METHODS FOR THE EXPERIMENTAL STUDY OF CONVERSATION

by

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Abstract

The objective in the project reported here was development of methods for sampling and manipulating everyday conversation.

Scientific study of social interaction bridges the domains of communications engineers, sociologists, psychologists. Each discipline has its own purpose, but all face a common problem: how can our communicative processes be validly sampled and assessed?

In this thesis, the author has suggested a theoretical background against which empirical approaches can be viewed. Previous work has been surveyed to illustrate the types of method which have been used to date. Alterations in method were suggested and demonstrated in the form of an experiment.

In this experiment, a method of collecting samples of everyday conversation in the laboratory was compared with one traditional method of stimulating interaction in a dyad (game-playing). The two methods produced measureably different types of looking, speaking, and pause behaviour.

Degree of acquaintance of the conversants, and their compatibility on the FIRO-B personality measures, and television as a medium of conversation also affected the interpersonal behaviour of the conversants.

Preface.

Most of us can ride a bicycle,swim,and write our own language. In one sense,we'know'how to do these things,for they are part of our wealth of acquired skills. In another sense,we do not'know' these activities,because we cannot explicitly describe how we perform them. When someone asks "how do you write with a pen?", we usually reply "like this",and give a demonstration. If the question were asked over an ordinary telephone,a verbal explication would be exceedingly difficult. Our'knowledge'of these skills is intuitive,rather than scientific.

For our social skills,this is even more the case. Almost all humans can speak a language (those who cannot are universally assumed to be physically or mentally defective,even in the absence of any other symptoms). But an explanation of how we generate utterances or how we understand them is still beyond us all. An event as common as everyday conversation remains much more inscrutable than the other side of the moon.

There are many reasons for our ignorance. For one thing,social interaction is much more intractable than,say,spheres rolling down inclines: we cannot easily remove the event from its usual setting without destroying it. Spheres and inclines are inanimate,and cannot refuse to perform if we change their mass or rate of slope. We cannot manipulate humans as easily- and,furthermore,in observing them,we are necessarily participating in the very event we wish to describe! On one hand,our presence as observers changes the nature

of the event. On the other hand, our explicit description depends to some extent upon our implicit understanding of this activity. For instance,a phonetic record of the verbal performance is not adequate if we want to examine the organisation of a passage of speech; the phonemic phrasing in the passage would be more effective to this end. But,for the moment,we cannot provide the scientific specifications for a machine which will distinguish a complete phonemic phrase ("a human being.") from an incomplete one (" a human being...").

To obviate the need for this type of interpretation by the observer,studies of social interaction have traditionally chosen more'concrete' types of data: numbers of words or messages,volume of speech,or scores on questionnaires. They have primarily examined types of interaction which can be generated under laboratory conditions: interview,directed discussion,and problem solving. And,they have been hampered somewhat by the technical problems involved in recording and analysing interaction.

This thesis attempts to demonstrate new approaches to these problems. A means of collecting samples of 'natural conversation , without alerting or perturbing the conversants,is presented.'Participant observers'are used throughout,in order to focus on the information which is available to those actually involved in the interaction. A broad range of data is obtained from each sample in order to examine various modes of communication which procede

simultaneously. Finally,the facilities of an electronics laboratory are employed to record and analyse data- to stop the flux of time.

Not all of the techniques used here are original. The novelty in this work lies in the conglomeration of many tried types of data with new methods of generating and recording interaction. The work is also novel in bringing 'natural' conversation into the laboratory,while effecting experimental manipulation of some of its aspects.

The thesis is divided into three parts. The first presents the background for the project: Chapter 1 discusses some theoretical issues; Chapter 2 chronicles the methodologies of previous projects. In the second part,the present experimemt is described: sub-part A reports the methods used (Chapter 3); sub-part B contains four Chapters (4 through 7) which present the different types of results obtained. Finally, Part III gives an overview of the whole project, and makes recommendations for the further study of social interaction (Chapter 8).

Throughout the thesis, direct quotations are indicated "thus". Single quotation marks,'thus', demarcate words which the author uses in a special sense. For instance,the everyday use of the term "conversation" is refined to delimit the focal point of this project: 'natural' conversation (or sometimes 'normal' conversation) is used to describe social interaction free of externally imposed motivation (Chapter 1). In Chapter 4, the phrases 'natural' and 'informal'

temporarily distinguish types of natural conversation occurring with and without the mediation of the video-telephone.

For the reader's convenience,an attempt has been made to locate figures immediately after the point in the text where they are first mentioned. However, tables have been assembled at the end of each chapter to facilitate cross-reference and comparison.

Without the aid of many people,the author could not have undertaken the project reported here. Barry Stapley,John Springate,and Archie White ably compensated,in preparing the apparatus,for the technical ignorance of the author. Peter Goddard spent many hours in perfecting a programme to read the data from punch-tape. David Hinckley advised on the use of multivariate analysis. R.Puddy and M. Rathbone did the photographic work,and Liz Farmer typed the final manuscript. V.W.Byndon provided the funds for duplication and binding.

Many of the author's colleagues in the Communications Section participated as 'observers' in the assessment of the video-tapes-and,in many other ways,contibuted to this concretely interdisciplinary project. Other students,who must remain nameless,participated as subjects.

Over these many years,Professor Colin Cherry provided intellectual stimulation,while the Canada Council,Ottawa,provided a stipend; each,in its own way,lightened the task.

Marina di Pisciotta,Italia. June,1972.

CONTENTS

Part I: Background

Chapter 1. A Theoretical Approach to Conversation

Prologue

Wilhelm von Humboldt, in 1836, advised that the nature of language could only be revealed in examining long passages of ordinary speech (translations in COWAN, 1963). For he drew a strong distinction between language as a product, a thing, and language as productivity, an on-going process; only language viewed as activity would reveal its subtelty. In order to subject the endless variety of everyday utterances to law, he proposed a theory of linguistic behaviour wherein consistency rested in the form of discourse, rather than its content. Form as he saw it was a system of principles for the generation of new utterances; form was organic in the sense of being inherently human, developed from within, functioning to express thought in articulated sound. Form in this sense contrasts with form as used by those concentrating on the content of language; for the latter, it is represented by grammatical classes, such as verb, plural, etc. (BLOOMFIELD, 1933, p.190).

Von Humboldt's way of thinking attracted few followers for more than a century. In this interval, scientific minds gripped the models of classical mechanics. For them, terms like 'form', 'function', had the unhealthy taste of teleology. However, modes of 'functionalist' thinking have, more recently, gained strength in learning how to deal with this criticism. The next section begins an account of social intercourse which owes much to von Humboldt.

1.1. The 'Vital Field' or 'Inner World' of the Organism.

The best way to study the behaviour of an organism is to observe it in its usual environment. In the broad sense, this means

the physical environs: tropical seas, caves, cities. But more specifically, it is only a part of the physical environment which the organism grasps: this is its 'vital field' or 'inner world'. The vital field is the totality of external features to which the organism reacts (and hence includes other organisms). To a large extent, it is determined by the goals of the organism and the means which it has to achieve them (WERNER and KAPLAN, 1963, Chp. 1). Any activity of the organism can only be analysed with reference to this particular environment.

1.2. Directed Behaviour

Following Kant (Critique of Judgement, in CASSIRER, 1950), the concept of purpose is a maxim adopted in the study of living things to aid explanation where mechanistic causality fails. The biologist would thus say that the function of the stickle-back's zig-zag dance towards his nest is to initiate courtship and hence reproduction of his species. The 'means' and 'end' are both observable events, and can be related by the maxim of 'directed behaviour'; but this is not to attribute 'motives' to the organism itself. In many creatures, the appearance of a specific stimulus-complex leads to a sequence of co-ordinated movements; this sequence is constant in form over time and different individuals of the species, and apparently genetically determined (HESS, 1962). On the other hand, human behaviour is for the most part more flexible, permitting conscious planning which can safely be called purposive (see LASHLEY , 1951, for a demonstration of the dependence of linguistic behaviour on planning).

From this point of view, what is the function of language in

humans? From Descartes onwards, most philosophers of language have accepted that language does not function solely for practical communication, in contrast to the sign-systems of animals (CHOMSKY, 1966). Discovering that he could not ascribe the multiplicity of linguistic performance to an automaton, Descartes emphasised the creative role of symbolic systems in thought and self-expression. In fact, it is reasonable to consider this to be the primary role of language, and the practical function to be derivative. Because specific languages necessarily arise in a social context, there is a tendency to mistake their utility in influencing others as their essential function.

1.3. The Pseudo-Language of Animals

Another reason for this confusion of primary and derivative functions is reliance on analogy with animal communication. Most animal communication occurs through the exchange of postural attitudes which can be called gestures. For the most part, these gestures are triggered by features of the animal's vital field; for instance, the courtship dance of the stickle-back is initiated by the appearance of a female in his territory (HESS, 1962). In response to his dance, the female follows hom towards his nest. The chain of action-reaction continues until the eggs are fertilised: " ...a situation in which parts of the act become a stimulus to the other (organism) to adjust itself to those responses; and that adjustment in turn becomes a stimulus to the first (organism) to change his own act and start on a different one" (MEAD, 1934, p.43). This is a case of the co-ordination noted by DEWEY (1896), in which what we know as 'stimulus' and 'response' partly overlap and determine one another.

In some animals, gesture includes a vocal aspect; but even here, the range of gesture available to any one species is extremely small. The vervet monkey, for instance, reacts to different predators with at least six different alarm calls, each of which leads to different types of escape behaviour by his comrades (MARSHALL, 1970); but only about thirty calls of all kinds have been identified in this species (ALTMAN, 1967). It is convenient to designate the communicative acts of animals as "signs", in so far as they arise in momentary response to the vital field of the species. Similarly, they can only be interpreted (i.e. reacted to) by this species, in context. Animal signs thus lack the generative principles of human speech, whereby an infinite string of diverse utterances can be made.

