those cognitively similar on Runkel's index of co-linearity with those cognitively similar on the exploratory measure or to establish whether both groups represented the same population. At the time of the collection of data it was thought that the post test was important in the index of co-linearity. Since the McNemar test of significance of change established that this was not the case, it is now realised that a greater number of S's could have been included in this sample. The sample, therefore, includes 36 S's.

(b) CLASSIFICATION OF CSB AND $\overline{\text{CSB}}$ GROUPS

The responses of the 36 S's to the 14 items included in the exploratory measure (see Appendix A) were examined and categorised. This could not be done on a quantitative basis since one response could not be classified as "better" or "worse" than another. Therefore, alphabetical categories were used to classify the responses. For instance, S's were asked to link the following initial and terminal points:-

1 17

Some subjects used the following gap-filling strategy:-

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

This response was classified as A.

Other subjects used a different strategy:-

1 3 5 7 9 11 13 15 17

This response was classified as B.

Other subjects responded using random numbers or linked the two points with a pattern. These reponses would be classified as C and D. This process was continued until the responses of every subject for this item had been classified. Similarly, every response to each of the 14 items used in the measure was classified in this way. Thus, for the completed test there were 14 categories of response for each subject, eg.,

SUBJECT X : A G A B B A A A A D C C F D

None of the subjects gave the same sequence of categories of response.

The categories of response for each of the 14 items were then examined, e.g., in response to A, BY HORRIBLE the following categories of response were given by the 36 S's:-

Category A	12 S's	.....33.3%
Category B	9	.....25%
Category C	2	..... 5.5%
Category D	3	..... 8.3%
Category E	7	.....19.4%
Category F	1	..... 2.7%
Category G	1	..... 2.7%
Category H	1	..... 2.7%

As shown previously, each category represented a gap-filling strategy, e.g., in Category C the strategy represents an attempt to construct a sentence from the material. Obviously the number of categories used was related to the item to which S's were responding, e.g., more categories were used in response to:-

E R A S E
F A T E

than in response to:-

C A T
D U T Y
E R A S E
F A T E
G E T

In the latter example more information is given to S's and the way to a

terminal point is more clearly defined. Thus, for each of the 14 items, the number and percentage of categories used by S's was calculated. The full analysis for the 14 items is given in Appendix H.

Responses to each item were classified in terms of popular and atypical responses. In this scoring system an atypical response was taken as indicative of a different frame of reference to the general population of responses. An atypical response is a category that has a small number of responses falling in it. This is, of course, in line with Bartlett's findings. Although there are theoretically many ways of filling gaps in information, the number of strategies actually chosen are relatively few. There are popular responses, i.e., a variety of strategies used by the majority of S's and what Bartlett refers to as "individual responses", i.e., those used by a minority and which fall outside the more popular categories employed. It is these "individual" or atypical responses which are taken to denote a measure of cognitive dissimilarity, i.e., where S's are not similar to the general population of S's in the gap filling strategies they employ. Therefore, in the example given on page 156, (A, BY HORRIBLE), responses A, B and E would be classified as popular responses. Responses C,D,F,G and H would be classified as atypical and showing cognitive dissimilarity. Clearly S's scoring popular responses cannot be scored definitively as cognitively similar, but their thinking is characteristic of the general population. A categorisation system comparable to Runkel's was precluded by the large number of possible alternative scoring categories in the fourteen items. There are a total of 72 scoring categories.

Thus, the responses of each of the 36 S's to each of the 14 items was classified as being a popular or an atypical response.

6 subjects gave 14 popular responses.
13 subjects gave 1 atypical response.
8 subjects gave 2 atypical responses.
3 subjects gave 3 atypical responses.
2 subjects gave 4 atypical responses.
Only 4 subjects consistently differed from the whole population in 10 or more responses, i.e. 75%.

It was felt that as a stringent measure only the latter four S's would be grouped as cognitively dissimilar. Even where S's gave 4 out of 14 atypical responses this only gave a 28.5% degree of dissimilarity. Therefore the relative numbers of CSB and $\overline{CSB}$ S's included in the study is disproportionate. However, although the number of $\overline{CSB}$ S's is small, this represents a high degree of deviation from the common frame of reference of answers to the items. Only one of these subjects was also cognitively dissimilar on the index of co-linearity proposed by Runkel. The two indices of cognitive similarity do not appear to be differentiating the same groups.

The responses of the eight lecturers were also categorised in the same way as previously described. The responses of all lecturers could be categorised as belonging to the common frame of reference.

(c) ACHIEVEMENT IN COURSE WORK

Runkel's research (1956) suggested that cognitive similarity was a facilitating mechanism in communication effectiveness. In his research he found that students who were cognitively similar to the lecturer achieved greater success in the course than students who were cognitively dissimilar (see Section 1(c)). Thus, the measure of greater achievement gave a measure of communication effectiveness. This research was, of course, related to the index of co-linearity as a measure of cognitive similarity. The relationship between cognitive similarity and achievement was also investigated where cognitive similarity was established by the

measure based upon Bartlett's work. The two groups, CSB and $\overline{CSB}$ were compared for achievement in course work. As indicated in previous sections of Part 3, the achievement of students was shown by a final grade mark. This represented an aggregate for grades for papers presented during the term and the results of mid-term and final examinations. The marking system was based upon a 9 point scale. In classifying the responses of the lecturers to the exploratory measure, it was found that these responses could be classified as belonging to the cognitively similar group, i.e., the group giving popular responses. Therefore, students who are CSB or $\overline{CSB}$ may be considered as total groups rather than considered in relation to separate subject areas. The Mann-Whitney U Test was used to establish any significance of difference in the achievement of CSB and $\overline{CSB}$ groups. The result is given in Table 3(c) 1.

TABLE 3(c) 1.

	n_1	n_2	U	U'	sig.
CSB / $\overline{CSB}$	4	30	78	42.	n.s.

This result is not significant at the .05 level. Previous research in this investigation had already shown that, contrary to Runkel's findings, in 6 out of 8 instances cognitive similarity was not significantly related to achievement or that the significance was in the opposite direction to that indicated by Runkel, i.e., subjects who were non co-linear achieved greater success than those co-linear with the lecturer. Therefore, perhaps the result in relation to achievement and the exploratory

measure of cognitive similarity could have been expected. Those who are cognitively similar on the exploratory measure do not achieve greater success in course work than those who are cognitively dissimilar on this measure.

(d) AH4 GROUP TEST OF GENERAL INTELLIGENCE

The two groups, CSB and $\overline{\text{CSB}}$, were compared for performance on the AH4 Group Test of General Intelligence, to investigate whether the measure of cognitive similarity based upon Bartlett's work differentiated groups on the basis of intelligence. It would also have been desirable to investigate the groups in relation to scholastic aptitude as shown in ACE scores. However, this data was not available for 3 of the 4 $\overline{\text{CSB}}$ subjects. The Mann-Whitney U Test was used to establish any significance of difference in the scores of CSB and $\overline{\text{CSB}}$ groups for verbal, non verbal and total scores on the AH4. The results are given in Table 3(c) 2.

TABLE 3(c) 2.

	n_1	n_2	U	U'	sig.
AH4 Verbal	4	30	112	8	0.0027
AH4 Non-Verbal	4	30	97.5	22.5	0.0228
AH4 Total	4	30	112.5	7.5	0.0026

These results are all significant at the .05 level. It is interesting to note that, as in the transfer groups, the significance of difference is greater for verbal intelligence than for non verbal intelligence.

Thus, it would appear that the exploratory measure has differentiated

two groups on the basis of intelligence. This finding will be discussed in the summary at the end of this section.

(e) D SCALE.

The CSB and $\overline{CSB}$ groups were compared for scores related to the D Scale. This scale measure open-ness and closed-ness of belief systems and gives a measure of general authoritarianism and intolerance. Positive scores indicate closed systems and negative scores indicate open systems. Table 3(c) 3. gives the mean, and standard deviation for the scores of the two groups:-

TABLE 3(c) 3.

	n	$\bar{x}$	δ
CSB	30	- 1.76	18.25
$\overline{CSB}$	4	- 6.5	64.5

The mean scores indicate a tendency for both groups to have open belief systems. The Mann-Whitney U Test was used to establish any significance of difference in the scores of the two groups. The result is given in Table 3(c) 4.

TABLE 3(c) 4.

	n_1	n_2	U	U'	sig.
CSB / $\overline{CSB}$	4	30	57	63	n.s.

The result is not significant at the .05 level.

The present study investigated whether those cognitively similar were also similar on intrapersonal variables, e.g., belief systems. However, there was no relationship between belief systems as measured by the D Scale and cognitive similarity based on the index of co-linearity. Similarly, there is no significant relationship between D Scale scores and cognitive similarity based upon the exploratory measure. In relation to the two indices, the scores of both cognitively similar and cognitively dissimilar groups have indicated open belief systems.

Differences in scores upon the D Scale have only been found to approach significance in the transfer groups (Section 3(b)), i.e., groups who change from cognitive similarity to cognitive dissimilarity or vice versa. It is interesting to note that the only group in the whole investigation whose scores indicated closed belief systems, was the group changing from cognitive similarity to cognitive dissimilarity.

(f) STUDY OF VALUES

Cognitive similarity based upon the exploratory measure was also investigated in relation to the intrapersonal variable of value systems. The CSB and $\overline{\text{CSB}}$ groups were compared for scores shown in the Study of Values profile. The Study of Values give an indication of the relative prominence of the six interest areas:-

Theoretical, Economic, Aesthetic, Social, Political and Religious.

Table 3(c) 5. indicates the mean scores of the two groups.

TABLE 3(c) 5.

	T	E	A	S	P	R
CSB	35.1	38.56	40.93	45.1	38.23	42.06
$\overline{CSB}$	34.25	41.5	38.25	40.75	40.25	45

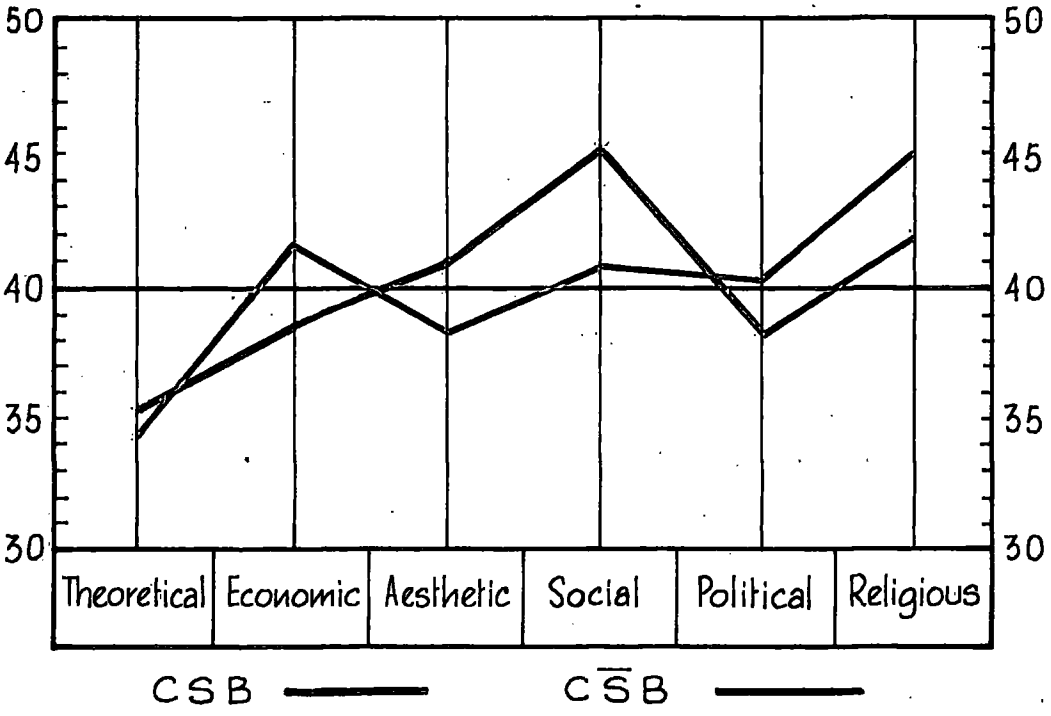
None of the scores fall within the categories defined by Allport, Vernon & Lindzey as high or low, or outstandingly high or low scores. The order of relative prominence for the two groups is:-

CSB : S R A E P T

$\overline{CSB}$: R E S P A T

Table 3(c) 6. shows the profiles obtained from the mean scores of the CSB and $\overline{CSB}$ groups.

T A B L E 3(c) 6.


50
45
40
35
30
Theoretical
Economic
Aesthetic
Social
Political
Religious
CSB
CS̄B

The Mann-Whitney U Test was used to establish any significant difference in the scores of the two groups for the six categories. The results are given in Table 3(c) 7.

TABLE 3(c) 7.

	n_1	n_2	U	U'	sig.
THEORETICAL	4	30	64.5	57.5	n.s.
ECONOMIC	4	30	54	66	n.s.
AESTHETIC	4	30	76.5	43.5	n.s.
SOCIAL	4	30	92	28	0.0436
POLITICAL	4	30	48	72	n.s.
RELIGIOUS	4	30	48	72	n.s.

The only result which is significant at the .05 level is in the Social category.

As reported in Section 3(a), there was a tendency for the group cognitively similar on the index of co-linearity to give greater prominence to the Social category than the cognitively dissimilar group. Also, both transfer groups gave greatest prominence to this area (see Section 3(b). Again, in relation to the Bartlett measure of cognitive similarity, it is in the area of Social values that cognitively similar and dissimilar groups differ most significantly. Although it could be said that Runkel's statements were testing social values, this obviously does not account for the difference on the exploratory measure. However, whereas the non co-linear group gave greatest prominence to the Aesthetic area, the $\overline{CSB}$ group gives greatest prominence to the Religious area.

In common with every other group in the study, least prominence is given to the Theoretical category by both CSB and $\overline{CSB}$ groups.

SUMMARY

The exploratory measure differentiated two groups. These groups differed in the gap filling strategies they employed in response to items in the measure. The groups, designated CSB and $\overline{CSB}$, also showed significant differences in scores on the AH4 Group Test of General Intelligence, the CSB group achieving significantly higher scores than the $\overline{CSB}$ group. Thus, it would appear that the exploratory measure differentiates groups on the basis of intelligence.