Since animal gesture follows a stereotype over individuals and generations within a species, and since it is intimately entwined with environment, the motor patterns of animal communication appear to be genetically determined (HESS, 1962). Similarly, there is growing evidence that our own nervous system is inherently adapted to the production of speech. The control systems for breathing and motoric patterning, and the vocal tracts show genetically stable modifications suited to speech. The appearance of the language in the child is closely synchronised with the features of biological maturation (stance, gait and motor co-ordination); this synchrony is not disrupted by growth retardation, nor intense language teaching; and there is a critical period for acquisition of a first language, corresponding roughly to the interval wherein the level of cerebral maturation rises from 60 to 100 percent of its maximum (LENNENBERG, 1967, Chp. 4). Furthermore, there is circumstantial evidence in the fact that no

human group lacking language has ever been reported, even (to the author's knowledge) in archaic myth.

There is reason, then, to think that language use is an inherently human capacity. How that capacity is developed by a particular individual depends upon his social milieu. If his parents speak French, then this will be his first language. Looking thus at a historical example, it may appear that society determines linguistic behaviour. A broader view will show that the two are inextricably interdependent.

1.4. A Developmental Viewpoint

To obtain a broader perspective, linguistic behaviour can be examined as it develops. Development can be characterised as a series of transformations in which the behaviour of the organism becomes increasingly differentiated and internally organised (after WERNER and KAPLAN, 1963, p.7). The utility of this viewpoint may be indicated by analogy: more can be learned about the game of chess in watching a novice than in watching a grand master.

Much of the following account of the development of language is derived from WERNER and KAPLAN (1963). Their way of thinking is largely unknown, perhaps because it is difficult to read in the original. A central feature of their very useful approach is that the 'primitive' stages of development often coexist with the more advanced, or re-appear under abnormal conditions. For this reason, their account corresponds at many points with speculative theories (e.g. MEAD, 1934; CASSIRER, 1955) about vanished stages in the evolution of language.

1.5. The Distinction Between Symbol and Sign

A striking thing about the first verbalisations of children is that there is in them little reference to biological needs. They consist primarily of expressions of surprise, etc., proper names, and onomatopoeic names for animals and things (like wow-wow, tick-tock). Even as the child, growing older, begins to string two or more vocables together, these early utterances are predominantly declarative, rather than imperative. Furthermore, these early declarations occur most frequently when the child is under no tension; under the pressure of biological need or pain, the child cries or makes call sounds (p.160; uncredited references henceforth are to WERNER and KAPLAN, 1963). Evidently, speech does not arise in the communication of practical need, not in the desire to influence others; rather it originates in cognitive interaction with the environment. The child's tendency to know its environment, manifest in grasping, manipulating, crawling, naming, can be considered as intrinsic, and not subordinate to biological need (WHITE, 1959).

The uniquely human instrument which permits the construction of a vital field which is consciously known, and not merely reacted to, is the symbol. A sign is a substitute for a thing, or event, which leads the beholder to anticipate another thing or event. For instance, a threatening posture, part of the attack procedure for one rhesus monkey, is a sign of imminent attack for the threatened rhesus. The sign is thus an intrinsic part of the interaction. Symbol, on the other hand, is established by an intentional act; an essential character of symbol is that it is intended, by the user, to represent something else (pp.12-17). The slim distinction between these two concepts will

grow with further discussion.

The symbol represents some referent. A point missed by theories of language based on association is that the correspondence or analogy between symbol and referent is not given objectively; but it is this relation which must be established by intentional act. The analogy is made between the pattern or form underlying the symbol and the connotational structure of the referent (p.15). Consider, for example, the earliest stages of naming, in which the representation is onomatopoeic. Here, the symbol should replicate some connotation of the referent most exactly. However, an international list (p.102) of the child's depiction of "dog" shows that representation involves reconstruction of the event via sounds previously practiced in the child's babbling!

*DOG:	French	=	oua oua	German	=	wau wau
	English	=	wow wow	Dutch	=	waf waf
	Japanese	=	wan wan			

* transcribed in everyday English phonetics

Here, too, there is an inkling of how symbolising influences the construction of the cognitive world (Whorf's hypothesis; WHORF, 1941).

1.6. Pre-Verbal Reference

In the beginning, the child lives in a sensory morass. Internal sensations - posture, biological need, pain - and external - light, colour, sound, movement - come together in an initially undifferentiated whole. Over the first few months, the infant begins to organise a perceptual world. The eyes begin to follow movement; as muscle co-ordination improves, the hand reach and grasp. However, co-ordination of hand and eye only appears at 5 or 6 months; for the first time, the

child connects what he can grasp with what he can see, and manipulative exploration begins. At this stage, the child starts to distinguish himself from external objects, which can be held at arm's length and visually inspected. At the end of 18 months, visual inspection no longer requires grasping and touching; tactual properties are now anticipated by visual experience.

An important element in this development is the child's mother, who is initially connected with all objects, e.g. food, clothes, toys. As the object becomes differentiated from self, so mother emerges: dealing with objects is from the outset a shared activity. The first acts of reference, touching, looking at, exchanging things, are social rather than individual acts (p.43). This early sharing is widely used as the basis for teaching language to the deaf and blind (KELLER, 1903).

1.6.1. Gesture

The first actual use of reference by the child occurs in pointing. Pointing is the culmination of development towards motoric reference, incorporating the distinction between self and external object. Developing near the end of the first year, it involves orienting the whole body as well as the outstretched arm towards the distant object. It is physically quite the opposite of grasping, and unknown in animals (if you try to point something out to your dog, he will sniff your finger in puzzlement).

G.H. MEAD (1934) clarified Wilhelm Wundt's conception of the gesture as the basic mechanism of social process: "....the gestures are the movements of the first organism which act as specific stimuli calling forth the (socially)appropriate responses of the second

organism." (MEAD, 1934, p.13). In animals, it is part of the intrinsic act (e.g. the threatening posture is the first stage of attack) which serves as gesture (sections 1.3 and 1.5); MEAD was not explicit in demonstrating that this part of the act becomes representational, as human gesture surpasses the exchange of signs in animals.

Hence, he could not describe how gesture evolves through increasingly abstract representational metaphor. These metaphors are largely physiognomic.

In physiognomic representation, a second type of analogy, (parallelling the onomatopoeic analogy, section 1.5)is used in relating the form of the referent to the form of the symbol. Here, the basis of analogy is the non-sonic properties of the referent- properties perceived in terms of body movement, in the early stages when the senses overlap. For example, a three-year old is asked to draw a circle: first he puffs out his cheeks, then he draws a very swollen copy; angularity may be represented in strong strokes of the pencil which cut the paper, roundness by very soft strokes. Generally, drawings by children between 2 and 4 appear to be based upon bodily-gestural analogy rather than on purely visual properties (p.90). Over the years, this type of gestural depiction is refined in so far as increasingly complex aspects of the referent are represented by increasingly abstract gesture: a child imitates the flickering of a light bulb by fluttering her eyelids; another imitates the oscillations of boats at anchor by raising one shoulder, then the other (p.89). On one hand, the analogy becomes more abstract: distal movement the body

begins as a demonstrative accompanying "there", "you"; later, it accompanies "then", "was", representing distance in time rather than space. On the other hand, the form of the gesture alters: distal movement first involves posture, then extension of the hand, finally shift in glance (this illustration is based on information in BIRDSHISTELL, 1966). WERNER and KAPLAN refer to this process of differentiation as 'distancing' between the form of the referent and the form of the gesture. The process culminates in the conventionalised gesture: the shrug of the shoulders, the wave of greeting.

1.7. Early Vocalisation

However, the appearance of a more powerful means of representation, 'vocal gesture', shifts the function of physical gesture (though it probably does not restrict its range, as WERNER and KAPLAN suggest). Vocal gesture has a unique feature: whereas facial expression, glance, movement of the body are not perceived in the same way by emitter and receiver, vocal gesture makes an identical stimulus available to speaker and listener (von Humboldt, 1836, in CASSIRER, 1955; MEAD, 1934). This feature maximises the potential for sharing experience, which is the basis of interpersonal understanding. There are indications of shared experience before the onset of verbal behaviour. As part of the differentiation of self from object and other, the child begins to respond differentially to humans. The first gesture of the child, the smile in response to his mother's smile, is one of the few wherein the act is identical for both parties (like lip-smacking in the rhesus monkey, it is expressive, rather than representational). At 8 months, Werner's nephew did not react to a pendulum swaying near

him, nor a swinging pencil; however, he bagan to sway 'empathetically' as Werner himself stood swaying before him (p.88). Sharing experience is rooted in the emergence of self, object and other, upon which reference is dependent (p.42; MEAD, 1934, p.49); children deprived of early maternal care perceive objects abnormally, and may show very little speech even at 4 years (p.72). Vocal gesture is, then, dependent upon sharing, but gives greater scope to mutual experience than physical gesture. It also relieves the constraints of time and space upon physical gesture in that it halts the flux of mental experience (CASSIRER, 1955, p.89). Just as tying a string around the finger helps one to remember some project, so the word, because it is part of a complex network, aids the memory in imposing order on the perceptual world. The word is a very powerful agent to this end, since it arises in contemplation of the perceptual world.

1.7.1. Onomatopoeic representation in symbols

One example of the use of onomatopoeic analogy in forming symbols has been presented in section 1.5. There, it was pointed out that representation of the sonic connotation involves selective perception and reconstruction in terms of the sounds already practiced by the child. Often, the analogy is with the sound of action: "o-o-o" for a carriage apparently depicts the effort of the horses pulling it; "f-f-f" for match depicts the sound blowing it out (pp. 101-102). Although the basis of depiction may be idiosyncratic, the means are the vocables of the surrounding conventional language: "shudde-shudde" = ball (sound of its bounce); "ling-dong-mang" = church bells;

"didi-lip-didi-lip" = key; (its jingling sound); "noat-noat" = walking (shuffling sound); (p.103). These examples are all from children between 1.5 and 2 years old, learning German.