Is this a function of the measure itself? Obviously, for some items the variable of intelligence would be unimportant. For example, when S's were asked to link the following points, - -, in any way they thought desirable, then the scope for individual response is limitless. No question arises of the possibility of "right" or "wrong" answers or that one response is more intelligent than another. However, with other items in the measure this would not be the case.

Bartlett observed a relationship between high intelligence and the ability to use minimal information in gap-filling. Obviously, the following examples differ in the amount of information they give:-

A	HORRIBLE
A, BY	HORRIBLE
A, BY, COW	HORRIBLE
A, BY, COW, DONE	HORRIBLE

In these four examples the way to a terminal point becomes increasingly defined. Similarly:-

E R A S E
F A T E

conveys less information than:-

C A T
D U T Y
E R A S E
F A T E
G E T

The measure included items which gave an increasing number of clues as indicated in the above examples. This, of course, implies that for some items there was a "correct" solution. Thus, for some items the variable of intelligence would be important.

However, the responses of S's were not categorised as "right" or "wrong". Those in the CSB group did not use only one category of response, i.e., a "right" or "intelligent" response. Instead, as a group, they used a variety of responses to each item. How then were the groups selected for intelligence when qualitative criteria were not used?

The answer appears to lie in the number of categories used in response to items where the variable of intelligence was important. For example, in response to:-

A HORRIBLE.

there was a large number of categories. However, as more information was given, i.e.:-

A, BY HORRIBLE.

then the more intelligent began to appreciate the information. This did not show itself in the simple dichotomy of "right responses" and "the rest". A variety of responses was still evident, e.g., some S's appreciated that there should be a numerical progression but ignored the alphabetical aspect and vice versa. But the number of categories used by the more intelligent narrowed as the amount of information increased. The more intelligent would obviously use available clues and their

categories of response become more defined. Those whose responses remained "dissimilar" to the categories which came to be more generally employed, either ignored the clues or failed to recognise their significance. These S's would presumably be the less intelligent. So it would seem that the more intelligent responded to clues and narrowed their responses to a number of categories. Their responses would be similar in that, if not selecting the "right" response, they selected from a defined number of popular categories which approached the correct solution. The less intelligent presumably did not appreciate the clues and gave responses consistently dissimilar to the more intelligent group.

It was also found that the dissimilar group differed in the kind of category they employed. The dissimilar group would often try to superimpose their own system on the information. Often, despite information to the contrary, they would try to construct sentences from the words given or construct another pattern and ignore the initial information. Thus, while the more intelligent would give similar responses in that they attempted to manipulate initial and terminal points, the responses of the atypical group were highly idiosyncratic.

Since the measure differentiated groups on the basis of intelligence, it is scarcely surprising that there was no significant difference between the groups on the other tests used in the study. It has already been shown, (Section 3(a)), that there was no significant relationship between high achievement and intelligence for this population of students. As shown by Rokeach (1960), there is consistently no correlation between D Scale scores and intelligence. Nor is the intelligence a significant variable in the Study of Values.

The exploratory measure appears to be an indirect if not a direct measure of intelligence. Obviously, the measure cannot be used as an index of cognitive similarity but the findings are still of interest. Bartlett had observed an apparent relationship between high intelligence and the ability to use minimal information in gap-filling. However, no research has investigated intelligence in relation to gap-filling strategies. Though the usefulness of the measure as an index of cognitive similarity is limited, the measure has potential as a device for selecting groups on the basis of intelligence. As such a device the measure could only be broadly diagnostic, but it has the advantage of being self administering. Although the measure has potential there is need for further investigation. Obviously, there is the problem of scoring. One possibility would be for a scoring system to be related to the number of clues given in items. The measure could also be used as a tool to study other processes of thinking, e.g., some of the items in the measure give scope for observing divergent thinking. It would seem that further investigation of the measure could be both interesting and profitable.

C O N C L U S I O N

CONCLUSION

The present study has attempted to examine the problem of developing student competence effectively in the education of teachers. Basically, this education, whatever the organisational or content features of the course, involves the processes of communication. There is a need for effective communication between lecturers and students. The problem of how this may be achieved relates to a wide field of research in social psychology which has investigated the processes of communication. Of particular interest within this field has been research by Runkel (1956) which has suggested that cognitive similarity is a facilitating mechanism in communication. The interesting results obtained by Runkel prompted the present investigation. This investigation had three main objectives:-

(a) to examine the index of co-linearity proposed by Runkel and establish whether his results could be repeated over wide range of subject areas,

(b) to examine groups which were not investigated by Runkel, i.e., groups who changed their position of cognitive similarity, and establish whether these groups had characteristics in common,

(c) to examine another measure of cognitive similarity in relation to achievement and effective communication, i.e., an exploratory measure based on the work of Bartlett (1958).

The concluding Chapter will discuss points which arise from these main areas of concern. It will examine the implications of the findings, discussing how they might be implemented to promote effective communication and how further research may be developed.

In relation to the first area of investigation, a summary of the main findings regarding groups established as cognitively similar or dissimilar according to the index of co-linearity shows:-

(a) In general there is no significant difference in the achievement of the two groups. In only two out of eight cases was there a significant difference in the direction predicted by Runkel. In four cases there was no significant difference in achievement. In two cases the significant difference was in the opposite direction to Runkel's findings, i.e., there was greater achievement by the cognitively dissimilar group.

(b) There was no significant difference between the two groups on scores related to:-

1. AH4 Group Test of General Intelligence.
2. ACE Test of Scholastic Aptitude.
3. D Scale.
4. Study of Values.

Despite the interesting results obtained by Runkel, the bleak array of facts in the summary suggests that it is possible that Runkel's results could have arisen by chance. The results of the present study give rise to many questions.

The index of co-linearity has differentiated two groups which do not differ significantly in achievement. Nor do these groups differ significantly on any of the variables investigated in the study. These variables all have a cognitive basis. It is claimed by Runkel that the index of co-linearity gives a measure of cognitive structure. Yet no relationship is found between groups presumably differentiated on the basis of cognitive structure and their performance on measures of cognitive variables. Is this suggesting that the cognitive structure of individuals can be similar although there are no similarities in the constituent parts of this structure? Are the groups indeed differentiated on cognitive structure or what is the basis for the selection of the groups?

One possibility is that the grouping is random and that Runkel has produced a statistical artifact. There are 5 stimulus statements in the index of co-linearity. Therefore, the number of possible combinations

of these is 5!, i.e., 120 possible responses. Of these, 50 responses can be designated as non co-linear, (see Table 2(d) 1.) Therefore, 70 responses fall within the co-linear or cognitively similar category. The probability of a response falling into a cognitively similar or dissimilar category is $\frac{5}{12}$ and $\frac{7}{12}$ respectively.

Although the writer has not the mathematical ability to carry the argument further, it would be interesting to establish whether or not Runkel's argument is indeed founded on a statistical artifact.

Although this explanation would neatly dispose of many problems, there are other factors to be considered. In the present study the McNemar test was used to establish any significance of change from pre test to post test. It was found that since there was no significant change, it was unnecessary to consider the post test responses of individuals. This seems to indicate that the initial differentiation of groups may not have been random. Further, when transfer groups were considered, the trend of the results indicated that each group appeared to have characteristics in common. If the grouping was random would such trends exist? The question is what are the transfer groups responding to when they change their position of cognitive similarity, and on what basis was the initial differentiation of groups made?

One possible explanation is that the index of co-linearity is measuring, not cognitive structure as suggested by Runkel, but the attitudes of individuals. In their responses to the index of co-linearity, S's gave value judgements in relation to 5 statements about a particular topic, i.e., psychology. The index could therefore be giving a measure of their attitudes towards the ideas expressed about this topic. The cognitively similar group would therefore include those whose attitudes were similar or compatible with those of the lecturer.

The cognitively dissimilar group would include those whose attitudes differed from those of the lecturer. How would this account for the fact that in Runkel's study the groups differed significantly in achievement? Runkel's results showed that the cognitively similar group achieved greater success in the course than the dissimilar group and this was taken to indicate more effective communication between lecturers and students who were cognitively similar.

In the procedure outlined by Runkel for the selection of stimulus statements, it was shown that these statements were selected by consultation between the experimenter and the lecturers teaching the course. Lecturers were given a long list of statements compiled by the experimenter and asked to select those which in their opinion, would be most suitable, i.e., statements which could be viewed from a variety of standpoints, (See Section 2(d)). Runkel states that the stimulus statements were not given as material to be learnt during the course or used as items in tests. Nevertheless, they are relevant to any discussion of general psychology. For instance, one statement concerns the nature/nurture position. It could very well be that because of their own attitudes, lecturers would emphasise certain points of view rather than others during the course. Indirectly, they would reveal their attitudes towards the statements. How would the reactions of students be affected?

Those in the cognitively similar category would presumably have similar or compatible attitudes with those of the lecturer. Attitudes infer certain expectancies and they would be alert to information and evidence which would support their own views. There is the probability that the lecturer would furnish this evidence and come to be viewed as a

credible source. There would be more likelihood of the lecturer being regarded favourably. As the Yale Studies have shown (1953) this can be an important factor in effective communication. For instance, Hovland, Janis & Kelley (1953), state that communication is less likely to be effective and material is learnt less efficiently if the source is regarded unfavourably, (see Section 1(b)). It could be assumed that students who were cognitively similar to the lecturer would have favourable attitudes towards him, regard him as a credible source and that communication between them would be effective. They would be likely to have a better appreciation of the lecturer's frame of reference and be more likely to answer questions in the way in which he would prefer. Presumably, those students who were cognitively dissimilar would not share the attitudes of the lecturer, would not regard him as a credible source and there would be less likelihood of effective communication. As Hovland, Janis & Kelley (1953), state, when the source is not credible and regarded unfavourably, individuals do not pay close attention to the content of the communication and/or do not attempt to comprehend the exact meaning of what is said. This general position would be affected by other intrapersonal variables within the filtering mechanism of individuals. For instance, students may not have shared similar attitudes with the lecturer initially. During the period of interaction students with open belief systems may have been more flexible and open to new ideas and come to have an appreciation of the lecturer's frame of reference. This argument will be extended in relation to differences in the transfer groups which will be considered in later discussion.

If this explanation is correct, one would not expect significant

differences between cognitively similar and dissimilar groups on the variables of intelligence and scholastic aptitude. However, since attitudes have cognitive as well as motivational and affective properties, perhaps some relationship with other cognitive variables could have been expected. Groups might have differed significantly in their responses to measures of belief and value systems. Perhaps a possible explanation is the fact that if the index of co-linearity measured attitudes, these attitudes would be related to a specific topic. Although attitudes rarely exist in isolation and form in clusters, there is no guarantee that individuals established as cognitively similar would share attitudes of wider compass. The measures of belief and value systems used in this study do not relate to a specific or narrow area, but are general measures of these variables. Therefore, it may not be reasonable to expect that the three measures are comparable.

If it is reasonable to suppose that (a) the index of co-linearity gives a measure of attitudes, and (b) that these attitudes which are important in interaction can account for the differential success of students, why were the results obtained by Runkel not repeated in the present study? It cannot be that attitudes are only important in psychology and not in any other subject area. The present study investigated the index over a wide range of subject areas. As far as possible, the study repeated the exact conditions of Runkel's research. If the writer had not been in Canada this would not have been possible. In English colleges it seldom occurs that one group of students is assigned exclusively to one particular lecturer. Yet it has been impossible to repeat Runkel's results. Could it be that the measures in the present study were at fault?

The stimulus statements used to differentiate groups in the present study were selected according to the criteria outlined by Runkel, (see Section 2(d)). They were a heterogeneous sample of statements capable of being viewed from a variety of standpoints. Further, according to the theory and as Runkel states, any representative and discriminable set of statements would do equally well as those finally selected. There is no question of the "right" or "wrong" selection of statements. The effectiveness of the measure depends on how statements are ranked by individuals. In both studies the statements related to a new subject area for students. Runkel's statements were used with an introductory course in psychology, a subject not included in the curriculum of schools. The statements in the present study concerned the teaching of a subject area - not the subject itself. For instance, although students would have some knowledge of mathematics, a course in how the subject should be taught in schools would be a new area. There appears to be no appreciable difference in the selection or content of statements in the two studies.

There is also the factor of the measure of effective communication. The measures used in the two studies differed but theoretically this should not have made an appreciable difference since both related to the achievement of students and how successful the lecturer had been in imparting information. Runkel's measure of effective communication was based upon quiz scores. Such tests were not part of the normal programme in the Canadian university. It was felt that the measure used, i.e., the final grades of students would give an effective measure of the success of students. There is a sense in which it ought to give a better indication of effective communication since it is more representative,

giving a composite assessment of course work and examination results. Perhaps it could be said that in this particular situation the range of marks was not sufficiently differentiating. A nine point marking scale was used. However, before the writer joined the staff, there had been considerable controversy about the marking system. It was felt that education lecturers had been making insufficient use of the extremities of the scale and that, for instance, education students were at a disadvantage in competing for open scholarships. Consequently, lecturers were encouraged to make use of the full range of the scale. Inevitably there would be a tendency for marks to cluster around the mean. But this characteristic is general and no doubt appeared in Runkel's scores too. Further, the statistical method used in the present study was appropriate for use on ranks and interval scales. However, it may be that the measure of effective communication demanded more of the data than could be provided by the insufficiently discriminating power of the index of co-linearity.

There is also the point that despite the representative nature of the final grade mark, there may have been effective communication which was not measured. For instance, some students may have had an intense dislike of a particular subject area. This attitude may have been formed by unfortunate experiences at school where, through poor teaching or other variables, the students may have experienced failure. Many students seem to experience difficulty with mathematics. Communication would have been highly successful if the lecturer had been able to diminish the paralysing sense of fear that failure to understand mathematics can induce. The student still may not have achieved good grades but would perhaps have begun to approach the subject with less apprehension. In this sense,

communication would have been successful and effective. This would not necessarily be evident in a measure of effective communication based on achievement in course work. In any teaching situation there are always intangible effects brought about by the teacher. Of course, the same argument could be used in relation to Runkel's work. There would be effective communication in his experimental situation which would not necessarily be apparent.