1.7.2. Physiognomic representation in symbols

A second type of analogy, appearing as the child grows older (2 - 3) is the physiognomic, which derives from representation in gesture. In this case, the non-sonic properties of the referent are depicted by analogy to organismic properties. For instance, the visual quality length or size may be represented by a long vowel (which requires a 'long' time to articulate) or a short vowel (p.104). Physiognomic representation has been proposed as the source of the dentals, which are used in antipodal reference throughout Indo-European languages: the formative movements and burst of air are directed outwards, paralleling the reference to something 'out there'. One of the first denotative utterances, accompanying early pointing behaviour, is the dental "da" = there (p.82).

Several modes of analogy are available for the expression of any one connotation. For instance, in the representation of size, (1) intonational variation: "teine" (in adult German = stone) with a high, short intonation in pointing to pebbles, or with a low, long intonation in indicating boulders; "ha-psi" with a deep, long intonation for tree, but with the second syllable accented in a high voice for a small flower, and at the same time, (2) exaggeration of the differentiating mouth postures; (3) vowel variation: a doll chair called "likill", an ordinary chair "lakell"; and (4) vowell length, as mentioned at the beginning of this section (pp. 104-105). In all of these cases,

the analogy is drawn between a visual property and the organismic activity involved in articulation.

1.7.3. Conventional representation

WERNER and KAPLAN contend that vocal representation begins in onomatopoeic analogy, and passes through physiognomic to conventional representation. The stages overlap, and in some measure coexist in the adult. Furthermore, conventional symbols, although handed down by the parent society, are, it is thought, apprehended via the antecedent metaphors by the child. WERNER and KAPLAN cite an experiment (pp. 26-29) wherein adults revealed the physiognomic oonnotations of conventional symbols. The subjects were asked to adjust the level of words projected upon a wall so that they rested at eye-level. Words like "climbing", "rising", were (erroneously) perceived as being above eye-level, and so were adjusted downwards, well below words like "falling", "dropping", which were adjusted upwards.

In another experiment, adults were asked to describe, in physical terms, how a set of everyday words protrayed their own meanings. They readily did so, largely by relating themselves to these words (e.g. "decayed : one dips into the word without finding resistance, like into rotten fruit", p.209). OSGOOD, SUCI and TANNENBAUM (1957) made this predisposition the basis of their "semantic differential", a technique for exploring personal relations to words.

It is contended that the difference between previous types of representation and conventional representation lies in increasingly abstract analogy. Differentiation of the form of referent and symbol parallels that discerned in gesture (section 1.6.1.). On the one hand,

as the child's perceptual world grows in complexity, his connotations of the referent become less concrete. For example, a child first uses "f-f-f" to represent blowing out a match; subsequently, she uses it as a name for smoke, then steam, then a funnel, a chimney, and finally, for any object standing upright against the sky (pp. 106-107).

On the other hand, as the child's vocabulary increases, the form which he perceives in the symbol no longer reflects form perceived in nature, but reflects conventional organisation. For example, a child constructs a verb, "wiehen" = to slide, by adding the conventional verb suffix (-en, in German) to his own onomatopoeic word for the activity, "wieh". Or, in constructing larger units, the child combines his depiction of piano playing, "tinkeli", with the conventional term for cabinet, to create a name for the piano: "tinkeli Kommode" (pp.107-108).

These examples illustrate the transitional stages between the earliest types of representation and the conventional. WERNER and KAPLAN (1963) follow development in detail through the acquisition of linguistic phrasing to the formation of complex verbal concepts. However, the goal here has been to present merely the kernel of this theory, as the basis for a discussion of conversation.

1.8. Communication of Meaning

The theory described in the foregoing sections has indicated that the foundation of language is social interaction (sections 1.6 and 1.7). But curiously, the initial function of language is not practical, not the communication of biological need, nor commands; rather, the initial function appears to be cognitive conquest of the environment (section 1.5). The critical contribution of social interaction is shared

experience (section 1.6).

PIAGET (1926) observed that in the early years - 3 to 4 - speech is remarkably ego-centric. The child talks to himself; when others are present, the successive utterances by each child are disconnected, each following his own thread (PIAGET, 1926, p.58). The child's use of analogy and example is highly personal; the interconnection of concepts is intuitive and syncretic (PIAGET, 1926, pp.46-47). Following experiments in which children were asked to relate stories to one another, PIAGET remarked: " ...understanding between children occurs only in so far as there is contact between two identical mental schemes already existing in each child....(the child) has not, like the adult, the art of seeking and finding some basis on which to build anew." (PIAGET, 1926, p.120). In fact, even in adults, 'memory' depends upon highly idiosyncratic interpretation of concepts and choice of synonym (BARTLETT, 1932).

In the early years, then, the child is not very successful in 'communicating'; conveying ideas - apart from shouting "Food!" - is not the root of language, but begins and persists in difficulty. MEAD (1934, p.71) points out the general conditions for the communication of meaning: a significant symbol is one in which the matrix of responses and attitudes elicited by the symbol is the same in speaker and listener. This state of affairs can only arise in the sharing of experience. But the contribution of the WERNER and KAPLAN theory on this point is that the connotations of the symbol for the speaker need not be identical to its connotations for the listener; what is required is that "...the connotations evoked in both adressor and addressee occupy a comparable position in each individual's personal

network of meanings" (WERNER and KAPLAN, 1963, p.50). To take a very simple example, if the speaker happened to be the child uttering "o-o-o" (section 1.7.1), then the listener would understand this as a reference to the horse and carriage (and not, say, the driver) only through his ability to form the same sort of analogy between sound and action as the child. Types of metaphor underly all natural languages, and ensure their general comprehensibility in the language community. In the Indo-European tongues, the conventional analogy representing duration is horizontal extension in space; intensity is represented by vertical extension (WHORF, 1941). Discovering this convention in other contexts, the listener can immediately distinguish "a high time" from a "a long time".

1.9. Language and Social Grouping

As the child grows older, his speech becomes decreasingly ego-centric. In speaking with other children, the child begins to exchange views about everyday events. Significantly, his speech with adults remains more ego-centric until he is 7 or 8! On one hand, the matrix of perception, analogy and expression is close to his own; on the other, the conventionalised forms of the broader society prevail.

Since the communication of meaning depends upon 'experience' shared by speaker and listener, it is not surprising that language communities grow around common 'vital fields'. The child does not babble randomly for long, but strings together sounds that he hears from more advanced speakers; he proceeds through stages to mastery of the conventional forms of those around him. These conventional forms

only partially free speech from idiosyncratic experience; for instance, the English sentence "Immediate constituent analysis (labelled bracketing) accounts for surface but not deep structure" (after CHOMSKY, 1965, p.17) uses conventional terms, in a conventional syntactic structure. From a formal point of view, there is no error in this sentence which prevents an ordinary English-speaker from understanding it; however, only a person versed in specific branches of contemporary linguistics would be able to comprehend the sense which CHOMSKY intended to convey. In everyday speech, misunderstanding almost never arises out of novel lexicon nor peculiar syntax; it arises rather when the stream of reference in the speaker's unfolding utterance does not follow the same direction as the stream of reference in the listener's model of the utterance.

Communication of meaning requires some similarity in the 'vital fields' of the communicators. Similarities are contingent on social contact. In the simplest case, social grouping demands phsyical proximity - mother and child, peer group, dialectal sub-societies and pre-linguistic tribes. In the most complex case, where people make highly specialised use of language, social grouping is effected over time and space - as in the example of the linguists exchanging the sentence quoted above. In all cases, the peculiarities of linguistic usage, which are rooted in common experience, augment the social group's internal cohesion. As early as 1868, Geiger suggested that language first arose in the expression of this sense of community (quoted in CASSIRER, 1955, p.287); and contemporary anthropologists reach the same conclusion: " ...the purpose of the rite is to affirm the existence of a social bond between two or more persons" (RADCLIFFE-

BROWN, 1958; rite, of course, embraces both linguistic and gestural performance). Even in the pre-linguistic rhesus monkey, brain-damaged individuals who fail to make the appropriate social signals are rejected and persecuted by their group (DICKS, MYERS and KLING, 1969).

1.10. Relevant Elements in the 'Vital Field'

SCHEGLOFF (1971) has looked at conversational communication of a specific type of information, namely place names, and found that the parallelism of 'vital fields' involves at least these factors: group-affiliation of the conversants, their geographical knowledge, their respective locations, the topic and the momentary stage of conversation. If, for example, an office worker wanted to tell a colleague where a letter was filed, she could say "it's in the next room"; however, this reference must change as she speaks to a new employee ("it's in the Commercial Inquiries file"), to a stranger who's come off the street ("it's in our files"), to a telephone caller ("it's in room 431"); it must also change when discussion turns to how the letter was filed ("it's under C").

Meaningful reference is always determined by considerations such as these. Generally, in any conversation, the participant's perceptions of time, place, group affinity, topic of conversation, momentary stage in the conversation - and his ecpectations of the other's perceptions - mould what is said. As the example above shows, a reference to any event or thing may be formulated in a variety of ways which may not be equivalent for the listener. The speaker's perceptions and expectations interact to select one formulation; and the listener's perceptions and expectations interact to determine his

interpretation of the reference. The whole set of perceptions and expectations are often lumped together as the 'context' of interaction. As SCHEGLOFF has demonstrated, context is not beyond empirical description.

When the sets of perceptions and expectations have little in common, meaningful reference cannot be made, even through usages common to speaker and listener. CICOUREL (1972) presents an excellent example form the classroom. The teacher speaks: "all right, let's make a line at the bottom of our paper". The teacher knows how this instruction fits into her projected lesson; a horizontal green line near the bottom of the page will represent the grass, and a worm will be drawn underneath it. However, she does not make this explicit in the instruction. The ambiguity of 'line' (horizontal? vertical? straight?) and 'bottom' (a line at the very bottom would not allow space for the worm) is reflected in the children's behaviour: they do not take up their crayons, but look at one another and the teacher.