The only finding in common between the present study and Runkel's work is that cognitively similar and dissimilar groups are not differentiated on the basis of scholastic aptitude. However, as pointed out earlier (Section 3(a)), since this variable was not built into the measure of co-linearity, it was hardly likely that groups would be differentiated according to this variable. Like intelligence, it is used as a control variable. Runkel investigated whether in any case scholastic aptitude could be related to success and found a significant correlation, i.e., ignoring cognitive similarity, the most scholastically able students achieved greatest success. In the present study no significant difference was found between groups of High and Low achievers on either scholastic aptitude or intelligence. The point that the range of marks may not have been sufficiently extensive has already been discussed. However, the grade marks, 9 and 3, used to establish High or Low achievers would seem to differentiate sufficiently. Further, if Runkel was correct, the high achievement group ought to have contained a preponderance of students belonging to the cognitively similar category. This was not found to be the case.

It would seem that although it may be possible to explain Runkel's findings, it is not possible to repeat these results when the index of

co-linearity is subjected to closer scrutiny. Further, the explanation proposed is counter to the position held by Runkel. However, it is an explanation which is more in line with other available research. The explanation proposes that the index of co-linearity is measuring attitudes and not, as Runkel suggests, cognitive structure. Undoubtedly, attitudes are part of this structure, but whereas it is difficult to appreciate how the whole cognitive structure of individuals would change during a course, it would be expected that interaction and communication would lead to attitude change. Change does take place as can be seen in responses to pre and post tests. In toto, as established by the McNemar test, the amount of change was not significant. Where it did occur, as shown in the present study, groups who changed in particular directions tended to have characteristics in common. These apparently conflicting results may be related to the fact that the odds of a particular response falling into cognitively similar or dissimilar categories are 5 : 7. For a response to fall definitively into a particular category, it would be likely to be a response representing the extremity of a continuum of possible responses. Those in the transfer groups may have held positions which the index could easily differentiate. Where finer discrimination was required and degrees of change may have been less in extent, the measure may have been insensitive. In suggesting that Runkel's findings involved attitudes and attitude change, an explanation is proposed which takes cognisance of the total situation. It takes into account that this is a dynamic situation in which change is expected as the result of interaction. As discussed earlier (Section 2(a)), this point appears to have received little attention from Runkel.

Also, contrary to Runkel's view, it is proposed that cognitive similarity is an intrapersonal variable and not an interaction variable. Individuals A and B may be cognitively similar - by whatever methods or criteria are used for establishing this. A and B do not interact. But they still may be said to be cognitively similar. In Homans view (1951), interaction refers to "some unit of activity in one individual being stimulated by some unit of activity in another." (p.35.) If A and B come into contact, cognitive similarity does not arise through interaction - it already exists. It may be evident in interaction. It may be increased by the influence of interaction and other variables. As Newcomb (1953) indicates, it is part of a cyclic process involving interaction, communication and liking. But fundamentally cognitive similarity appears to be a complex of similarities on a variety of intrapersonal dimensions. An important variable within this complex may be the variable of attitudes.

Research by Newcomb (1953) and Triandis (1959, 1960), has established patterns of cognitive similarity. It appears that the cognitions of individuals are organised into systems. Such systems are a complex of a variety of intrapersonal variables, e.g., attitudes, beliefs, values, etc. When such systems are similar, Newcomb and Triandis have shown that this can be a facilitating mechanism in communication (see Sections 1(c) and 1(d)). A problem which could be posed for future research is the development of an effective, reliable and valid measure of cognitive similarity. It would seem necessary that such a measure should incorporate a number of sampling devices of various dimensions to approximate the cognitive structure of individuals.

The second main area of investigation relates to transfer groups, i.e., groups who during the course changed from their original position of cognitive similarity or dissimilarity. Although the factor of change is an integral part of any situation involving interaction and communication, this factor received little attention from Runkel. This point was discussed in Section 2(a). Runkel's results only considered those groups who maintained cognitive similarity or dissimilarity from pre test to post test. Although Runkel proposed cognitive similarity as an interaction variable, he gave little consideration to the effects of this interaction. The trend of the results in the present study showed that transfer groups had certain distinguishing characteristics. The following table gives a summary of these trends. (Full analysis of the data was given in Section 3(b)).

$\overline{CL}$ - CL	CL - $\overline{CL}$
Greater verbal competence	Less verbal competence
Open belief systems	Closed belief systems
Wide participation in social activities	Less involvement in social activities
Prominence of the Aesthetic value area	Prominence of the Religious value area

As measured by the index of co-linearity, transfer groups changed their position of cognitive similarity or dissimilarity to a particular lecturer after a period of interaction. It has previously been suggested that the index of co-linearity gave a measure of the attitudes of individuals. If this explanation is acceptable, it would infer that interaction with the lecturer had brought about attitude change. Although

it can be established that interaction resulted in change and that this change was probably related to attitudes, it is impossible to establish the degree of change. The extent of change may have been from a borderline position of disagreement to agreement. There may have been extreme change from one end of an agreement-disagreement continuum to another - from diametrically opposed attitudes to those which were very similar. If the index had been more discriminating it may have been possible to establish the degree of change which did take place. However, the trend of the results can establish that, on a number of variables, the transfer groups each had characteristics in common. Also, although there was no significant difference in the achievement of the transfer groups, the trend indicated that the $\overline{CL}$ - CL group tended to achieve greater success. It would seem, therefore, that communication had been more effective for one group than for the other.

This is implying, of course, that effective communication is that which results in students developing an appreciation of the lecturer's frame of reference and moving towards a position of cognitive similarity. Obviously both groups experienced attitude change. There is a value judgement in assuming that the direction of one change is more acceptable than the other. Since in the lecturing situation, the lecturer is presumably wishing to develop certain attitudes rather than others, this kind of value judgement is inevitable. The lecturing situation implies that certain objectives exist. If this assumption can be made, then the $\overline{CL}$ - CL group appear to have characteristics which result in positive change and effective communication. The CL - $\overline{CL}$ group shows negative change where communication has been less effective.

One factor obviously relates to the differential verbal ability of

the two groups. The $\overline{CL}$ - CL group showed greater competence on verbal sections of tests of both intelligence and scholastic aptitude. The course would present a predominantly verbal situation - in lectures per se and in reading related to the course. The verbal competence of the $\overline{CL}$ - CL group may have resulted in the greater ability of this group to appreciate the lecturer's frame of reference. Presumably the CL - $\overline{CL}$ group would have greater difficulty in verbal comprehension and be less adept in predominantly verbal situations. However, comprehension does not necessarily imply acceptance - nor does acceptance necessarily mean there has been comprehension. New ideas and information may be accepted or rejected with or without understanding. The real importance of the factor of differential verbal ability relates to the fact that this variable is allied to the characteristic open and closed belief systems of the two groups.

Rokeach (1960) suggest that new information is processed and coded in such a way that it is either rejected or filtered into the individual's belief-disbelief system. The process is greatly influenced by the degree of open or closedness in the systems of the individuals involved. Closed minded individuals have a high rejection of opposing beliefs. On the other hand, the magnitude of rejection of disbeliefs by the open minded is relatively low. A basic characteristic which defines the degree of open or closedness is "the extent to which a person can receive, evaluate and act on relevant information on its own intrinsic merits, unencumbered by irrelevant factors in the situation arising from within the person or from outside." (p.57). Irrelevant internal pressures refer to unrelated beliefs, irrational ego motives, the need to allay anxiety etc. Irrelevant external pressures refer to reward and punishment arising from

external authority. The more open a belief system, the more the individual evaluates and acts on information independently on its own merits. The more closed the belief system, the more difficult it is for the individual to discriminate substantive information from information about the source. It is probably this factor which is important in determining the change in response in the transfer groups and accounts for the differential effects of communication.

The closed minded transfer group initially gave responses compatible with those of the lecturer. However, these reponses to the index of co-linearity were given at pre tests before the course began. As a result of interaction during the course this group moved to a position of dissimilarity. Presumably interaction resulted in a rejection of the views of the lecturer. An examination of the Study of Values data shows that all lecturers gave greatest prominence to the Theoretical area. Because of this factor, it may be that lecturers were more likely to intellectually examine ideas and perhaps be liberal in interpretation. The closed minded group, although initially indicating that they shared similar attitudes, may not have been able to tolerate cherished beliefs being modified and "liberalised" in this way. They may have come to regard the views of the lecturer as a threat to established beliefs. Because of their high magnitude of rejection of disbeliefs they may have moved to a position of cognitive dissimilarity. The lecturer may not have been viewed as a credible source and have come to be regarded unfavourably. In this case, communication would be unlikely to be effective. The reason for the change in position may have been less logical than the explanation proposed. As Rokeach (1960) has suggested, closed minded individuals seem to be more affected by internal irrelevant

factors. Also, if the lecturer came to be regarded unfavourably, any communication from him would be likely to be rejected. It is a characteristic of closed minded individuals that they cannot discriminate substantive information from information about the source. Presumably this difficulty would not be operating in the more open minded group. This group would be more able to evaluate information according to its own merits. They would probably be more flexible in incorporating new ideas into existing belief systems, not because these ideas emanated from external authority, but because the more integrated structure of their belief systems would allow for greater latitudes of acceptance. This group may have been more willing to consider the lecturer's point of view and thus move to an appreciation of his frame of reference.

Not only would open or closed mindedness affect the reactions of the groups to the lecturer and his communication, but this factor would affect the way in which individuals operated in the learning situation. The course would involve more than simple acceptance or rejection of information. Students would have problems in understanding new material, seeing relationships within this material and appreciating how this complemented or supplemented existing knowledge. Rokeach & Vidulich (1960), have investigated variables in the problem solving techniques of open and closed minded groups. Although the groups showed no difference in analytical ability, the open minded group showed superiority in the ability to synthesise. This factor probably presented problems to the closed minded group in the learning situation. Presumably they were less able to employ inductive rather than deductive thinking. Yet the situation demands inductive thinking if new items of knowledge are to be

synthesised into existing structures and an overall understanding is to emerge. Also, Rokeach found that inability to integrate new beliefs in problem solving situations was related to inability to recall. He suggests that closed minded individuals attempt to defend themselves against the threat inherent in new systems which may contradict established ones. Consequently these individuals are not prepared to entertain new systems seriously and fail to remember information. If nothing is remembered there is nothing to integrate. It would seem that failure to remember information would undoubtedly affect the response of the closed minded group in any measure of achievement related to effective communication. The open minded group would not find this an inhibiting factor and would presumably be more able to remember the content of the lecturer's communications. The group would also vary in their approach to meeting problems. Rokeach has shown that open minded groups show greater willingness to entertain problems. The closed minded group often react with emotional rejection. Obviously, there can be no problem solving in a learning situation and no achievement if individuals refuse to meet problems initially. It would seem that such differences between open and closed minded groups in the learning situation were operating in the present research. There was no significant difference in the achievement of the transfer groups but the open minded group, ($\overline{CL}$ - CL), tended to achieve greater success.

It was found that the $\overline{CL}$ - CL group was significantly more active in university and extramural activities. It is possible that this characteristic may be related to the open mindedness of this group. They may have been more open to experience, more willing to approach and actively seek or initiate new contacts and new situations. If

social contacts are extended then individuals must be prepared to encounter a variety of opinions and beliefs. Many of these may be contrary to one's own. It has been shown by Rokeach that closed minded individuals are sensitive to threats to their beliefs and established positions. Obviously, the more one can encapsulate experience the less likelihood of threat, real or imaginary, developing. Also, it may be that the more socially active group was more responsive to group incentives and group attitudes. It has been shown that the group can be a powerful agent in attitude change. If the group as a whole reacted favourably towards the lecturer and regarded him as a credible source, the $\overline{CL}$ - CL group may have been more readily prompted to adopt the norm of the group.

While it is possible to account for the differential effects of such variables as dogmatism and verbal ability, the findings in relation to value areas present a problem. The groups differed significantly in two areas. The CL - $\overline{CL}$ group gave more prominence to the Religious area and the $\overline{CL}$ - CL group, greater prominence to the Aesthetic area. The main problem appears to be the difficulty of defining the characteristics of the Religious value area. Obviously, like the D Scale, it is not concerned with ideological content. In reading relevant material it is difficult to establish concrete fact concerning individuals who give prominence to this area, e.g., "He is a mystical man and seeks to comprehend the cosmos as a whole and relate himself to its embracing totality." (Allport, Vernon & Lindzey (1960), p.5.) This statement seems to the writer to be singularly uninformative and ambiguous. In general, the Religious area seems to be described in terms of the "eternal vaguities." Interest in the Aesthetic area appears to indicate

a tendency to regard life as "a procession of events, each impression to be enjoyed for its own sake". (p.4.). Perhaps the closed minded individual is unable to do this. This may imply a certain fragmentation of experience and create ambiguities which the closed minded cannot tolerate. Their preference may be for structure and ordered pattern. The most significant fact seems to be that interest in the Aesthetic area implies individualism and self sufficiency. This dimension may account for the significant difference in the groups. As Rokeach has shown, closed mindedness implies a heavy reliance upon external authority and authority figures. One would not expect to find this in those who valued individualism and self sufficiency. Further research may establish whether in general open and closed minded groups differ significantly in the Aesthetic area.

Having considered the characteristics of the transfer groups, examining how certain factors may have influenced effective communication, what implications emerge and how can the lecturer use this knowledge to aid effective communication? The use of factors which appear to lead to an appreciation of the lecturer's frame of reference does not imply the encouragement of conformity and blind acceptance. It would be undesirable for students to be moulded into a homogeneous, unquestioning mass. If this was the objective, brain-washing techniques could just as well be applied. The objective is to encourage a critical and analytical approach to new information and new problems. Before it is possible to apply critical thinking effectively, it is necessary to understand the position one wishes to question. Without effective communication initially, such understanding is unlikely to develop. It is one matter to reject after critical appraisal and considered judgement based on understanding.

It is quite another matter to reject because the initial communication has not been comprehended or given attention.

In considering how the findings may help in the attainment of this objective, it would seem that too great a dichotomy could be made between the transfer groups. In this way they could come to be viewed like the "goodies" and "baddies" in Western films - with one group having all the desirable qualities and the other having the less acceptable characteristics. This is not necessarily so. For instance, closed minded individuals may have a high magnitude of rejection of opposing beliefs. On the other hand it may be possible that the degree of open mindedness is so great that the individual is completely gullible and accepting. One reaction would seem to be as undesirable as the other. Enjoying group acceptance and participating actively in social occasions may be more healthy than rejection or negation of the group. But if group standards completely replace individual judgement then the gain is outweighed by the loss. It would seem that a balance needs to be achieved. Such a balance may represent an ideal rather than a practical situation.