1.11. Implications for the Study of Conversation

Many of the theoretical issues broached in the previous sections bear upon the empirical study of social interaction. Since communication of practical need is only one facet, perhaps not a crucial facet of language use (sections 1.2, 1.8), the study of problem-solving and interview behaviour may not reveal much about meaningful reference. In these situations, the purpose of interaction should be clear to the participants; each may accept a role prescribed by the situation e.g. "I am going to ask questions about your business practices"; "I am going to answer questions about my business practices". The perceptions

and expectations of the participants will thus be delimited; there should be less interplay (of the type observed by SCHEGLOFF and CICOUREL) intended to elucidate the participants' vital fields.

If, on the other hand, the participants do not enter a structured situation, where the goals and roles have been imposed from without, this type of interplay should be more evident. Interaction should then serve, more frequently, in 'self-expression'; its goals will at least be determined by the participants. The author proposes that social interaction under these conditions be called 'natural conversation'; this is the focal point of the present project.

Since the context of interaction is determined by the participants' vital fields (section 1.10), control of their perceptions and expectations should permit the generation of various types of interaction. Of course, only a very general type of control can be attempted, on three facets of the interpersonal situation: the physical setting, the group-affinities of the participants, and the purpose of their meeting.

A doctor's office will usually lead to different types of exchange than a public bar. In themselves, these settings generate different types of social expectations, A man sitting in the office might say "I've got this pain right here", if a man in a white coat entered; however, if another entered in attire similar to his own, he might ask "what time is your appointment?". The man's behaviour changes according to his perception of another's group-affinity (medical person or patient) in the same situation. Contrarily, the man might say to the doctor, "Please sign here for this package", if, in fact, he entered the office to make a delivery. Here, the purpose of the

meeting affects what is said.

Obviously, these facets of the interpersonal situation (and others) interact to determine its content. They can only be separated in intellectual exercises like analytic discussions or experiments. However, an attempt to control them does not seem too ambitious.

Subtle cues to the purpose of a meeting probably lie in the size of the meeting place, the arrangement of chairs or other types of furniture, or equipment; and in the ambient levels of light and sound. "Group affinity" encompasses many facets of person-perception; sex, race, age, language group, occupation, religious, political and other affilitations. Generally, this factor may be controlled through the selection of subjects. Finally, the perceived purpose of the meeting - chat, interview, game, negotiation, etc. - may be altered via instructions.

In order to generate 'natural' conversation, it would appear necessary to arrange meetings wherein the 'cause' of the assembly is not related to the nature of social exchange. For instance, this situation probably prevails in a restaurant; people may meet there in the course of nourishing themselves, but their exchange will not be restricted to "pass the butter", "have some of this". Discourse is (generally) even further divorced from the 'cause' of the meeting in a public bar or coffee lounge. If people with vaguely compatible group affinities (common language-group is probably the minimal requirement) are brought together in this type of setting, 'natural' conversation may be expected to occur - especially if the participants do not have well-defined roles which dominate the meeting (as would be the case if a person sat down and a woman in waitress' attire brought

in the coffee).

Supposing that control of these factors permits the generation of conversation, what sort of data will lead to fruitful analysis? Words? Postures? Facial expressions? Gestures of the hands? The human participant undoubtedly attends to all of these; they interact to determine the quality and sense of social interaction. As pointed out in sections 1.6 and 1.7 (see also BIRDWHISTELL, 1960), physical and vocal gestures are intricately entwined in social interaction - communication is an integral performance. Vocal gesture may be transcribed as written language. Physical gesture may also be codified; but this complex task may be simplified by attending to the direction of glance in the participants. Clearly, gestures which are not seen by the other may illustrate the state of one participant to an observer, but they can have no communicative value within the interaction. Moreover, glance not only provides information to the looker, but also is in itself a most influential gesture.

Although an analysis of word usage or posture or glance may in itself be very informative, our communicative process will only be scientifically known through study of the integration of vocal and physical gesture.

Part I: Background,continued

Chapter 2. Empirical Approaches

Prologue

When the researcher decides to bring human communication under his microscope, he is immediately confronted with several important questions of method: (1) what is the purpose of the research, (2) what sort of data is relevant to this purpose, (3) how can this data be assessed so as to discriminate between various hypotheses, (4) how can samples of this data be collected. There is always a danger that the answer to one of these questions will seriously limit the credibility of the answers to the others. For example, Bavelas' choice of an easily-quantifiable datum (number of messages) led to a type of sample (people passing notes through walls) which must have no generality whatsoever! (BAVELAS, 1953).

The studies mentioned in this survey have been divided into three groups on the basis of their general purpose: (1) studies using types of communication as dependent variables for the assessment of telephonic systems (2) studies aiming to manipulate factors in communication, in the tradition of experimental social psychology and (3) studies adopting an ethological approach in order to study natural communication. This survey aims to illustrate types of empirical exploration which have already been tried, rather than present a comprehensive list (for the latter, see ARGYLE, 1969).

2.1. Assessment of Telephonic Systems

One of the great problems in designing devices and networks for telecommunication is determining how they will be used. For this reason, organisations like Bell Telephone and the G.P.O. have long been interested in techniques for generating test conversations.

Perhaps as a result of the interest of contemporary psychologists in Games Theory, DEUTSCH and KRAUSE proposed a type of game as a model of the bargaining situation (DEUTSCH and KRAUSE, 1960). A game has many attractive features: it provides a context for interaction which remains the same over all subjects, permits control of the relative status and power of the players, prescribes ways of re-solving conflict, and is a straight-forward means of getting people to interact. A feature which many researchers favoured in a game was that its outcome presented a simple way of measuring the effect of interaction.

In their game situation, DEUTSCH and KRAUSE asked the players (female Bell employees) to imagine themselves to be managers of two transport companies operating on the same stretch of road. Each was to move her 'truck' to the terminus of the other company, for imaginary payment. Sometimes the road was blocked by gates under the control of one or both of the players (see Appendix B). DEUTSCH and KRAUSE did not allow the two players to see one another; each had an electronic panel whereby she could control the movement of her 'truck'. In this case, the panels were not interconnected, so that each player did not know the position of the other's truck until it collided with hers or entered her terminus, to win. The monetary outcome of each successive trial was the major source of data.

When threat (in the form of control of a gate) was available to one player, the total 'profits' of the players dropped below the level occurring without threat; when threat was available to both players, profits sank even lower. Joint profit was interpreted as an indicator of agreement. By providing a telephone link, DEUTSCH and KRAUSE showed that communication did not lead to greater agreement if the

players were competitive.

RICHARDS and his colleagues asked pairs of subjects to perform various tasks, such as describing odd-shaped drawings to one another, or ranking a series of paintings in an agreed order. In the ranking experiment, several types of data were collected: the subjects' scores on the Eysenck Personality Inventory, speech volume, duration of conversation, the opinions of trained telephone operators on the conversation, and the initial and the final ranking of the paintings. The change from each subject's original ranking of the paintings to the agreed ranking was used to grade the interaction. RICHARDS found that this type of negotiation approximated natural conversation and fully utilised the telephone systems under test (RICHARDS, 1968).

In comparisons of face-to-face interaction with telecommunication, REID, (1970) asked his subjects to interview a confederate posing as a scholarship candidate. He found that their ratings were statistically identical, whether they conversed via telephone or face-to-face. Similarly, in a second experiment, he found that subjects facing a confederate were no more able to judge when he was lying than subjects listening via a loudspeaker in the next room. In this case, the confederate merely spoke about himself, exaggerating his accomplishments at pre-arranged intervals. Though REID found no differences in his measures of 'efficiency', he did find that persons conversing face-to-face felt more confidence in their judgements of the other.

In another experiment, subjects were asked to pose as union or management representative, and to simulate a wage negotiation. An attempt was made to give a context to the supposed situation. For some reason, management was given the stronger case; this side forced the settlement towards its own position more frequently over the telephone,

than in face-to-face conversation (MORLEY and STEPHENSON, 1969). The results were interpreted as proof that telephone conversation is more formal, and is better suited to hard bargaining than face-to-face interaction.

STAPLEY extended these techniques of assessing telecommunication to the video-telephone. He performed extensive experiments on the contribution of different types of television image to communication. In his main experiment, he asked subjects to interact in two different ways (1) discussing their summer holidays and (2) playing the Deutsch-Krause Trucking Game, while using a prototype video-telephone network. STAPLEY obtained a broad range of measurements of the use of speech and glance by the pair of subjects. Three types of channel were used: sound plus monochrome image, sound plus outline image, sound alone. Interestingly, the only differences in looking behaviour occurred between the two types of interaction, and not between the two types of image (STAPLEY, 1972).

Since the video-telephone equipment constructed by STAPLEY and his semi-automated system of measuring speech and glance were used in the present research, relevant results of his work will be mentioned later.

2.2. Traditional Social Psychology

A characteristic common to the studies surveyed in this section is the experimental manipulation of factors derived from traditional social psychology, to determine their effect upon interaction. For the most part, both the methods and the type of dependent variable are also traditional, though there are some interesting innovations. These studies are grouped according to the type of data oollected.

2.2.1. Speech

To collect long samples of speech is simple; the difficulty begins with any attempt to analyse it in a meaningful way. Various methods of distilling speech have been tested. GOLDMAN-EISLER and COHEN, (1970) classified English utterances into six classes: simple active affirmative, two types of affirmative passive, negative, negative-passive, interrogative. They collected samples from a variety of sources- Hansard, radio lectures, academic discussions and psychiatric interviews of academics, neurotics, and schizophrenics. The frequency of passives from each source decreased in the order of their listing: this was interpreted as a reflection of decreasing intellectuality. The only statistically significant differences in the frequency of affirmatives occurred between prepared speeches from Hansard and both schizophrenic and all non-schizophrenic samples.

Another type of grammatical classification scheme was proposed by JONES and WEPMAN (1967). They gave each subject 20 TAT cards, and taperecorded their anecdotal responses. For their sample of normal and aphasic speakers, they derived 5 distinguishing 'factors': (1) descriptive specificity (2) richness of vocabulary (3) use of pronominal phrases (4) use of interjection (5) use of conjunctive form (6) hesitation and repetition.

Other methods of classification have been developed by TRAGER, (1958) and CRYSTAL and QUIRK, (1964). However, any analysis of this type is time-consuming; it is not surprising that researchers have relied on methods more amenable to quantisation. In the assessment of telecommunication systems, speech volume and duration were not only easy to measure, but germane. This type of measurement also found a

place in psychological research: KRAUSE (1969) counted the number of words spoken by his subjects! In attempting to establish a "controlled life-like situation", he asked 40 pairs of strangers to converse for 10 minutes. Previously, he had matched them into congruent, incongruent and mixed pairs, according to their scores on the Frankfurt Questionnaire (degrees of information revealed to/received from best friend). Pairs of strangers whose members revealed and received little information from their best friends were judged to be incompatible, and did not talk about intimate subjects; they also spoke the fewest words.

YOUNG (1969) chose the temporal patterning of conversation as a dependent variable. His subjects were asked to discuss an intimate, and a non-intimate topic, in what they believed to be a psychotherapeutic interview. Some pairs were composed of two peers, others of 'patient' and therapist. YOUNG obtained a record of the temporal patterning of their interaction by separating the two subjects, so that they had to share a communicating system; each subject pressed a button to signal when the other could use the channel. Pairs of peers shared the available time more equally; the therapists allowed their patients to do most of the talking.

Measurement of the temporal characteristics of speech has been brought to a very refined state by JAFFE and FELDSTEIN (1970). They have automated a complete analysis of conversational rhythm. Working from live or taperecorded interaction, their system encodes the sequences of sound and silence. Each member of a dyad triggers a voice-relay when he speaks; the relay is sampled 200 times per minute for the presence of speech, which is then encoded on paper tape, and also fed into an on-line digital computer. However, the thresholds of the

device are set by the operator, in listening to the early parts of each dialogue; thus, speech as heard by a participant is encoded.

JAFFE and FELDSTEIN were interested in the transitions between various speaker-states. Therefore, they wrote a computer program to fractionate their data into five categories: (1) vocalisation (2) speaker switch (3) pause (4) switching pause (5) simultaneous speech. On this basis, the program turned out a numerical account of temporal interaction.

The system was used by its originators in three experiments, to assess its validity and reliability. Their approach was similar to that in the present research - they tried to establish independent variables which would affect the measured behaviour, and they made repeated measures on subjects interacting with different partners. In the first experiment, female subjects were interviewed on different occasions by different interviewers. Both innocuous and embarassing subjects were broached. In the second experiment, dyads were instructed to resolve their differences in attitude (revealed by a questionnaire). At roughly 3-week intervals, the subjects met two different members of their own sex, and one of the opposite sex. Another factor was introduced by visually screening the members of the dyad from one another, on some occasions. Finally, in the third experiment, female subjects met in "more natural social dialogue"; they were asked to discuss anything for 30 minutes! Subgroups of 4 were formed, such that and each member conversed with each of the other 3 on successive occasions.

Briefly, the results of these experiments suggested that temporal features of conversational style remain relatively stable, whether the

speaker meets the same partner after a long interval, or speaks about different topics, or speaks under different conditions. However, individual differences were considerable, and a strong effect of one speaker's style on the other's was exerted on the duration of silence (rather than speech). JAFFE and FELDSTEIN have provided excellent data on speech patterning, and they have done so with a reliable technique which can rapidly digest a great amount of data. However, they have also demonstrated that this patterning in itself is not too sensitive to experimental manipulation.

GOLDMAN-EISLER's discovery that conversational speech-rate is determined not by the rate of articulation (which remains fairly constant within and between speakers) but by duration of silences focussed attention on the pause (GOLDMAN-EISLER, 1961). MACLAY and OSGOOD (1959) had seen the pause as a halt by the speaker as he hunted for a word; with a 'filled pause' (ah, uhm, etc.), the speaker maintained control of the interaction during this search. Others speculated that filled pauses were indices of anxiety, but since they encountered difficulties in both inducing and reliably identifying 'anxiety', their efforts were not very fruitful.

On the other hand, BOOMER (1965) was successful in trying to relate all types of pauses to syntactic aspects of speech. He asked his male subjects to speak extemporaneously to an interviewer, for 3 minutes on any subject of their choice. From audiotape, he prepared transcripts of their speech, and used a synchronised oscillograph to identify silences. A 'naive' linguist was asked to mark the phonemic phrase boundaries on the transcripts. (Phonemic phrases are phonologically marked segments, with only one primary stress, ending in a

terminal juncture; BOOMER, (1965)). Pauses in general, and both the filled and unfilled subtypes, did not show 'random' distribution over the phonemic phrase, but showed a statistically significant peak after the first word. Assuming that hesitations mark points where planning decisions are made, BOOMER concluded that most pauses occur after the speaker has committed himself to speaking, but halts to clarify the pattern of his phonemic phrase.

The analysis has found support in the previously reviewed experiments of JAFFE and FELDSTEIN. The details will be discussed in the chapter on pauses.

2.2.2. Gaze

In addition to what is said, there is a wealth of non-vocal information available to conversants. How much of it do they use? How does it influence their behaviour? Considerable effort has been expended in experiments on the spatial orientation, posture, body movements and facial expression of people in communication (for a concise review, see ARGYLE and KENDON, 1969).

Of course, if these visual features are to have any impact, each conversant must look at the other. The study of gaze thus presents a means of short-cutting the complexity of experimenting on all the areas of visual information. Moreover, the direction the other's gaze is in itself a cue to the conversant. (see CHAMPNESS, 1970, for traditional references to "the look")

The telephonic research surveyed in section 2.1 demonstrated that the contribution of visibility is very subtle in the types of inter-

action studied. ARGYLE, LALLJEE and COOK, (1968) speculated that the look has 3 functions in social interaction: (1) emotional feedback (2) speech synchronisation (3) affiliative balance. In a series of experiments, they interviewed a set of subjects repeatedly under conditions designed to restrict visibility: the restrictions consisted of dark glasses, masks in face-to-face interaction; and an opaque or one-way screen during communication via intercom. Their subjects reported (on a set of scales) that they felt unconfortable when the interviewer was not visible, particularly when they themselves were visible. The degree of discomfort was not as great when they themselves were hidden, and diminished completely when both members of the dyad had an equal opportunity for looking. Invisibility also led to longer pauses and more interruptions in speech.

Evidence that a normal person can detect the direction of another's glance with great accuracy accumulated (GIBSON and PICK, 1963; CLINE, 1967). Acuity was measured by a simple technique developed by GIBSON and PICK and essentially replicated thereafter: subjects were required to judge the direction of glance of a trained 'looker' seated from 4 to 6 feet in front of them. When the looker gazed into the area around the subject's eyes, acuity reached its peak: at a distance of 4 feet, the subject could detect a horizontal deviation of $\frac{1}{2}$ inch of the looker's eyes from his own; and a vertical deviation of 1 inch (CLINE, 1967). When gaze fell outside this central 'eye-contact' region, accuracy diminished; it also decreased as the looker's face rotated away from the line between himself and the subject, although error was constant rather than random. This, together with the difference between horizontal and vertical acuity suggested that the operative cue is the

position of the pupil in the white part of the eye. ANSTIS, MAYHEW and MORLEY (1969) and STAPLEY (1972) found that these results could be generalised to perception of gaze in a face presented on a television screen.

Discovery of this acuity had two important consequences: first, it meant that direction of glance, particularly in the 'eye contact' region, was a source of information available to persons in communication, second, it meant that observers would be able to reliably detect the direction of glance for scientific measurement.

The relation between direction of glance and a number of conceivable factors - sex, affiliation, dependency, social reinforcement, distance, verbal content - has been explored. EXLINE and his colleagues used the interview format in a series of experiments, with the the intention of assessing the effect of various factors on the looking behaviour of the interviewee. They adopted an unfortunate solution to the problem of controlling the interviewer's glance: he looked at the interviewee continually throughout the experiment. Of the 3 functions for looking suggested by ARGYLE et al, two, emotional feedback and speech synchronisation, were thus vitiated! Furthermore, every look by the interviewee necessarily resulted in 'eye contact'.

Under these unusual conditions, they found that females engaged in "mutual glance" more frequently than males while speaking, and during silence, but not when they were listening. Personal topics led to more silence than innocuous topics, and less mutual glance while speaking. Sex of the interviewer, and instructions to conceal feelings, had no effect on looking behaviour. FIRO questionnaires revealed that their female subjects were more disposed to group activity

and display of affection than the males; this disposition was found to be positively related to amount of mutual glance (EXLINE, GRAY and SCHUETTE, 1965). Attempts to socially reinforce looking behaviour(the interviewer suffixing the interviewee's glance with 'uh huh', 'good') were unsuccessful in so far as theoretical expectations were reversed: 'dependent' interviewees given 'low' social reinforcement looked significantly more while talking than did 'dependent' interviewees given high reinforcement, or 'dominant' interviewees under low reinforcement; EXLINE and MESSICK, (1967). In view of the fixed glance of the interviewer, it is difficult to believe that the intended manipulations of feedback were effective. For the same reason, a similar experiment by EFRAN (1968) - which indicated that interviewees under evaluation look more towards an interviewer from whom they expect approval (especially if he is of higher status) - must be treated with caution.

In another experiment, EXLINE and WINTERS (1965) examined a third possible function of glance: the affective relation between the interviewer and interviewee was altered by informing the latter that he was making a good, or bad impression.

Subjects with their feelings towards the interviewer thus soured looked at him for less time, in comparison with those making a 'good impression'. Here again, the interviewer continually looked into the eyes of the interviewee. However, this obfuscating factor was absent from an earlier experiment, in which groups of three naive subjects were used (EXLINE, 1963). The groups were so formed that the ratios of affiliation motivation to achievement motivation (French's Test of Insight) of all three members fell on the same side of the overall

median. High and low affiliation groups were asked to either agree on the name for a new product (competitive situation) or merely discuss the possibilities (co-operative). The type of situation interacted with affiliative need: subjects high in affiliative need looked more in the co-operative situation than the low affiliation subjects; in the competition situation, their looking decreased, while the looking of the low affiliation subjects increased.