There is, of course, a problem for the lecturer in defining within his class the characteristics which have been found to be related to effective communication in the transfer groups. Research by Rokeach (1960) seems to suggest that lecturers would have little success in subjectively deciding which individual students were closed minded. His own research showed that the lecturer-student relationship introduced a "masking" effect in the lecturer's judgements. If the closed minded individual is very sensitive to authority he is "likely to adopt a respectful, acquiescent and at the same time enlightened and objective facade." (p. 106). As best as he can he will inhibit or cloak expressions

of a closed belief system. His behaviour may be entirely different in reacting with students since these will not be regarded as authority figures. On the other hand, the more open minded student may show more willingness to venture sincere opinions which may challenge those of the lecturer. It is conceivable that the lecturer may view the open minded student as dogmatic. Similarly, depending on the flexibility of the lecturing situation, lecturers may or may not be able to establish which individuals have verbal abilities or are involved in social activities. Much will depend on knowing the students as individuals.

If lecturers are supplied with information about students, this is usually an indication of previous academic achievement or an intelligence test score. Often this is a total score without differentiation of verbal or non verbal components. In view of the findings of the present study, such a differentiation could be helpful. Students would probably regard information about social involvement or social activities as an infringement of privacy. They would probably be right. However, there is the possibility that a D Scale score would be more useful to the lecturer than either an intelligence score or background information. In this way he could be more aware of the cognitive styles of students. Perhaps further research would show whether lecturers did indeed find this a useful aid in helping students and appreciating some of their learning difficulties. It may also help if the lecturer had some insight into the extent of the open or closed mindedness he was himself bringing to the communication situation.

Always assuming that some way has been found of diagnosing what appear to be key characteristics in students, how can the lecturer use this information to promote more effective communication? In a

sense he is like the teacher with a social isolate in the class. One cannot direct the child to be sociable or direct the rest of the class to enjoy his company. All the teacher can do is create the necessary conditions so that the child may be successful in some way and give opportunities for rewarding social contacts to develop. Similarly, the lecturer cannot direct closed minded individuals to be flexible. However, like the teacher he can create the necessary conditions, e.g., situations where flat rejection of information is impossible but where the very situation enforces analysis and appraisal. In this way it may be possible for the closed minded individual to see that what initially seemed unacceptable has facets which may be congruent after all. Such opportunities could be given by the use of Case Studies and role reversal techniques, (these techniques will be discussed fully later). Similarly, by structuring the learning situation it would be possible to increase the opportunities for verbal skills and involvement and participation. Since the groups is such an influential agent in attitude change and since the CL - $\bar{CL}$ group appear to be less involved in social activities, the promotion of group enterprises may prove to be effective. Suggestions for developing more effective communication are given in the last section of the conclusion. This overall consideration of the study discusses ways in which lecturers may draw upon available research to make communication more effective.

The third main area of discussion concerns the adaptation of the work of Bartlett (1958) as an exploratory measure of cognitive similarity. Two considerations influenced this choice of measure. Bartlett's examples illustrative of thinking within closed systems allowed subjects to be highly individual in their responses to stimulus items. Yet such

responses could be quantified and established as showing similarities or dissimilarities. Further, it was unlikely that the exploratory measure would be measuring the attitudes of subjects, i.e., they were not required to respond to the subject matter or ideas expressed in the stimulus. It was therefore postulated that the measure would give a better indication of cognitive structure per se than the index of co-linearity proposed by Runkel. A full discussion of the rationale was given in Section 1(e).

The analysis of data relating to the exploratory measure was given in Section 3(c). This section discussed the criteria used for establishing groups as similar or dissimilar. It will be remembered that this grouping reflected (a) popular responses and (b) atypical responses. In summary the analysis of data showed:-

(a) The index of co-linearity and the exploratory measure were defining different groups.

(b) There was no significant different in the achievement of the two groups defined by the exploratory measure.

(c) There was no significant difference in the D Scale scores of these two groups.

(d) There was a very significant difference between the two groups on the AH4 Group Test of General Intelligence on Verbal, Non Verbal and Total scores. The significance was greater in the verbal than in the non verbal section of the test.

(e) There was a significant difference between the two groups on the Social area of the Study of Values.

These points and other features will be discussed. Although the exploratory index did not help in the measurement of cognitive structure per se, it produced interesting results which will be commented upon.

It was noted that the exploratory measure and the index of co-

linearity were defining different groups. There is a sense in which this could have been expected since the two measures required different responses. In Runkel's measure S's were required to respond to 5 stimulus statements. Despite Runkel's assertion that he was primarily interested in structure not content, responses to the index of co-linearity cannot do other than reflect the influence of content. One cannot respond to statements and indicate which are most or least preferred without reference to the subject matter of the statements, taking cognizance of the information and ideas they present. Thus, in the index of co-linearity, S's are making value judgements about subject matter and, in their preference order, revealing something of their attitudes towards a particular subject area or statements related to it. The exploratory measure does not give opportunities for this variable to operate. For example, items such as:-

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or

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arouse no affective state and make no appeals to the attitudes, beliefs or values of subjects. For this reason one would not have expected groups differentiated on this measure to differ significantly on D Scale scores. The stimulus is neutral. The responses reveal structure, i.e., the gap filling techniques employed by S's in response to initial and terminal information. Usually it is possible to make a false dichotomy between structure and content; they are not mutually exclusive and often it is difficult to make a distinction. In this case such a distinction appears to be justified. Further, Runkel claimed that the index of co-linearity did indeed measure structure and that the responses

of S's revealed the way in which they structured cognitive space. If Runkel was correct, since the exploratory measure is definitively related to structure, then the two measures ought to have differentiated similar groups. This was not found to be the case.

It was found that there was no significant difference in the achievement of the groups established as cognitively similar or dissimilar by the exploratory measure. Cognitive similarity established by the exploratory measure gives no better indication of success than the index of co-linearity. It will be remembered that in only 2 out of 8 instances was cognitive similarity significantly related to achievement using the latter measure. There is, however, the point that in the exploratory measure intelligence is a significant variable. Since one group was of significantly higher intelligence than the other there was the possibility that this might influence the achievement of the groups. Certain research has shown a significant relationship between achievement and intelligence. Runkel found this in his own results and Evans (1958), quoted earlier, showed a significant relationship between intelligence and the results of theory of education examinations. However, with this particular sample of students there was no such significant relationship (see Section 3(a) relating to High and Low achievers). This point has previously been discussed in relation to the range of scores. In view of the other results in this study it would have been surprising if the groups established by the exploratory measure had shown a significant difference in achievement or if the variable of intelligence could account for such a difference.

The exploratory measure defined groups which differed significantly in relation to the variable of intelligence. Since Bartlett had observed

a relationship between high intelligence and the ability to use minimal information in gap filling, it was anticipated that this variable might be important. (see Section 1(e)). Section 3(c) discussed ways in which the variable was related to certain items in the measure. There is also the point that the measure concerns thinking within closed systems. This is a characteristic of most intelligence tests, i.e., all the information necessary to the solution is inherent in the structure of the problem and the subject must manipulate this information in ways that are necessary to achieve a solution. As Wertheimer (1959) has pointed out, the solution is usually one defined as "correct" by the test maker. He shows that thinking within closed systems can be more or less elegant depending on whether the subject really appreciates the structure of the problem or merely applies rote formulae to achieve the answer. Intelligence tests usually concentrate on the end products rather than show concern with such process distinctions. Although such distinctions may have been made in the present analysis, thinking within closed systems is obviously conducive to the operation of the variable of intelligence. Thus, if the variable of intelligence is built into the measure, one would expect the results to reflect the influence of the variable. However, is it sufficient to say that the cognitively similar group was of significantly higher intelligence than the dissimilar group? Could other variables have been operating and was there opportunity for them to do so?

As discussed in Section 3(c) there are certain items where clues have been given so that a right response is indicated and there is opportunity for the exercise of intelligence. However, this does not apply to every item. There are also opportunities for divergent and

creative thinking, e.g., the item - -, does not imply a "right" or intelligent strategy and the response could be highly divergent and unusual. There is also the point that problem solving items are included which give opportunities for both evaluative and associative modes of thinking, i.e., both intelligent and creative modes of thought. As Wallach & Kogan (1965) point out, in approaching a problem the creative individual with the larger associative repertoire will generate more possibilities among which an elegant solution might well be included. "Such elegance requires that the individual recognise the most appropriate fit between problem and solution. Such cognition involves the operation of processes that must be subsumed under the construct of intelligence." (p.307). Thus in the stimuli within the exploratory measure there would be opportunities for both intelligent and creative modes of thinking. How far is one justified in making this dichotomy?

Research in creative thinking springs from the work of Guilford (1956) which makes a distinction between convergent and divergent thinking. Whereas the former concerns conventional and "right" responses, the latter may be likened to Bartlett's (1958) concept of "adventurous thinking", stressing breaking out of the mold and employing unusual and unconventional approaches. Divergent thinking became allied to the concept of creativity and a great deal of research was generated in relation to creativity and intelligence, most research concerning creative processes in young children, e.g., the work of Getzels & Jackson (1962) and Torrance (1962). It is questionable whether such studies established that there was an aspect of cognitive functioning which could appropriately be labelled "creativity" which stood apart

from the traditional concept of general intelligence. For example, examination of data related to a creativity battery used by Getzels & Jackson (1962) shows that the creativity tasks are no more strongly correlated among themselves then they are correlated with intelligence.

Wallach & Kogan (1965) postulated that previous research had not taken important variables into consideration, e.g., creativity procedures were invariably referred to as "tests", administered to large groups of students where temporal constraint was present - either implicitly or explicitly. They suggest that such settings where the respondent feels he is being evaluated in terms of success-failure criteria are not conducive to creative thinking. The research of Wallach & Kogan emphasised task-centred, permissive or playful situations. It was argued that in such situations "associative play" would encourage the abundance and uniqueness of associations generated by the stimuli and give a truer indication of creative thinking. Some stimuli were verbal, others were visual. In their results the creativity measures were highly intercorrelated. The intelligence measures were also highly intercorrelated. But the correlations between creativity and intelligence measures were extremely low. Wallach & Kogan conclude that it is possible to define and measure creativity independent of general intelligence. This does not mean that the two modes of thinking do not interact. Wallach & Kogan distinguished 4 groups of children and studied the characteristics of each, i.e., High Intelligence - High Creativity, High Intelligence - Low Creativity, High Creativity - Low Intelligence and Low Creativity - Low Intelligence groups. Although these findings relate to children they are applicable in the present study. One would expect young children to show less differentiation in

modes of cognitive functioning than adults.

The exploratory measure fulfilled certain of the criteria of Wallach & Kogan. Although not every item gave opportunities for creative thinking such opportunities did exist. Although the instructions did not ask for an abundance of responses or unusual responses, instructions were permissive. For example, most instructions ended with the phrase "in any way that you think to be indicated." No time limit was imposed. Whereas the situation may not have been exactly playful, students attended voluntary sessions of their own volition and such sessions were quite informal. In this particular situation freedom of response should have been encouraged since the students knew the data was being sent out of the country and would not "be held in evidence" either for or against them. Since creativity and intelligence may be viewed as distinct aspects of cognitive functioning what are the implications in relation to the exploratory measure? It may be that the cognitively dissimilar group, i.e. the group giving atypical responses could be a group definied by Wallach & Kogan as showing High Creativity - Low Intelligence.

Although one can say that the groups differed significantly in intelligence, one can only infer a difference in creativity. Of the two groups differentiated one consistently gave popular responses which fell within the group norm. The responses of the other group diverged from this norm and were atypical. It may be that the latter group were more creative in their approach and more adventurous in their response to stimuli. Although one cannot say by any objective standard that the cognitively dissimilar group were highly creative or that the cognitively similar group were not creative, a comparison of their responses reveals

that the former group were less conventional and more divergent in approach. This may possibly indicate a greater degree of creativity.

The results of the Study of Values analysis may give some support to this speculation. There was a significant difference between the "exploratory" groups in the Social area of the Study of Values. This was the only area in which there was a significant difference. Also, of all the groups in the entire study, the group established as cognitively dissimilar by the exploratory measure was the only group which did not give greatest prominence to the Social area. In investigating High Creativity - Low Intelligence children, Wallach & Kogan (1965) found that it was in the Social area that these children experienced greatest difficulty. Whereas the Low Creativity - Low Intelligence group appeared to compensate for poor academic performance by activity in the social sphere, the former group coped with academic failure by social withdrawal and retreat within themselves. They appeared to have difficulty in social contacts, were least sought after as companions, least confident, least assured and "quite avoidant of the companionship of others" (p.295). One cannot equate the Social area of the Study of Values with desire for companionship but the area obviously relates to interrelationships with others. It is precisely this dimension which most clearly characterises the High Creativity - Low Intelligence group studied by Wallach & Kogan.

Although it is impossible from the evidence available to come to a definitive conclusion, there are indications that the exploratory measure may possibly define a High Creativity - Low Intelligence group. However, this does not necessarily imply that this group would be creative in thinking within open systems. Nor can one assume that the more intelligent

group is not creative. One can only postulate that the cognitively dissimilar group may be more so. Within the limits of the present study no conclusion can be reached but further investigation of these points may prove to be of interest.

Bartlett stated that the number of ways in which gaps will be filled in any fairly homogeneous social group are far fewer than the number of ways in which they could be filled theoretically. "Far fewer" may be a relative term. Although the number of theoretically available strategies will always outnumber those actually used, the number of strategies employed may vary from group to group. The number representing few strategies in one group may represent many strategies in another. Although obviously one has no standard for comparison, it would seem that a very restricted number of strategies were employed by the particular group in the study. This restricted number resulted despite the fact that the measure theoretically allowed for many possibilities, the instructions were permissive and no time limit was imposed. It is interesting to speculate whether cultural factors may have influenced the limited number of strategies employed.

All students in the study had passed through an educational system which tends to emphasise evaluation and conformity. Although this may appear to be a value judgement, an examination of the Canadian grade system reveals a much more structured approach than is evident in the English educational system, e.g., there is a certain uniformity induced by grade level examinations. The amount of structure may vary from province to province. Certainly in Alberta, through personal observation as well as through study of provincial handbooks and official publications, one found that the system militated towards structure and conformity.