ELLSWORTH and CARLSMITH (1968) attempted to overcome the problem of a fixed-gaze interviewer in a clever way. Acting on the earlier finding (EXLINE, GRAY and SCHUETTE, 1965) that females look more than males, they used only female interviewers; and since most looking occurs during listening, they trained these interviewers to look at the interviewees' eyes only at the end of their own utterances. In a 'no-look' conditions, the glance was directed at the interviewees' ear, rather than his eyes. By selective grouping of subjects, they arranged to use topics which would be favourable or unfavourable to the interviewees. Unfortunately, their main dependent variable was evaluation of the interview and interviewer on a 7-point scale; the interviewees' looking was not monitored. Here again, the only statistically significant result was an interaction: looking behaviour enhanced the effect of the type of topic, so that interviewers who looked at the interviewee while discussing favourable material were liked more, and those who looked while discussing unfavourable material were liked less.

ARGYLE and DEAN (1965) suggested that all these diverse factors - mutual glance, physical intimacy of topic, amount of smiling, physical proximity, etc. - interact to produce a level of intimacy, in any social grouping. The level of intimacy is, according to this 'Affiliative

Conflict Theory', a state of equilibrium among these dimensions. Attempting to demonstrate this balance, they measureed variation in mutual glance as the distance between two conversants changed. Each subject was asked to move to different chairs, so that at different times the dyad was separated by 2, 6 and 10 feet. They found that the amount of mutual glance increased with distance. However, this result is subject to two qualifications: first, the confederate gazed steadily at the eyes or at the other's eyes throughout the experiment; even though 'many' of the participants reported that they were not aware of the confederate's stare, the fact remains that for them, every look at the confederate occasioned 'eye contact'. Noting this, GOLDBERG and KIESLER (1969) instructed their confederate to look near the end of his own utterance, and when the subject replied; they also attempted to disguise their manipulation of the distance between the conversants. They obtained an increase in mutual glance as distance increased from $2\frac{1}{2}$ to 6 feet.

The second qualification concerns the accuracy of measurement by ARGYLE and DEAN. STEPHENSON and RUTTER (1970) essentially repeated the experiment, with two ammendments: a confederate (the pseudo-subject) sat facing the observers in the subject's place, looking at the other confederate's eyes, ears, and shoulders in sequence; in this situation, the performance of the observers was under scrutiny. As the pseudo-subject moved to the more distant chairs, the observers increasingly judged his looks at the ears and shoulders of the other confederate as 'mutual glance'. The implicatinn was that the increased looking at greater distances, reported by ARGYLE and DEAN, could have been an observer-artifact.

STEPHENSON, RUTTER and DORE (1972) have reported an experiment in which television cameras were used to present an image of constant size to the observers, as the distance between the conversants changed. A confederate 'looker' was not used; looking was measured by four judges observing a video-tape of the two subjects in semi-profile (rather than full-face). Confounding error thus reduced, the ratios of mutual glance to speech and listening increased with distance.

2.2.3. Other Behavioural Measures

An experiment by BROWN (1968) illustrates the use and interpretation of the Deutsch-Krause Trucking Game (see Appendix B), in testing a concept as nebulous as 'face' (GOFFMAN, 1955). BROWN modified the rules so that 'tolls' were placed on the gates. A confederate played the game 20 times with each subject, each trial ending when one player reached the other's terminal. On the first 10 trials, the gates were controlled by the confederate, who charged exhorbitant rates for passage. A fake audience (simulated by murmurs, giggles, etc. emanating from behind a one-way mirror) commented differentially on the behaviour of the confederate and the subject. On the second set of 10 trials, the subject was allowed to charge a toll which was scaled so that he could only extract a large sum from the confederate if he paid a similar amount himself. The game demonstrated that if a subject was criticised by the fake 'audience', so that he 'lost face in the public eye', then he was prepared to retaliate even at great cost to himself.

Attempts have been made to use large units of behaviour as data. For example, BALES developed a scheme of classification which required the experimenter to interpret, as participant observer, the intentions

of the actor. The unit of behaviour was "a single simple sentence of verbal communication or its non-verbal equivalent"; each unit had to be sorted into one of twelve categories (such as 'asks for opinion' or 'expresses solidarity'). The flow of interaction in a group of several people was coded by one or more observers via paper-punch (BALES and SLATER, 1956).

Since Bales was interested in decision-making groups, the classification scheme was very partial to problem-solving, at the expence of other types of behaviour. BALES and SLATER tested the system, asking groups of undergraduates to discuss a given problem and come to a collective desision. The groups met once a week for a month. The resultant mass of categorised behaviour was used to follow the differentiation of roles and development of group structure over time.

It is not surprising that this bulky research tool was not widely used. However, in its willingness to attempt to digest complex but meaningful aspects of behaviour, Bales' scheme had much in common with the methods to be discussed in the next section.

2.3. Ethological Studies

The object of the type of work illustrated in this section is to passively sample everyday communication. This is the feature distinguishing it from experimental research, wherein the goal is to predetermine some aspect of interaction by controlling the ambient conditions. The term 'ethological' is borrowed from naturalists who believe that the first step in a science of animal behaviour is an exhaustive description and analysis of the animal in its normal habitat, ".....because behaviour is so multiform that a wealth of evidence can

always be compiled in support of any theory, no matter how capriciously constructed." (HESS, 1962). Obviously, the difficulties involved in observing unperturbed behaviour and categorising it are paramount in an ethological approach.

Developmental psychology has a long history of naturalistic research. PIAGET based much of his writing on observations of a very small sample - his own children; nevertheless, his inductive insight has provided the intellectual foundations for broader study (PIAGET, 1926). Others have attempted to develop comprehensive classificatory descriptive systems. For instance, COLLINS (1969) used an interaction analysis code with 20 'purpose' categories and 20 'mode' categories to record the interaction of deaf children with their mothers. The code was used to categorise all communicative acts; thus COLLINS found that the mothers used oral and non-oral modes of communication, whereas the deaf children relied on gesture, demonstration, and some speech combined with gesture. In retrospect, the mothers could accurately recall the purpose of their specific communicative acts, but they could not recall the mode in which they had acted. BORKE (1969) published a set of categories intended to be used for analysing interaction recorded on video-tape. The observation unit was ".....defined operationally as any behaviour which in the observer's judgement reflects one person's attempt to communicate with another."; this meant that verbal statements, gestures, glances and other non-verbal actions could be categorised. Although this system was derived from Bales' categories, and was used by BORKE to examine the interaction of families performing various tasks, it was designed for general application. The codification schemes of both COLLINS and BORKE hinge on the participant observer's inter-

pretation of the intent behind each communicative act.

In proposing the study of kinesics, BIRDWHISTELL (1960) hoped to eliminate this interpretation by the observer. Kinesics focussed on the visual aspects of non-verbal communication - specifically, on 'kines', units of body motion. The observer classified the kines into morphological groups, according to a system which coded different types of movement in the face or other elements of the body (see BIRDWHISTELL, 1966, for an example). BIRDWHISTELL's kine is not to be confused with what is commonly known as gesture, for he claimed that gestures carry, ".....the instruction to look elsewhere in the body's behavioural stream for their modification or interpretation", and therefore can only be identified if the observer supplies a context.

BIRDWHISTELL thus coded natural behaviour, by eaves-dropping on everyday situations (e.g. a mother and child speaking on a bus, (BIRDWHISTELL, 1966). He derived some rather complex relations between spoken english and classes of kines; a simple example is the relation between certain pronouns and extension of the hand or shifting of glance: distal movement of the hand or glance may be associated with a distal referent, such as "he", "that", "there"; proximal movement may be used in conjunction with an immediate referent, "I", "this", "now".

Another sample of everyday behaviour was collected by inviting customers in London pub into discussion over their drinks. BIRDWHISTELL made a sound-film of the informal conversation, which was subsequently analysed 'kinesically' by KENDON (1970). Frame by frame, the movements of the participants were synchronised with the verbal transcript. Kendon was interested in 'interactinnal synchrony', the rhythmical co-ordination of the flow of movement in the listener with

the flow of speech and movement in the speaker. The data, then, took the form of a long descriptive passage.

This type of analysis had previously been applied to the psychiatric interview (CONDON and OGSTON, 1967; SCHEFLEN, 1964), but to discover what happens in an ordinary conversation was even more germane. CONDON and OGSTON coined the term 'interactional synchrony' to describe the co-ordination of movement in the speaker and listener; however, the author finds it convenient to apply a shortened version, interaction synchrony, to all types of co-ordination occurring in social intercourse.

When a speaker moves (i.e. turns his head, raises his arm, etc.), the boundaries of his movement coincide with the boundaries of his speech; longer waves of movement correspond to longer segments of speech (words and phrases), and the shorter waves correspond to syllables or sub-syllabic units (KENDON, 1970). This is perhaps not too surprising, in view of the complex organisation of respiratory and vocal muscle which speech requires (LENNENBERG, 1967). However, it is surprising that the boundaries of movement in the listener correspond with those in the speaker! Since this was the case even when the listener and speaker were not looking at one another, KENDON was able to conclude that the listener was responding to the speech patterns of the speaker (KENDON, 1970).

Usually, only the smaller waves of movement (i.e. those occurring at or within the word-boundary) coincide. And, in most cases, the movements of the speaker and listener are not similar, but merely coincident. But sometimes the correspondence is not only in timing but in also in kind. This sort of mirroring obviously requires that the listener look at the speaker. Since this sort of co-ordination did not

occur with listeners not directly addressed by the speaker, KENDON suggested that interaction synchrony is one of the ways in which conversational rapport is established and signalled. He also concluded that the precision of this co-ordination means that the speaker is constructing an anticipatory image of what the speaker is going to say (the 'analysis by synthesis' model of speech perception).

KENDON thus made some illuminating discoveries with a very straight-forward technique, and a lot of tedious work: he is also responsible for another relevant work in this section. Noting that previous work on direction of gaze (much of it has been reviewed in section 2.2.2.) concentrated on experimental manipulation of variables believed to affect looking, KENDON turned instead to the function of gaze in everyday social interaction. In a preliminary study (KENDON, 1967), he brought together pairs of unacquainted undergraduates, and asked them to 'get to know one another' over a 30 minute period. The subjects were informed that they were being filmed, and told about the purpose of the research; nonetheless, they reported that they accommodated themselves to this situation in a few minutes.

Film and sound records (5-minute samples taken during the last third of the session) of 6 conversations were used as data. Direction of gaze was lifted, frame by frame, from the film, and a verbal transcript was synchronised with this information. Over all the dyads, the proportion of time spent in looking at the other, and the average duration of this look, showed considerable variation. However, the data for each subject generally conformed to a pattern, showing consistent differences in gaze during listening and speaking, and during short and long utterances.

When listening, the subject characteristically gazed at the speaker for long periods, looking away only briefly; the speaker spent about equal amounts of time looking at the listener and looking elsewhere. During long utterances (longer than 5 seconds), the listener watched the speaker; as the end of the utterance approached, the speaker looked up at the listener, thus engaging in mutual glance; finally, as he took up the role of speaker, the original listener looked away. In long utterances, the rate of speech was higher when the speaker was looking, suggesting to KENDON that the periods of diverted glance were used for planning subsequent speech segments.

On the other hand, KENDON proposed that short utterances be divided into several types: signals that the listener is attending the speaker, agreement signals, exclamations, laughter, and attempts at interruption. Given this classification, he was able to discern stable gaze patterns for each type, thus: in making an attention signal, the listener looks at the speaker, but looks away in signalling agreement; a laughing subject looks at the other; if expressing positive affect he will look at the other, but will look away if his exclamation is negative; unfortunately, attempted interruptions were too rare to indicate a trend.

In this project, KENDON began to uncover the multifarious functions of gaze in natural conversation. Subsequently, he extended his method to fully grasp the pattern of conversational gaze (KENDON and COOK, 1969). In this study, eleven subjects (5 male, 6 female) were introduced to each of four other subjects (2 male, 2 female), and asked to become acquainted. During their 30-minute conversation, two observers behind a one-way screen pressed keys whenever their

respective subjects looked at the other; a third observer pressed one of two keys to indicate which subject was speaking. The keys operated a paper-punch, whose output was assessed by computer.

The continuous record of the gaze and speech of the two subjects permitted the calculation of four other, highly informative combinations for each subject: mutual glance, joint utterance, looking while speaking, and looking while listening. The frequency, average duration and cumulative duration as a percentage of total time was available for each of these events. KENDON and COOK concentrated on 15 of the 18 dependent variables. By calculating the intercorrelations of these measures, they examined the consistency of gaze patterns of a given subject over 4 interactions, and the influence within a given dyad of one subject's 'style' upon the 'style' of the other.

The conclusions drawn from the data were that some aspects of a person's social performance remain constant, although the behaviour of the other conversant also has some impact: gaze and speech are interrelated in a complex manner. In this particular study, very little was done with the great mass of data collected; its significance lies, rather, in its marriage of the measurement of gaze pattern to the measurement of speech pattern, in a sample approximating natural conversation.

Verbal content is the most intractable type of data obtainable from every-day conversation. Its diversity reflects the fact that each conversation involves the interplay of (at least) two idiosyncratic experiences - hence, classification schemes attempting to embrace all possible conversations are very impractical (e.g. PEIRCE, 1940; MORRIS,

1946). On the other hand, SCHEGLOFF (1971) has demonstrated a technique for examining the use of language within any particular situation. In conversation, the speaker can indicate a specific referent via a broad range of roughly synonymous terms. However, if he wishes the listener to follow the sense of what he says, he will have to choose one which relates his own experience to that of the listener. For example, a garageman might tell a woman who brings in a car "the engine's not getting enough fuel"; then, turning to a mechanic, report "the carburetor jets are damaged".

One type of reference that which SCHEGLOFF has scrutinised is place reference. He has speculated that in mentioning place names, the speaker must match his internalised geography to with the listener's. For instance, an exchange in Los Angeles, about Jim, who is in New York: "where's Jim?", "oh, he's in the East"; if the exchnnge occurred in New York, however, the listener would take "he's in the East" to mean that Jim is not in the city; "he's in the Bronx" would be more appropriate (after SCHEGLOFF, 1971). Formulation of place names not only involves the respective locations of the referent and the conversants, and their internalised geographies; SCHEGLOFF has demonstrated through examples that group membership (e.g. foreigner, fellow employee) of the conversants, and the topic or activity at a particular point in the conversation are also factors which the speaker must consider in selecting the appropriate term. As the example above indicates, SCHEGLOFF examined the verbal performance of the conversants in the light of these factors, in order to expose their meaningful modes of reference. Although his published work gives little detail, his samples were drawn from everyday telephone

conversations. It is often thought that the dependence of social interaction upon context renders the phenomenon irreducible; however, SCHEGLOFF's approach demonstrates that analysis may procede by examining the way in which the conversants perceive and use momentary context.

2.4. Concluding Comments

The foregoing survey illustrates the broad range of methods which have been used to study dyadic communication. Yet there is one element common to almost all the inquiries reviewed here, no matter how diverse their ends and means. This element is the use of some task to generate interaction. In the case of studies attempting to follow the ethological approach, this task was perhaps intrinsic to everyday conversation, e.g. "Become acquainted". Nevertheless, the experimenter had to explicitly request this type of activity, because he had told his subjects how and why he was observing them (see section 1.10).

On the other hand, the tasks used in experimental studies may be described as extrinsic: that is to say, each dyad was asked to focus on a goal provided by the experimenter, e.g. "Describe these TAT cards", "Tell the interviewer about your school days", or "Win as much money as possible". The members of the dyad are thus given a common goal which is practical and extrinsic, in the sense that it is not evolved by the dyad itself. In many experimental studies, the object is to standardise the subjects' motivations in this very way. However, if the ethological approach is adopted, then every attempt must be made to avoid extrinsic motivation, so that the common goals established by the dyad may be clearly observed. There is every reason to expect that

the nature of the relationship between conversants under extrinsic motivation will be different from that between conversants intrinsically motivated; in the former case, the participants must take the roles of performers.

Another feature common to the experimental research is the reliance on a few easily-quantified dependent variables: usually one behavioural measure (speech, gaze) supplemented by questionnaires. In some cases, the most accessible datum is also very relevant (e.g. speech volume or duration in the assessing the quality of telephonic networks); in other cases, this is clearly not the case (e.g. number of words spoken in assessing the quality of everyday speech, KRAUSE, 1969). As the phenomenon under examination becomes more complex, so the description of it must attain a broader empirical base. KENDON has shown how a large and complex set of data can be utilised to describe natural communication (KENDON, 1967, 1970; KENDON and COOK, 1969). STAPLEY has used part of this same set to look at a planning problem, namely the utility of alternative telephonic aids (STAPLEY, 1972).

One conclusion to be drawn from the surveyed work, then, is that initial explorations of natural conversation should attend (at least) to the interaction of speech and gaze. Other conclusions relate to methods of collecting such data. The common methods were filming the interaction (KENDON, 1967; KENDON, 1970), and 'real time' analysis by a panel of observers (KENDON and COOK, 1969). Both these presented problems in testing reliability; on one hand, the tedious frame-by-frame analysis would have to be repeated; on the other, a second panel of 3 observers would have to perform a parallel 'real time' measurement.

In fact, no tests of reliability were performed on either of these two methods.

In the years since KENDON began these studies, closed-circuit television equipment has become widely available, bringing a host of advantages. Video-taped interaction is ready for instant playback, complete with synchronised sound-track; analysis and re-analysis can proceed at will. Furthermore, the raw data remains on hand, in case a first assessment suggests that the researcher look at something new. Recently, reductions in the cost and mechanical complexity of video-taperecorders have virtually erased the few advantages of film.

A second merit is the television camera: compact, noiseless, light-sensitive. This inconspicuousness means that cameras can be positioned so as to capture, as nearly as possible, a full-face close-up of each member of the dyad. Use of the full-face image is imperative if the errors in observer accuracy noted by STEPHENSON and RUTTER (1970) are to be avoided.

Furthermore, in an electronic medium, images of both subjects can be stored in the same frame. A final conclusion to be drawn from the experimental research reviewed here is that independent variables must be chosen and manipulated with care. For instance, the use of looking schedules by a confederate (EXLINE et al, 1965, 1967: EFRAN, 1968; ARGYLE and DEAN, 1965; ELLSWORTH and CARLSMITH, 1968; GOLDBERG and KIESLER, 1969) probably presents more difficulties than advantages. There is also a danger that a new discovery such as 'mutual glance' will be rushed into the treatment of diseased variables such as 'anxiety' or 'verbal reinforcement' (EXLINE and MESSICK, 1967) before it is fully understood. On the other hand, sex (EXLINE, 1963; KENDON

and COOK, 1969) and individual differences, which might be lumped as 'personal style' (JAFFE and FELDSTEIN, 1970; KENDON and COOK, 1969) seem to be intrinsically relevant factors; furthermore, variables of this type can be unobtrusively manipulated in the selection of subjects. Also relevant are the general conditions, whereby the perceived goal of interaction (e.g. being interviewed, playing a game) is determined (JAFFE and FELDSTEIN, 1970); here, comparison of behaviour under extrinsic and intrinsic motivation is germane.

Part II of this thesis describes an experiment wherein the author attempted to follow some of the recommendations which he has made in this section.

Part II: An Experimental Study of 'Natural Conversation'

Introduction to the Experiment

Introduction to the experiment.

In view of some of the distinctions drawn in Chapter 2,the title of Part II may seem contradictory. 'Experiment' implies control and manipulation of variables; 'natural conversation' implies the event unperturbed,in its pristine state.