In general the system tended to stress the convergent rather than the divergent. This does not imply criticism of the Canadian system for their problems differ from ours and they develop their own techniques to meet these difficulties, e.g., the sheer physical area of the province imposes constraints which call for certain organisational features.

There is also the factor that all students in the study had to finance their own university education. Bursaries existed but these had to be repaid in money or service. Consequently many students worked their way through university. It was seen in the questionnaire analysis of the transfer groups that 92% of the sample undertook part-time or vacation employment. It could be said that this tends to make students place high value on a university education for its attainment has usually involved considerable effort and hardship. The situation could also be said to have an inhibiting effect. The student who has done hard manual labour all summer is not likely to put his chances of success at risk by "sticking his neck out" and acting counter to accepted norms.

One wonders whether the small number of strategies employed by the majority of students indicates that they did not grasp opportunities to "go out on a limb" and give highly individual responses when the chance to do so legitimately existed. Their experience may have conditioned them to conformity. They may have looked for the "right" and acceptable response rather than attempting to break away from the conventional. Obviously this suggestion is purely speculative. One would need a great deal of other experimental evidence, e.g., from a variety of cultures or educational systems to decide whether or not cultural variables could have an inhibiting effect influencing the number or range of strategies employed. However, it is another possible

avenue of investigation.

The exploratory measure is limited in its usefulness as an index of cognitive similarity because of the heavy "contamination" of the variable of intelligence. However, as noted previously, (Section 3(c)), it could perhaps be regarded as a potential measure of intelligence per se. Also as Wertheimer (1959) has pointed out, intelligence tests tend to concentrate on end products rather than show concern for process distinctions. It would seem that an elaboration of the exploratory measure could give both, i.e., it reveals not only the solution but how the solution is reached. Thus the measure could also be a tool for studying thinking processes. Since one can legitimately make a dichotomy between intelligence and creativity, perhaps the opportunities for the latter mode of thinking could be extended so that one could simultaneously have a measure of both aspects of cognitive functioning. Since the measure is self-administering, the test-like conditions which Wallach & Kogan object to as stultifying creative thinking would not be present. Obviously there are many difficulties, e.g., in quantification and scoring. One possibility would be to use the number of clues necessary to reach a correct solution as the basis for a scoring system. Measures of creativity could relate to abundance or uniqueness of response. There are also problems of reliability and validity.

It would seem that further investigation of the exploratory measure could be interesting and fruitful. This could be related to a variety of dimensions, e.g., cultural variables, creativity, intelligence, the study of cognitive processes or the development of evaluative techniques. There are many potential lines of investigation.

POSTSCRIPT:- Learning and communication in Colleges of Education

The present research originated in an interest in the general problem of communication and learning in colleges of education. The findings in the three main areas of the investigation have been discussed in relation to specific points which have arisen in each particular area. However, what emerges from an overall view when the results are considered in toto, together with other findings in the field of learning and communication? In general, the importance of attitudes has emerged very clearly throughout the study. Although the study did not set out to study attitudes specifically, this variable has increasingly established itself as a central concern. Attitudes have been seen to be an important variable in effective communication. They are animportant variable in the filtering mechanism of individuals and interact with the content, source, media or situational characteristics of any communication. Further, both Newcomb (1961) and Triandis (1959, 1960) have shown cognitive similarity to be a facilitating mechanism in communication. It has been seen that attitudes are important variables in cognitive similarity and the possibility of Runkel's research results being explained in terms of this variable has been discussed. Attitudes are also important in the lecturing situation since this is a communication situation and concerned with attitude change. Attitudes are important in teacher-education since this education is primarily concerned with the development of professional attitudes. Consequently, this study will finally consider the implications of research findings in relation to the education of teachers. This section will consider:-

(a) the importance and definition of professional attitudes,

(b) how such attitudes may be effectively encouraged within the total learning situation by the use of available research material.

There is the question of deciding which attitudes are important, where change needs to be brought about and what it is that the lecturer seeks to communicate effectively to students. Some attitudes are relevant to any student situation and are not specific to education students. For instance, students often need to be helped to develop new attitudes towards learning and encouraged to develop new study habits. Many grammar schools obviously have an enlightened approach but too often students have been used to note-taking and passively accepting information. Consequently they need a more positive approach. They need to be encouraged to generate their own ideas, follow lines of inquiry and work independently.

Other attitudes are specific to the teacher training situation and concerned with the development of professional responsibility. Students' attitudes towards teaching are often based upon their own experience and distorted memories of their own school days. These attitudes may bear little relationship to actual practices in classrooms today. Their attitudes towards teaching may be based upon a traditional concept of the teacher, e.g., often the myth persists that the older the children the greater the merit of the teacher. Perhaps the biggest attitude change for education students relates to their need to reverse their role. For many years they have been on the receiving end of education. Now they are called upon to take the lead in classroom situations. In other words, they must develop a professional outlook. They need to develop professional attitudes of responsibility which are defined by the function and role of the teacher. It appears that colleges should

clearly define which professional attitudes are important and create a climate of learning and achievement where such attitudes can be encouraged.

In a sense professional attitudes have already been developing in students before they enter college. The groups to which one aspires to belong act as non membership reference groups. Because the individual is desirous of membership he may acquire the attitudes and mannerisms appropriate to his future role. Some of this learning may be formal, e.g., through introductory courses. Much learning is through informal contact with practising professionals. Merton (1957) refers to this process as anticipatory socialisation. He suggests that individuals tend to think of themselves primarily in occupational terms and that future occupational role can greatly influence present attitudes and behavioural patterns. Also, Rosenberg (1957), suggests that the individual will develop a representation of the behaviour of his chosen profession and "he will start to think and behave in a way which he believes will be appropriate when he actually enters practice." (p. 24.). There is the question of whether such anticipatory attitudes are realist, whether they are based on stereotypes or whether they represent an idealistic view of the profession.

Research by Ratsoy (1965) has shown that the longer education students are involved in a programme which affords frequent and extended association with experienced teachers, the more they will adapt the attitudes of these teachers. Ratsoy suggests that this is a good thing since, for instance, induction into the profession would be simplified when the new teacher enters schools. It may be highly convenient but one doubts if colleges could wholeheartedly congratulate themselves if this

happened. Contrary to Ratsoy's view, the writer suggests that this could have a stultifying effect. Whereas education must look at established practices and seek to retain what is good, change is always necessary to bring methods and attitudes to teaching into line with current thought and current developments. The role and function of the teacher has changed and is changing tremendously. This is partly because society is changing so rapidly and there is a sense in which schools are a reflection of society. To seek to educate students to entrenched attitudes of the teacher's role is educating to a concept of "yesterdays" teacher. The function of the college is not to maintain status quo, although obviously students must be equipped to each in schools as they exist. The function of the college is rather to initiate or even outstrip educational development. Vygotsky (1962) stated that the only good teaching is that which outpaces development. It could be said that the only good college education is that which equips students not only for schools as they are but as they will become.

The teacher's role is now clearly seen to be far from the traditional notion of a methodologist working with a few reliable patterns of operation. The old concept of "methods in teaching" is pitifully inadequate. Teacher education must without question become academically respectable in the sense that its main body of content is substantive rather than procedural. For the teacher in to-day's world needs above all else to be able to use concepts flexibly. He needs a wide ranging set of concepts which provide the background for recognising the essential nature of each teaching situation as it arises. He needs to choose procedures appropriate to that particular situation - with all the adaptation that this implies. He needs to be able to carry out the selected

procedures effectively under whatever circumstances may exist at that moment. In the future a teacher's procedures will not be a set of methods, learned in college and put to repeated use in school. They will be determined on the spot by the concepts he uses. They will vary to match whatever conditions he recognises from child to child. This kind of teaching requires a well informed practitioner. In other words, the teacher is going to have to adopt a more thorough-going decision-making attitude with all the analytical thinking that this implies. This may not be the attitude to teaching that students bring to college. It may not be the attitude which persists in schools, but it is one that the lecturer needs to communicate effectively to the student if the long proclaimed aim of helping each child achieve full potential is ever to be a reality. The lecturer needs to build in the necessary skills so that such approaches to teaching become a practical possibility for the student. In turn this implies that the education of teachers needs to be maximally effective and that the standard of teaching in colleges can meet the challenge of developing enlightened professional attitudes in students. The present study has explored one factor which might have helped in this situation and might have facilitated communication between lecturers and students. However, cognitive similarity is only one factor in the situation. Other factors in the total learning situation, e.g., activity learning, role reversal, need to be considered in relation to cognitive similarity if teacher education is to be maximally effective. How can lecturers use such factors and incorporate available research material into their methods of teaching students?

Much may depend primarily upon a change of attitude by the lecturers themselves. It could be said that approaches to the education of teachers have not kept pace with other developments in education. Over the years there have been considerable advances in the education of young children. Modern practices seek to take cognizance of available research into the ways in which children learn. There is an effort to create situations in which meaningful learning can take place and where a child is encouraged to inquire and discover. There is a greater recognition of individual differences; children are encouraged to proceed at their own pace and actively develop individual interests. Change in early education has taken place to greater to lesser degree throughout the country. This does not imply that a state of perfection has been reached. It is hoped that a still more enlightened view and intelligent approach will develop. Similarly, through the impetus of the Newsom Report (1963), there have been considerable developments and innovations in secondary education. Students are being sent out into these schools, encouraged to be imaginative and venturesome in their teaching and flexible and willing to adapt to a variety of approaches. Yet do they experience this variety themselves in their college education? Has this been such that it has encouraged decision making and analytical thinking?

Colleges appear to have advanced along the front of developing a closer liason with schools. Many have schemes for developing increasing co-operation with serving teachers. This is obviously a healthy development. There have also been improvements aimed at increasing the amount of student contact with children, e.g., group practices involving work with small groups of children. But does this impinge directly on the actual teaching situation in colleges? In general, "lecturing" is still

equated with the formal delivery of information - a "stand and deliver" approach. This may be followed by discussion but in general groups appear to be too large for this to be effective. Students diligently make notes to be regurgitated at some later date. But how much real thinking or involvement is taking place and is the situation really encouraging positive attitudes towards learning? One has cause to wonder when the most frequently asked question is "Are we likely to get this in an examination?" Perhaps the writer could be accused of generalising but the observations are based upon a wide contact with colleges of education.

It seems paradoxical that in the classroom the lecturers themselves were probably innovators and flexible, analytical teachers. But the classroom situation gradually recedes. Children tend to become viewed more and more as disembodied components in experiments who react thus and so. This is unfortunate. As the sharpness of classroom experience is dulled so too, apparently, is the memory that no class of children will unprotestingly and quietly suffer being "talked at" with little activity and involvement. In general, students appear to be more courteous - or more accepting. Perhaps this gives rise to a certain complacency among lecturers, fostering the attitude that one talks about experimental methods instead of trying them - "Do as I say not do as I do."

Perhaps the answer lies in lecturers adopting a more flexible approach and being more aware of developments in other disciplines which have had to develop effective techniques in communication. For instance, it would seem that much could be learnt from techniques used in Business Studies. This was brought home to the writer in Canada when the first all-Canadian Business Studies Conference was held in Alberta.

Many of the subjects under discussion generated considerable interest among educationalists. It appears that this area has had to develop techniques for the education of managers. This is partly because management skills have changed. Managers in industry have increasingly had to handle more information, communicate skilfully and develop a more analytical approach to problems. They need many skills to equip them for their decision making function. In a sense this is comparable with the position of teachers today. Also, the change of emphasis in managerial skills necessitated the re-education of individuals already established at managerial level. These were older men. Obviously such men were used to authority and would not take kindly to being "lectured at". There was the additional problem that the factor of age created difficulties in itself. Much research has investigated the effects of ageing in relation to skills and learning processes. For instance, Welford (1958) has investigated the problem of ageing and human skills and shown the effects of ageing upon the deterioration of short term memory. Belbin & Downs (1964) have investigated factors important in the training of the adult worker. They found that the older learner needed to be actively involved and encouraged to derive principles for himself. These findings are especially important in relation to mature students in colleges of education. It would also seem that Belbin & Downs point to a worthwhile principle to apply in general. Because of problems generated in their field, Business Schools have had to develop techniques and approaches to make communication and learning both meaningful and effective. One example is the use of the Case Study Method. The lecturer in the college of education could profitably draw upon this body of knowledge. There is also the whole field of research in psychology

related to communication which has investigated important variables in the process. Much of this research was discussed in Section 1(b). The writer is not suggesting that lectures per se should be abandoned entirely. It is suggested that simultaneously a variety of approaches could give students the experience, at their level, of flexible learning situations which they themselves will be attempting to create in schools. By using available research as a basis for new approaches it would be hoped that more effective communication would develop between lecturers and students and that this would lead to the establishment of acceptable professional attitudes.

One such approach could employ the Case Study Method. This was developed at the Harvard Business School for students with little or no practical experience. The material is based upon situations which arise in industry and which call for decisions to be made. Often the studies are based upon actual problems which have arisen in companies. In considering these cases the student is required to make decisions but not take responsibility for these, i.e., it is not an actual situation but a learning situation and mistakes would not be disastrous for the company or workers. The Method involves applying knowledge of theory to practical situations. Students are divided into syndicates or small groups. Ideally, groups would include about six members. These groups discuss the problem, apply concepts they have learnt, make decisions and reach conclusions. There is then general discussion and comparison of the findings of the groups with the lecturer acting as chairman. The function of the lecturer is not so much to lead discussion but to ensure that concepts are correctly applied. How does this method incorporate what is known of factors in effective communication and attitude change?

Research, e.g., Kelley & Volkart (1952) and Newcomb (1948) shows the importance of the group in attitude change. Research by Triandis has shown the importance of group attitudes in cognitive similarity, (1959, 1960). The group can be an effective agent in establishing and changing attitudes. In general students have insufficient experience of operating in small groups. These syndicates encourage the exchange of ideas and encourage involvement and active participation. A student can lose himself in a large discussion group but is drawn into the small group and needs to contribute. It was shown in the present study that the transfer group which moved away from a position of similarity with the lecturer tended to be more closed minded and had fewer verbal and social skills than the group which moved to an appreciation of the lecturer's frame of reference. By the use of syndicates there is the possibility that the more closed minded would be drawn into the group and stimulated to consider new ideas. It is also a social situation which should encourage more social contacts and increase verbal skills. The method provides an effective learning situation since individual differences are recognised, the task is largely self paced and the gain of information within the control of the group members. The Method can alleviate the problems of mature students. Since social skills are unaffected by ageing they have the opportunity to use these skills and gain confidence.

The technique would seem to be an effective instrument in helping students develop positive attitudes to the function of the teacher. It can encourage the use of analytical skills and decision making processes and increase the understanding that theoretical concepts have a practical application. The writer tried this method in Canada and was surprised

at the increase in interest and involvement on the part of the students. The method was integrated into a Child Development course and based upon material from the writer's own experience in schools. One unexpected development was the way in which the method encouraged individual research and use of library facilities. Interest was such that students were generating their own lines of inquiry. They were much more willing to discuss problems with the lecturer and thus lecturer-student communication became more effective. The method also proved to be successful with serving teachers. Whereas students had a large amount of theoretical knowledge and little practical experience, serving teachers were in the reverse situation. In using the method they could draw upon this experience and apply new theoretical knowledge to what they knew of classroom situations. The main difficulty appears to be the role of the lecturer. The method harnesses the interests, activities and energies of the students. The problem lies in ensuring that their efforts are profitable. The lecturer needs to use the method skilfully so that the concepts he has introduced are being used by students.

As discussed in Section 1(b), any communication is subjected to a selective and evaluative process by the filtering mechanism of individuals. Rogers (1952) suggests that this process can be a positive barrier to communication and states "a major barrier is our very natural tendency to judge, evaluate, to approve (or disapprove) the statement of the other person or group", (p. 29). A prime reaction to a communication is to evaluate it in terms of one's own frame of reference. This tendency is heightened in situations where feelings and emotions are deeply involved. As a consequence there will be "two ideas, two feelings, two judgements

missing each other in cognitive space." (p. 29.). Rogers investigated ways of breaking down this barrier. His simple solution is that real communication occurs when there is listening with understanding. In operational terms this means the employment of a simple rule; "Each person can speak up for himself only after he has first restated the ideas and feelings of the previous speaker accurately and to that speaker's satisfaction." (p. 29.). This process is more difficult than it appears and usually, once the other person's point of view has been appreciated, one's own views have to be revised. Rogers found that when hostile or antagonistic attitudes existed that, by use of the technique, statements grew less exaggerated and less defensive. Rogers' technique is very like the role reversal method proposed by Cohen (1951) which employs the same strategy. As Cohen points out, after hearing his argument re-stated the initiator may wish to re-evaluate his position. He also raises the point that the rest of the group begin to appreciate the ineffectiveness of criticising without understanding.

It would seem that this technique could be used effectively in discussion groups with students. It is a chastening experience for a lecturer to discover that he is misunderstood but one is made more aware of the problem of communicating effectively. How often does one probe to find out if there has been real understanding? Lecturers tend to be like jesting Pilate and do not wait for an answer. Also, as Eliot says, "I got to use words when I talk to you." The exercise could be valuable to lecturers and students in showing how precision in language is important. It may increase verbal fluency and accuracy. The technique may also be helpful in trying to establish points of contact with closed minded individuals. Instead of giving a negative defensive reaction, they

may be more likely to appreciate points in common with the lecturer or the group when a real analysis of the situation has been made. It also gives opportunity for all individuals to establish some point of cognitive similarity and thus communication should be more effective. Students tend to become more involved and participating and more ready to adopt a critical, analytical approach. Perhaps the most important contribution of the method is its power to increase listening ability for obviously effective communication depends partly on the development of effective listening skills.

It has been shown that individuals differ in their responsiveness to different media. Technical advances have made many forms of media more readily available in colleges. Perhaps more effective communication could be established by the use of a variety of audio-visual aids. For instance, tape recorders can be used effectively. They can be used in conjunction with the role reversal technique to encourage the examination and analysis of arguments used in discussion. It is then frequently realised how often arguments are based upon value judgements rather than objective fact, although this may not have been evident in the initial communication. Overhead projectors, slide projectors etc., present visual material. Often much information can be presented in diagrammatic form. With some students this will be more effective than aural presentation.

Many colleges now have access to closed-circuit television units. If this is merely used for bigger and better lectures then it would seem to be defeating its own purpose. Interesting work has been initiated in Stanford University where, under the direction of Dwight Allen, (1965), micro-teaching has been developed. Micro-teaching is described as a scaled down teaching encounter in class size and class time. Class size

is limited to 1 - 5 pupils and class time from 5 - 20 minutes. Micro-teaching may be used with or without video tape. It is an effective means of giving feedback and knowledge of teaching in a short time and a means of changing students' perceptions of their own teaching behaviour. Micro-teaching aims to break down the complex task of teaching into simpler components so that the learning task becomes more manageable for the beginner. The student focusses upon a particular aspect of teaching before he proceeds to another skill, e.g., using questions effectively, controlling participation, employing re-inforcement etc.

There is a sense in which the technique can be used in a very restricted way so that the student develops formulae to apply and set responses - which is counter to the flexible attitude one would hope to foster. It is a technique which can "atomise" the teaching situation. However, it has potential as a tool in attitude change and in developing a critical approach on the part of students. There can be immediate feedback for the student. The behaviour which took place is evident and unequivocal. Students often find it difficult to be objective about their performance in the classroom and sometimes inclined to be sceptical of the lecturer's assessment of this performance. The evidence is available so that they can look upon their performance instead of relying upon their memory of what took place. If used in more flexible encounters with children it would seem that micro-teaching could give lecturer and student valuable diagnostic material, helping the student be analytical towards his own performance and helping the lecturer ensure, not only that correct attitudes and concepts are being formed, but that the student can implement these in a practical way. The student is involved and interested -after all, it is his performance. It is felt that the emphasis

should be placed on the performance of the student, not the lecturer. This not only ensures active participation but the "demonstration" can be fraught with difficulties. There is always the problem that students come to view the lecturer's performance as "correct", as a recipe or formula. It would seem preferable that students be encouraged to develop their own style in teaching and have a critical, analytical attitude towards this.

The previous suggestions have outlined possible techniques which, utilising what is known of variables in the situation, may increase effective communication between lecturers and students. Certain general principles emerge. If cognitive similarity is a facilitating mechanism then it would seem that the lecturer should always attempt a balanced presentation of material to give greater opportunity for all students to establish some rapport with his frame of reference. From a consideration of the transfer groups, it would seem that the lecturer needs to recognise that students will have different cognitive styles. Some will more readily adapt to his frame of reference. Others, because of closed belief systems may be more resistant to change and new information. It has been suggested that a D Scale score for students would provide the lecturer with more useful information than the results of an intelligence test. The importance of the group as a source of attitudes and an agent in attitude change is also relevant. The potency of the group can be used to encourage effective communication. Factors of involvement and participation are important too. If approaches incorporating these variables can lead to more effective communication then there is more possibility of students developing desirable professional attitudes and acquiring professional knowledge.

If new approaches are tried, then further research can and should arise. Too often in education the success of new approaches is described in subjective rather than in objective terms. Results tend to be descriptive rather than quantitative. If new approaches are introduced then it is necessary to evaluate and measure their effectiveness in relation to attitude change and effective communication. This calls for clear criteria, measuring techniques and close control of the many variables operating in the situation.

The present study has indicated possible areas for further research. Future investigations may give greater understanding of the processes of communication and show how more effective communication between lecturers and students may be developed. It is necessary to understand these processes of communication and learning if new methods are to be effective. Each study will only add a fragment of new information but put together they will begin to build into models of reliable learning situations.

A P P E N D I X A.

AN EXPLORATORY MEASURE OF COGNITIVE SIMILARITY

BASED ON THE WORK OF BARTLETT (1958)

This measure was presented as a booklet with each of the 14 items on a separate page. For purposes of presentation in the Appendix this has been condensed and items and instructions will all be included on the same sheet.

INSTRUCTIONS

The following questions are part of an experiment on human thinking and are not to be considered as an intelligence test. There are no right or wrong answers. The object of the questions is to find out how you think and it would therefore be very helpful if you would give the steps in arriving at your final answer wherever you feel this is called for.

When you have completed a question do not look back after moving to the next question.

Thank you for your co-operation.

.....oOo.....

ITEM 1.

1 17

Take 1 as the first and 17 as the last number and fill up the gap between them in any way that seems indicated.

ITEM 2.

\- -

Fill the gap between the two marks in any way that seems indicated.

A P P E N D I X A. (continued)

ITEM 3.

Look at the terminal words and then fill up the gap in any way that you think to be indicated.

A HORRIBLE

ITEM 4.

1, 3, 17

Fill up the gap in the above arrangement of numbers.

ITEM 5.

A, BY, HORRIBLE

Fill up the gap in the above arrangement of words.

ITEM 6.

A, BY, COW, HORRIBLE

Fill up the gap in the above arrangement of words.

ITEM 7.

A, GATE, NO, I, DUTY, IN, CAT, BO, EAR, O, TRAVEL, ERASE, BOTH, GET, HO, FATE.

E R A S E
F A T E

From the group of words at the top of the page complete the vertical arrangement indicated by the two words "erase" and "fate" taking erase as the middle word in the column. Not all the words given need be used.

ITEM 8.

A, GATE, NO, I, DUTY, IN, CAT, BO, EAR, O, TRAVEL, ERASE, BOTH, GET, HO, FATE.

D U T Y
E R A S E
F A T E

A P P E N D I X A (continued)

ITEM 8 (continued)

From the group of words at the top of the page complete the vertical arrangement indicated by the three words "fate", "erase", "duty", taking erase as the middle word in the column. Not all the words given need be used.

ITEM 9.

A, GATE, NO, I, DUTY, IN, CAT, BO, EAR, O, TRAVEL, ERASE, BOTH, GET, HO, FATE.

C A T
D U T Y
E R A S E
F A T E
G E T

From the group of words at the top of the page complete the vertical arrangement indicated by the five words "get", "fate", "erase", "duty", "cat",, taking erase as the middle word in the column. Not all the words given need be used.

ITEM 10.

AFTERWARDS, KIT, ENTRY, EFFORT, MANTLE, I, OVERTHROW, GAP, MOTOR, COST, OUTCOME, BET, COWSLIP, ENTER, QUICKSILVER, O, POTLUCK, QUIETNESS.

G A P
I
K I T

From the group of words at the top of the page complete the vertical arrangement indicated by the three words "kit", "I", "gap", taking I as the middle word of the column. Not all the words given need be used.

ITEM 11.

AFTERWARDS, KIT, ENTRY, EFFORT, MANTLE, I, OVERTHROW, GAP, MOTOR, COST, OUTCOME, BET, COWSLIP, ENTER, QUICKSILVER, O, POTLUCK, QUIETNESS.

E N T E R
G A P
I
K I T
M O T O R

From the group of words at the top of the page complete the vertical arrangement indicated by the five words "motor", "kit", "I", "gap", "enter".

A P P E N D I X A (continued)

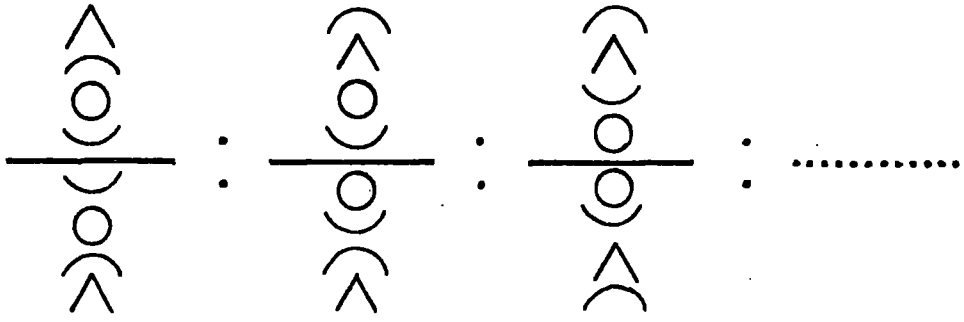
ITEM 12.

Continue to change the positions of the numbers in successive steps until you reach an arrangement at which it seems natural or sensible to stop.

1234: 2134: 2143:

ITEM 13.

Continue to change the positions of the items in the design given below along the lines of changes indicated in the steps given until you reach a natural or sensible final arrangement.



ITEM 14.

DONALD
GERALD
ROBERT

Given that:-

(a) D = 5
(b) every number from 0 - 9 has itse corresponding letter, and
(c) each letter must be assigned a number different from that given for any other letter.

Find a number for each letter stating the steps of your thinking and their order. Do not use any scrap paper, put everything down on the paper provided.

A P P E N D I X B.

SUBJECT AREA STATEMENTS USED IN THE INDEX OF CO-LINEARITY

There are 5 statements related to each subject area:-

MUSIC

(1) Music provides a unique field for fostering all aspects of a child's development.

(2) Music education today gives insufficient emphasis to listening skills.

(3) Music with children is a recreative rather than a creative activity.

(4) All music education can be achieved through the experience of singing.

(5) Music gives relaxation from the more demanding aspects of the school programme.

SOCIAL STUDIES

(1) Social understanding is synonymous with civic competence.

(2) Young children have so little sense of time that historical material can be meaningless.

(3) Social studies is an amalgam of other subject areas.

(4) The social studies programme should not follow a syllabus but rather consider what the environment has to offer.

(5) In social studies there is no substitute for first hand experience.

ART

(1) Aesthetic appreciation is caught not taught.

(2) Children need technical skills to develop the ability to express themselves through art.

(3) In art it is the end product which is important.

(4) As in all other subjects it is necessary for art educators to have

A P P E N D I X B. (continued)

ART (continued)
standards and evaluative criteria.

(5) Art expression is inherent in all men.

READING

(1) The same basic principles are to be found in all methods of teaching reading.

(2) To recognize words is to read.

(3) Facility in reading is best achieved by planned progression through carefully graded vocabulary.

(4) Inability to read usually stems from inappropriateness of method.

(5) Success in learning to read depends largely on good visual memory.

MATHEMATICS

(1) Mathematics offers order and pattern which can be appreciated by all children.

(2) Logical thinking used in Mathematics can be transferred to other subjects.

(3) Our environment is daily becoming more mathematical in its implications.

(4) Proficiency in Mathematics depends to a great extent on accuracy in computation.

(5) Schools are following tradition in devoting a large part of the school day to the teaching of Mathematics.

APPENDIX C.

A SAMPLE PRO-FORMA OF THE INDEX OF CO-LINEARITY RELATED TO SUBJECT AREA STATEMENTS

Subjects were requested to mark:-

✓ the statement with which they most agreed.

✗ the statement with which they least agreed.

APPENDIX C. (continued)

Course & Section No. ___

Name

Name of Lecturer _____

1. Music provides a unique field for fostering all aspects of children's development. 2. Listening skills are not given sufficient emphasis in music teaching. 3. All music education can be achieved through the experience of singing.	
1. All music education can be achieved through the experience of singing. 2. Music gives relaxation from more demanding aspects of the school programme. 3. Music with children is a recreative rather than a creative activity.	
1. Music gives relaxation from more demanding aspects of the school programme. 2. Listening skills are not given sufficient emphasis in music teaching. 3. Music provides a unique field for fostering all aspects of children's development.	
1. Listening skills are not given sufficient emphasis in music teaching. 2. All music education can be achieved through the experience of singing. 3. Music gives relaxation from more demanding aspects of the school programme.	
1. Music provides a unique field for fostering all aspects of children's development. 2. Music with children is a recreative rather than a creative activity. 3. All music education can be achieved through the experience of singing.	

APPENDIX C. (continued)

1. Listening skills are not given sufficient emphasis in music teaching. 2. Music gives relaxation from more demanding aspects of the school programme. 3. Music with children is a recreative rather than a creative activity.	
1. All music education can be achieved through the experience of singing. 2. Music with children is a recreative rather than a creative activity. 3. Listening skills are not given sufficient emphasis in music teaching.	
1. Music provides a unique field for fostering all aspects of children's development. 2. Music gives relaxation from more demanding aspects of the school programme. 3. All music education can be achieved through the experience of singing.	
1. Music gives relaxation from more demanding aspects of the school programme. 2. Music with children is a recreative rather than a creative activity. 3. Music provides a unique field for fostering all aspects of children's development.	
1. Music with children is a recreative rather than a creative activity. 2. Listening skills are not given sufficient emphasis in music teaching. 3. Music provides a unique field for fostering all aspects of children's development.	

APPENDIX D.

THE DOGMATISM SCALE (Rokeach 1960) FORM E

INSTRUCTIONS

The following is a study of what the general public thinks and feels about a number of important social and personal questions.

The best answer to each statement is your own personal opinion. We have tried to cover many different and opposing points of view. You may find yourself agreeing strongly with some of the statements, disagreeing just as strongly with others, and perhaps uncertain about others; whether you agree or disagree with any statement, you can be sure that many people feel the same way as you do.

Mark each statement in the LEFT margin according to how much you agree or disagree with it.

Please mark every one.

Write +1, +2, +3, or -1, -2, -3, depending on how you feel in each case.

+1	= I agree a little	-1	= I disagree a little
+2	= I agree on the whole	-2	= I disagree on the whole
+3	= I agree very much	-3	= I disagree strongly

Course, Section No. .....

Name ..... Name of Lecturer. .....

1.	The United States and Russia have just about nothing in common.
2.	The highest form of government is a democracy and the highest form of democracy is a government run by those who are most intelligent.
3.	Even though freedom of speech for all groups is a worthwhile goal, it is unfortunately necessary to restrict the freedom of certain political groups.
4.	It is only natural that a person would have a much better acquaintance with ideas he believes in than with ideas he opposes.
5.	Man on his own is a helpless and miserable creature.
6.	Fundamentally, the world we live in is a pretty lonesome place.
7.	Most people don't give a "damn" for others.
8.	I'd like it if I could find someone who would tell me how to solve my personal problems.
9.	It is only natural for a person to be rather fearful of the future.
10.	There is so much to be done and so little time to do it in.
11.	Once I get wound up in a heated discussion I just can't stop.
12.	In a discussion I often find it necessary to repeat myself several times to make sure I am being understood.
13.	In a heated discussion I generally become so absorbed in what I am going to say that I forget to listen to what the others are saying.

APPENDIX D. (continued)

14.	It is better to be a dead hero than to be a live coward.
15.	While I don't like to admit this even to myself, my secret ambition is to become a great person, like Einstein, or Beethoven or Shakespeare.
16.	The main thing in life is for a person to want to do something important.
17.	If given the change I would do something of great benefit to the world.
18.	In the history of Mankind there have probably been just a handful of really great thinkers.
19.	There are a number of people I have come to hate because of the things they stand for.
20.	A man who does not believe in some great cause has not really lived.
21.	It is only when a person devotes himself to an ideal or cause that life becomes meaningful.
22.	Of all the different philosophies which exist in this world there is probably only one which is correct.
23.	A person who gets enthusiastic about too many causes is likely to be a pretty 'wishy-washy' sort of person.
24.	To compromise with our political opponents is dangerous because it usually leads to the betrayal of our own side.
25.	When it comes to differences of opinion in religion we must be careful not to compromise with those who believe differently from the way we do.
26.	In times like these, a person must be pretty selfish if he considers primarily his own happiness.

APPENDIX D. (continued)

27.	The worst crime a person could commit is to attack publicly the people who believe in the same thing he does.
28.	In times like these it is often necessary to be more on guard against ideas put out by people or groups in one's own camp than by those in the opposing camp.
29.	A group which tolerates too much difference of opinion among its own members cannot exist for long.
30.	There are two kinds of people in this world: those who are for the truth and those who are against the truth.
31.	My blood boils whenever a person stubbornly refuses to admit he is wrong.
32.	A person who thinks primarily of his own happiness is beneath contempt.
33.	Most of the ideas which get pointed out nowadays aren't worth the paper they are printed on.
34.	In this complicated world of ours the only way we can know what's going on is to rely on leaders or experts who can be trusted.
35.	It is often desirable to reserve judgement about what's going on until one has had a chance to hear the opinions of those one respects.
36.	In the long run the best way to live is to pick friends and associates whose tastes and beliefs are the same as one's own.
37.	The present is all too often full of unhappiness. It is only the future that counts.
38.	If a man is to accomplish his mission in life it is sometimes necessary to gamble "all or nothing at all."
39.	Unfortunately, a good many people with whom I have discussed important social and moral problems don't really understand what's going on.

A P P E N D I X D. (continued)

40.	Most people just don't know what's good for them.

APPENDIX E.

QUESTIONNAIRE RELATING TO BACKGROUND AND EXPERIENCE

NAME _____ MALE FEMALE

Date of Birth _____ Religion _____

Married/Single _____ Position in Family _____

Country of Origin _____ Place of Birth _____

Academic Background. (Please give details of any honours or awards. Indicate subjects taken.)

High School _____

Date of Leaving _____

University _____

Date of Entrance _____

Major Subject _____

Awards or Qualifications not included above. E.g., Canadian National Music Examination.

Were you in full-time employment before coming to University? If so, please give details.

Do you work during University vacations? Please give examples of types of employment.

APPENDIX E. (continued)

Are you a member of any University societies, groups, teams, etc.? Please give details.

Do you hold office in any of the activities? Please give details.

Please give details of any other activities. These may be unrelated to campus activities. E.g., Community or Church activities, sports activities.

Do you hold office in connection with these activities? Please give details.

Are you travelled in other countries? Which? Length of Stay?

Please indicate the number of hours you spend in study (a) each day
(b) each week

(only an approximate answer is required)

Do you intend to proceed to a degree before leaving University? Give details of your plans.

Please give some indication of the kind of post you would like to obtain in your professional field after you are qualified and have some practical experience.

APPENDIX F.

ANALYSIS OF DATA RELATING TO THE STUDY OF VALUES FOR COGNITIVELY SIMILAR AND DISSIMILAR GROUPS

MUSIC

	n_1	n_2	U	U'	sig.
T	6	28	54	114	n.s.
E	6	28	77	91	n.s.
A	6	28	94.5	73.5	n.s.
S	6	28	68.5	99.5	n.s.
P	6	28	99	69	n.s.
R	6	28	101.5	66.5	n.s.

READING

	n_1	n_2	U	U'	sig.
T	6	29	82	92	n.s.
E	6	29	68.5	105.5	n.s.
A	6	29	108.5	65.5	n.s.
S	6	29	85	89	n.s.
P	6	29	37.5	136.5	0.01
R	6	29	114	60	n.s.

A P P E N D I X F. (continued)

MATHS. A.

	n_1	n_2	U	U'	sig.
T	6	8	17.5	30.5	n.s.
E	6	8	36	12	n.s.
A	6	8	14	34	n.s.
S	6	8	21	27	n.s.
P	6	8	33.5	14.5	n.s.
R	6	8	21.5	26.5	n.s.

MATHS. B.

	n_1	n_2	U	U'	sig.
T	6	20	72	48	n.s.
E	6	20	50.5	69.5	n.s.
A	6	20	79	41	n.s.
S	6	20	45	75	n.s.
P	6	20	62.5	57.5	n.s.
R	6	20	44.5	75.5	n.s.

APPENDIX F. (continued)

MATHS. C.

	n_1	n_2	U	U'	sig.
T	7	29	159	44	0.0107
E	7	29	91.5	111.5	n.s.
A	7	29	63	140	n.s.
S	7	29	116.5	86.5	n.s.
P	7	29	99	104	n.s.
R	7	29	88.5	114.5	n.s.

SOCIAL STUDIES X

	n_1	n_2	U	U'	sig.
T	3	12	24	12	n.s.
E	3	12	18	18	n.s.
A	3	12	12.5	23.5	n.s.
S	3	12	31.5	4.5	n.s.
P	3	12	16	20	n.s.
R	3	12	13	23	n.s.

A P P E N D I X F. (continued)

SOCIAL STUDIES Y

	n_1	n_2	U	U'	sig.
T	11	21	97	134	n.s.
E	11	21	120.5	110.5	n.s.
A	11	21	120	111	n.s.
S	11	21	153.5	77.5	n.s.
P	11	21	93.5	137.5	n.s.
R	11	21	158	73	0.04

APPENDIX G.

ANALYSIS OF QUESTIONNAIRE RESPONSES OF THE TRANSFER GROUPS

		CL - $\overline{CL}$ (n = 26)		$\overline{CL}$ - CL (n = 52)	
		n	%	n	%
AGE	18			4	7.6
	19	12	46.1	21	40.3
	20	8	30.7	13	25
	21	2	7.6	9	17.3
	22	3	6.5	4	7.6
	MATURE	1	3.8	1	1.9
SEX	FEMALE	23	88.4	42	80.7
	MALE	3	11.6	10	19.3
MARITAL STATUS					
	SINGLE	23	88.4	45	86.5
	MARRIED	3	11.6	7	13.5
COUNTRY OF ORIGIN	CANADA	21	80.7	47	90.4
	REST	5	19.3	5	9.6
RELIGION	ANGLICAN	4	15.3	12	23.07
	UNITED	9	34.6	17	32.7
	LUTHERAN	3	11.5	5	9.6
	ROMAN CATHOLIC	7	26.9	9	17.3
	GREEK ORTHODOX	1	3.4		
	GREEK CATHOLIC			1	1.9
	LATTER DAY SAINTS	1	3.4	1	1.9
	EVANGELICAL	1	3.4	2	3.8
	JEHOVAH WITNESS			1	1.9
	PENTECOSTAL			1	1.9
	NON AFFILIATED			3	5.7
POSITION IN FAMILY					
	ELDEST	11	42.3	22	42.3
	YOUNGEST	1	3.9	6	11.5
	OTHER POSITION	14	53.8	24	46.2

APPENDIX G. (continued)

	CL - $\overline{CL}$ (n = 26)		$\overline{CL}$ - CL (n = 52)	
	n	%	n	%
MAJOR SUBJECT				
ENGLISH	5	19.2	12	23.07
EARLY CHILDHOOD EDUCATION	5	19.2	12	23.07
MATHS	5	19.2	1	1.9
PHYSICAL EDUCATION	3	11.5	11	21.1
FRENCH	3	11.5	3	5.7
HISTORY	2	7.6	3	5.7
SOCIAL STUDIES	2	7.6	6	11.5
MUSIC	1	3.4	2	3.8
ART			1	1.9
SCIENCE			1	1.9
AWARDS	7	26.9	13	25
FULL TIME EMPLOYMENT	7	26.9	13	25
PART TIME EMPLOYMENT	24	92.3	47	90.4
UNIVERSITY SOCIETIES	7	26.9	21	40.4
OFFICE HOLDERS IN UNIVERSITY SOCIETIES	2	7.6	5	9.6
OTHER SOCIETIES AND ACTIVITIES	8	30.7	28	53.8
OFFICE HOLDERS IN OTHER SOCIETIES	2	7.6	6	11.5
FOREIGN TRAVEL	10	38.4	21	40.4
AVERAGE Hours of Study (Day)	3.3		3.3	

A P P E N D I X G (continued)

	CL - $\overline{CL}$ (n = 26)		$\overline{CL}$-CL (n = 52)	
	n	%	n	%
INTENTION TO PROCEED TO DEGREE	15	57.6	28	53.8
HIGH PROFESSIONAL ASPIRATIONS	9	24.6	21	40.4

APPENDIX H.

ANALYSIS OF CATEGORIES OF RESPONSES IN THE EXPLORATORY MEASURE

	Category	Number of Responses	Percentage
ITEM 1	A	27	75
	B	5	13.9
	C	1	2.7
	D	1	2.7
	E	1	2.7
	F	1	2.7
ITEM 2	A	11	30.5
	B	14	38.5
	C	3	8.3
	D	1	2.7
	E	3	8.3
	F	1	2.7
	G	2	5.5
	H	1	2.7
ITEM 3	A	17	47.2
	B	4	11.1
	C	8	22.2
	D	5	13.9
	E	1	2.7
	F	1.	2.7
ITEM 4	A	2	5.5
	B	34	94.4
ITEM 5	A	12	33.3
	B	9	25
	C	2	5.5
	D	3	8.3
	E	7	19.4
	F	1	2.7
	G	1	2.7
	H	1	2.7

APPENDIX H (Continued)

	Category	Number of Responses	Percentage
ITEM 6	A	15	41.6
	B	11	30.7
	C	3	8.3
	D	2	5.5
	E	4	11.1
	H	1	2.7
ITEM 7	A	11	30.7
	B	19	52.7
	C	1	2.7
	E	4	11.1
	H	1	2.7
ITEM 8	A	17	47.2
	B	14	38.5
	E	5	13.9
ITEM 9	A	19	52.7
	B	12	33.3
	E	5	13.9
ITEM 10	A	13	36.1
	B	19	52.7
	E	4	11.1
ITEM 11	A	18	50.7
	B	14	38.5
	E	4	11.1

APPENDIX H. (Continued)

	Category	Number of Responses	Percentage
ITEM 12	A	4	11.1
	B	7	19.4
	C	4	11.1
	D	8	22.2
	E	10	27.7
	F	3	8.3
ITEM 13	A	3	8.3
	B	8	22.2
	C	3	8.3
	D	9	25
	E	4	11.1
	F	9	25
ITEM 14	A	1	2.7
	B	1	2.7
	C	9	25
	D	5	13.9
	E	7	19.4
	F	12	33.3
	G	1	2.7

B I B L I O G R A P H Y

ADORNO, T.W.; FRENKEL-BRUNSWIK, E.; LEVINSON, D.J. & SANFORD, R.N. "The authoritarian personality", Wiley. N.Y. 1950.

ALLEN, D.W. & GROSS, R.E. "Micro-teaching- a new beginning for beginners", N.E.A. Journal, December, 1965.

ALLPORT, G.W.; VERNON, P.E. & LINDZEY, G. "A study of values; A scale for measuring the dominant interests in personality", Houghton Mifflin, 1951, 3rd Ed. 1960.

ANASTASI, A. "Psychological testing". The Macmillan Co. N.Y. 1954.

ANDERSON, R.C. & AUSUBEL, D.P. (Eds.) "Readings in the psychology of cognition", Holt, Rinehart & Winston Inc. 1965.

ANDERSON, E.E. ET AL. "A comparison of the Weschler-Bellvue, Revised Stanford-Binet and American Council on Education tests at the college level." J. Psychol. 14, 317-320, 1942.

BARR, A.S., "Teacher effectiveness. A summary of investigations", Dembar Publications, 1961.

BARRETT, D.M. "Differential value of Q and L scores on the ACE Psychological Examination for predicting achievement in college mathematics", J. Psychol. 33, 205-207, 1952.

BARTLETT, F. "Thinking: An experimental and social study", Allen & Unwin, 1958.

BELBIN, E. & DOWNS, S. "Activity learning and the older worker", Ergonomics, 7, 429-437, 1964.

BERKOWITZ, L. & LUNDY, R.M., "Personality characteristics related to susceptibility to influence by peers and authority figures", J. Pers., 25, 306-16, 11, 56, 1957.

BERENDA, R.W., "The influence of the group on the judgements of children," King's Crown Press, Columbia Univ. N.Y. 1956.

BETTELHEIM, B. & JANOWITZ, M. "Dynamics of prejudice", Harper, N.Y. 1956.

BOWDEN, A.O.; CALDWELL, F.F. & WEST, G.A.
"A study in prestige", Amer. J. Sociol. 40, 193-204, 1934.

BROWN, R. "Social psychology". The Free Press, N.Y. 1965.

BRUNER, J.S.: GOODNOW, J.J. & AUSTIN, G.A.
"A study of thinking". Wiley. N.Y. 1956.

CAMPBELL, D.T. "The indirect assessment of social attitudes". Psychol. Bull. 47, 15-38. 1950.

CALVIN, A.D.: HOFFMAN, F.K. & HARDEN, E.L.
"The effect of intelligence and social atmosphere on group problem solving behaviour". J. Soc. Psychol. 45, 61-74, 1957.

CHOWDRY, K. & NEWCOMB, T.M.
"The relative abilities of leaders and non-leaders to estimate the opinions of their group". J. abnorm. soc. Psychol. 47, 51-57, 1952.

COHEN, J. "The technique of role reversal: a preliminary note". Occup. Psychol, 25, 64-66, 1951.

COOMBS, C.H. "Psychological scaling without a unit of measurement". Psychol. Rev. 57, 145-158, 1950.

COOMBS, C.H. "Theory and methods of social measurement", in Festinger, L. & Katz, D. (Eds.)
"Research methods in the behavioural sciences". Dryden, N.Y. 1953.

COOMBS, C.H. "A theory of data". Wiley. N.Y. 1964.

COOMBS, C.H. & KAO, R.C.
"Non-metric factor analysis". Univ. of Michigan Press, Eng. Res. Bull. No. 38. 1955.

DE FLEUR, M.L. & WESTIE, F.R.
"Verbal attitudes and overt acts: An experiment on the salience of attitudes". Amer. sociol. Rev. 23, 667-673. 1958.

DICKSON, E. ET AL.
"Characteristics of teacher education students in the British Isles and the United States". U.S.O.E. Co-operative Research Project, No. 2518. Research Foundation of the University of Toledo, 1965.

ELBING, A.O. "An experimental investigation of the influence of reference group identification on role playing as applied to business". Unpub. Ph.D. Diss. in Sherif, Sherif & Nebergall, "Attitudes and attitude change", W.B. Saunders Co. 1965.

FESTINGER, L. "Theory of cognitive dissonance". Harper & Row, N.Y. 1957.

GETZELS, J.W. & JACKSON, P.W. "Creativity and intelligence". Wiley. N.Y. 1962.

GUILFORD, J.P. "The Structure of intellect". Psychol. Bull. 53, 267-293. 1956.

GUILFORD, J.P. "Three faces of intellect". Amer. Psychologist, 14, 469-479, 1959a.

HAYEK, F.A. "The sensory order: An inquiry into the foundations of theoretical psychology". Univ. of Chicago Press. 1952.

HEBB, D.O. "The organisation of behaviour: A neuro-psychological theory". Wiley. N.Y. 1949.

HEIDER, F. "The psychology of interpersonal relations". Wiley. N.Y. 1958.

HEIM, A.W. "An attempt to test high-grade intelligence". Brit. J. Psychol. 37, 2. 1947.

HILGARD, E.R. "Theories of learning". Appleton - Century - Crofts, N.Y. 1948.

HOMANS, G.C. "The human group". Harcourt Brace & World, 1950.

HOMANS, G.C. "Social behaviour; its elementary forms". Routledge & Kegan Paul Ltd. 1961.

HOVLAND, C.I.: JANIS, I.L. & KELLEY, H.H. "Communication and persuasion". Yale U.P. 1953.

HOVLAND, C.I. & WEISS, W. "The influence of source credibility on communication effectiveness". Publ. Opin. Quart. 15, 635-650. 1951.

HUNTER, I.M.L. "Memory: Facts and fallacies". Penguin Books 2nd Ed. 1963.

JANIS, I.L. ET AL.
"Personality and persuasibility". Yale U.P. 1959.

JANIS, I.L. & FESHBACH, S.
"Effects of fear-arousing communications". J. abnorm. soc. Psychol. 48, 78-92, 1953.

JANIS, I.L. & FESHBACH, S.
"Personality differences associated with responsiveness to fear-arousing communication". J. Pers. 23, 154-66. 10. 29. 1954.

JANIS, I.L. & FIELD, P.B.
"A behavioural assessment of persuasibility: Consistency of individual differences". Sociometry, 19, 241-59. 1956.

JENKINSON, M.D.
"Some implications of psychological research for Elementary Education". Canadian Education and Research Digest, 2, 195-203. 1962.

KELLEY, H.H. "Salience of membership and resistance to change of group-anchored attitudes". Hum. Relat. 8, 275-89. 1955.

KELLEY, H.H. & VOLKART, E.H.
"The resistance to change of group-anchored attitudes". Amer. sociol. Rev. 17, 453-465. 1952.

KELLY, G.A. "The psychology of personal constructs". W.W. Norton. N.Y. 1955.

KELMAN, H.C. & HOVLAND, C.I.
"Reinstatement of the communicator in delayed measurement of opinion change". J. abnorm. soc. Psychol. 48, 327-335. 1953.

KLAPPER, J.T."The effects of mass media". Bull. Appl. Soc. Research. N.Y. Columbia Univ. Mimeo. 12. 1949.

KLAPPER, J.T."The effects of mass communication". The Free Press, Glencoe, 1960.

KRECH, D.: CRUTCHFIELD, R.S. & BALLACHEY, E.L.
"Individual in society". McGraw - Hill. N.Y. 1962.

LANA, R.E. "Three theoretical interpretations of order effects in persuasive communications". Psychol. Bull. 61, 314-320, 1964.

LAZARSFELD, P.F.; BERELSON, B. & GAUDET, H.
"The People's choice; how the voter-makes up his mind in a presidential campaign." Duell, Sloan & Pearce, N.Y. 1944.

LEEDS, C.H. "A scale for measuring teacher-pupil attitudes and teacher-pupil rapport". Psychol. Monogr. 64. No. 6. 1950.

LINTON, H.B. "Rorschach correlates of response to suggestion". J. abnorm. soc. Psychol. 49, 75-83, 1954a.

LUCHINS, A.S."Definiteness of impression and primacy-recency in communication". J. soc. Psychol. 48, 275-290, 1958.

MACLEAN, M.S.; GOWAN, M.S. & GOWAN, J.C.
"A teacher selection and counselling service". J. educ. Res. 48, 669-677. 1955.

MACPHAIL, A.H.
"Q and L scores on the ACE Psychological Examinations". Sch. and Soc. 56, 248-251. 1942.

McLUHAN, M. "Understanding media; the extensions of man". McGraw-Hill. N.Y. 1964.

MANUAL, H.T. ET AL.
"The new Stanford - Binet at the college level". J. Educ. Psychol. 31, 705-709. 1940.

MELLINGER, G.D.
"Interpersonal trust as a factor in communication". J. abnorm. soc. Psychol. 53, 304-309. 1956.

MERKHOFER, B.E.
"College students study behaviour". Unpub. Doc. Diss. Chicago. 1954.

MERTON, R.K. "Social theory and social structure". The Free Press, Glencoe. 1957.

MORGAN, C.T. "Students work book to accompany introductions to psychology." McGraw-Hill. N.Y. 1956.

NEWCOMB, T.M."Personality and social change". Dryden Press. N.Y. 1943.

NEWCOMB, T.M."Attitude development as a function of reference groups: The Bennington Study". in Sherif M. "An outline of social psychology". p. 139-154. Harper. N.Y. 1948.

NEWCOMB, T.M. "An approach to the study of communicative acts". Psychol. Rev. 60, 393-404, 1953.

NEWCOMB, T.M. "The prediction of interpersonal attraction". Amer. Psychologist. 11, 575-586, 1956.

NEWCOMB, T.M. "The cognition of persons as cognizers", in Taguiri & Petrullo, "Person perception and personal behaviour". Stanford Univ. Press. 1958.

NEWCOMB, T.M. "The acquaintance process". Holt, Rinehart & Winston Inc. 1961.

NEWSOM REPORT. "Half our future". A report of the Central Advisory Council for Education (England), Chairman: Newsom, J. H.M.S.O. 1963.

OPENSHAW, K. "The corkscrew path". J. of Teacher Educ. 16, 233-37, 1965.

OSGOOD, C.E. & TANNENBAUM, P.H. "The principle of congruity in the prediction of attitude change." Pyschol. Rev. 62, 42-55, 1955.

OSGOOD, C.E.; SUCI, G.J. & TANNENBAUM, P.H. "The measurement of meaning". Univ. of Illinois Press, Urbana, 1957.

PEPITONE, A. "Attraction and hostility". Tavistock Publications, 1966.

RATSOY, E.W. "A comparative and cross-sectional study of attitudes of prospective teachers." Unpub. Ph.D. thesis. Univ. of Alberta, 1965.

ROBBINS ET AL. "Higher education". Report of the Committee appointed by the Prime Minister under the chairmanship of Lord Robbins, 1961 - 1963. H.M.S.O. 1963.

ROGERS, C.R. & ROETHLISBERGER, F.J. "Barriers and gateways to communication". Harvard Business Review, July - Aug. 1952.

ROKEACH, M. "The open and closed mind". Basic Books Inc. N.Y. 1960.

ROSENBERG, M.; SUCHMAN, E.A.; GOLDSEN, P.K. "Occupations and values." The Free Press, Glencoe, 1957.

RUNKEL, P.J. "Cognitive similarity in facilitating communication." Sociometry. 19, 178-191, 1956.

RUNKEL, P.J. in GAGE, N.L.
"Paradigms for research on teaching" in "The handbook of research on teaching". A.E.R.A. 93f. 1963.

RYANS, D.G. "Characteristics of teachers". A

SARGANT, T.W. "Battle for the mind". Wm. Heinemann Ltd. 1957.

SEARS, R. R. "The theoretical framework for personality and social behaviour". Amer. Psychologist. 6, 476-83, 1951.

SHERIF, C.W.; SHERIF, M. & NEBERGALL, R.E.
"Attitude and attitude change: The social judgement-involvement approach". W.B. Saunders Co. 1965.

SIEGEL, S. "Non-parametric statistics". McGraw-Hill. N.Y. 1956.

SPRANGER, E. "Types of men". Niemeyer, Halle. 1928.
(trans. by PIGORS, P.J.N.)

STEVENS, S.S. "Psychology and the science of science". Psychol. Bull. 36, 221-63, 1939.

THURSTONE, L.L.
"The measurement of values". Univ. of Chicago Press. 1959.

TRIANDIS, H.C. "Categories of thought of managers, clerks and workers about jobs and people in industry". J. appl. Psychol. 43, 338-344, 1959b.

TRIANDIS, H.C. "Differential perception of certain jobs and people by managers, clerks and workers in industry". J. appl. Psychol. 43, 221-225, 1959b.

TRIANDIS, H.C. "Cognitive similarity and interpersonal communication in industry." J. appl. Psychol. 43, 321-326, 1959c.

TRIANDIS, H.C. "Cognitive similarity and communication in a dyad". Hum. Relat. 13, 2, 175-83, 1960a.

TRIANDIS, H.C. "Some determinants of interpersonal communication". Hum. Relat. 13, 3, 279-87, 1960b.

TORRANCE, E.P. "Guiding creative talent". Prentice-Hall. 1962.

VYGOTSKY, L.S. "Thought and language". M.I.T. Press. 1962.

WALLACH, M.A. & KOGAN, N.
"Modes of thinking in young children". Holt, Rinehart & Winston Inc. 1965.

WEISS, W. & FINE, B.J.
"Opinion change as a function of some intrapersonal attributes of the communicators." J. abnorm. soc. Psychol. 51, 246-257, 1955.

WELFORD, A.T. "Ageing and human skill". O.U.P. 1958.

WERTHEIMER, M. "Productive thinking". Harper. N.Y. 1959.