However,the juxtaposition of these two concepts is intentional. The principle objective in this project was an examination of social interaction as it occurs in everyday life. In order to collect samples,it seemed essential that the motivation for intercourse be 'intrinsic', not imposed in the form of some practical task (section 2.4); and that the conversants be undisturbed by the sampling procedure. On the other hand,previous work suggested that one of the chief sources of data was the coordination of speech and glance; and that in gathering this type of data, accuracy and reliability were crucial (section 2.4). Since these technical problems discouraged field studies,it seemed necessary to bring the natural phenomenon into the laboratory.

There are,of course,parallels in ethology. A biologist may want to make detailed observations on the behaviour of ants in his laboratory. Instead of putting a lot of individuals into small cages,he builds a terrarium which a whole colony of ants can adapt to its 'vital field' (section 1.1). Clearly,the perceived environment was critical in the present endeavour as well. The laboratory had to appear as a place for having a conversation,to encourage conversation in this sense.

That conversation does not occur on every 'social occasion' is a commonplace observation. Two people conversing in a London restaurant will probably fall silent as they get up to enter a lift or tube train which contains others. The general condition for entering conversation with another is to appear to be 'alone' with him, at social distance (SOMMER, 1959), with nothing else to do. Features of a laboratory designed to create such an appearance are described in Chapter 3.

Features of the conversational environment which are not physically based may be lumped as 'the conversant's perception of the other person' (the conversant's perception of himself is implicit in his perception of the other; see MEAD, 1934). For instance, the purely practical, even ritualised exchange with the newspaper vendor may give way to dialogue if it is discovered that he lives next door. Since these features are characteristics of the conversants, it became possible to make the study experimental through the choice of participants. There were many conceivable criteria for sorting people into typical groups: sex, innumerable personality typologies, age, status, career, etc. Degree of acquaintance was chosen as a criterion which was both easy to specify, and of intrinsic interest; it seemed likely that friends and strangers would converse in different ways. FIRO-B (SCHUTZ, 1960) was also used, to determine whether it had any predictive power. The criteria for selecting and matching prospective conversants are discussed in section 3.2.

To persuade people to enter the laboratory,a 'sham experiment',of a type likely to be found in electrical engineering, was used. It involved playing a game via a prototype video-telephone link. Fortuitously,it also provided a second type of experimental manipulation: the differences between the two types of interaction,game playing and conversation,were examined. The sham experiment could also be structured so as to induce changes in the conversation which followed it; this possibility is elaborated upon in Chapter 8.

If the subjects were invited to the laboratory on a pretext, was it ethical to surreptitiously record their behaviour? Since repeated measures on the same subject were crucial,it was impossible to disclose the real nature of the study until data collection was completed. In law,the author violated the civil liberties of his subjects. However,steps were taken to minimise the likelihood of real injury to the participants: the author made it clear to prospective subjects that the experiment would involve talking to friends and strangers over a mock video-telephone system, and that this social interaction would be tape-recorded; and,at the end of each session,the subjects were asked to sign a form authorising the use of their video-taped behaviour for data purposes. Although the subjects were not aware at this stage of the surreptitious recording procedure,it was hoped that this selection process and the signing of the formal document would permit elimination of persons who might react strongly to being recorded.

Furthermore,the experiments were conducted openly,in the labs of electrical engineering,with various persons passing freely within earshot. Finally,the subjects were fully informed of the purpose and nature of the experiment after data collection had been completed; they were invited to view the video-tapes, and preside over their erasure. As no one accepted this invitation, it may be concluded that no subject actually felt that his privacy had been seriously invaded.

Part II has been split into two sub-parts; A describes the methods in detail,and contains only Chapter 3; B contains Chapters 4,5,6 and 7,which are devoted to four different kinds of data derived from the experiment.

Part II-A: Methods

Chapter 3. The Methods in Detail

3.1 Laboratory and Equipment.

The 'laboratory' was designed to solve three inter-locking problems: (1) getting the subjects to remain stationary and relax in an atmosphere conducive to conversation (2) making a visual and (3) making a sound record of both sides of this conversation. The essential feature of any solution was that it did not suggest to the subjects that their behaviour was being guided and recorded by the experimenter.

The laboratory was disguised as a small lounge.Two chairs were located at right angles (an orientation noted in informal conversation by SOMMER,1959),across a coffee-table.Care was taken to remove any other pieces of furniture which might be used for sitting,and to find confortable easy-chairs with high backs,such that the subjects,once in them,would be reluctant to get up,and would not be able to shift about excessively.The subjects were thus positioned to permit optimal recording of their interaction (Figure 3.1).

The only other furniture was a tall cabinet and a bookcase. The latter contained a few engineering journals and technical reference books,for the pilot studies indicated that any more interesting literature could distract the conversants' attention. Similarly,it was necessary to partially obscure the windows with the vanes of the venetian blinds,since the laboratory provided a very attractive view of London.Every effort was made to present

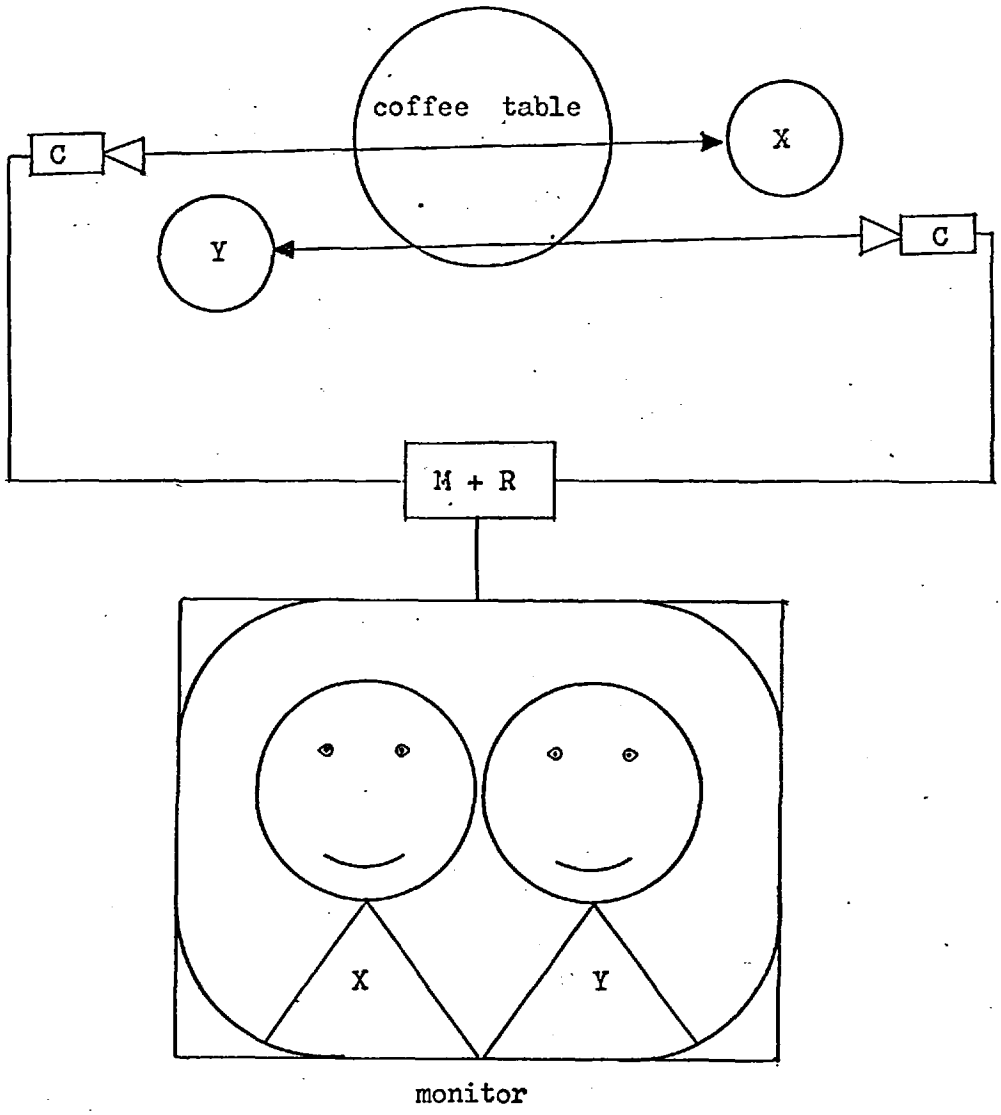


Figure 3.1 Diagram of the 'lounge',seating two subjects,X and Y; the position of the cameras (C) is shown, and the mix- and recording of the video-images is schematically presented (M + R).The output is juxta-posed full-face images of both X and Y(plus sound-track).

each subject with only one focus of attention in his immediate environment: the other person.

Since the subjects entered the laboratory under the pretext of participating in an experiment on video-telephones,one of the 'prototype devices' could be used to record natural conversation. It projected from a curtain-wall(Plate 1b); its camera focussed on the more distal of the two chairs during natural conversation, and also during the sham-experiment,when the video-telephone was actually in use.

The second camera was located behind a 'two-way blackboard'- two sheets of glass separated by a smoky film which allowed only %12 of the incident light to pass.This very dark glass was mounted on a solid wall in a wooden frame,so that it looked like a plastic blackboard (Plate 1a). Various words and drawings in white grease-pencil covered its surface.The camera projected through a hole in the wall behind the blackboard; its lense peeked through a funnel attached to the back of the blackboard,and the funnel was lined with black cloth such that there were no angular,reflecting surfaces behind the glass.The camera was thus rendered almost completely invisible from the lounge (Figure 3.2).

Here,an especially light-sensitive camera was used to record through the dark glass (see Appendix D).It was focussed on the second chair.In fact,each camera looked over the back of the proximal chair to record the more distal,so that each captured as nearly as

Plate 1(a). The 'two-way blackboard' viewed from the lounge.

Plate 1(b). Arrangement of the chairs and table in the lounge.

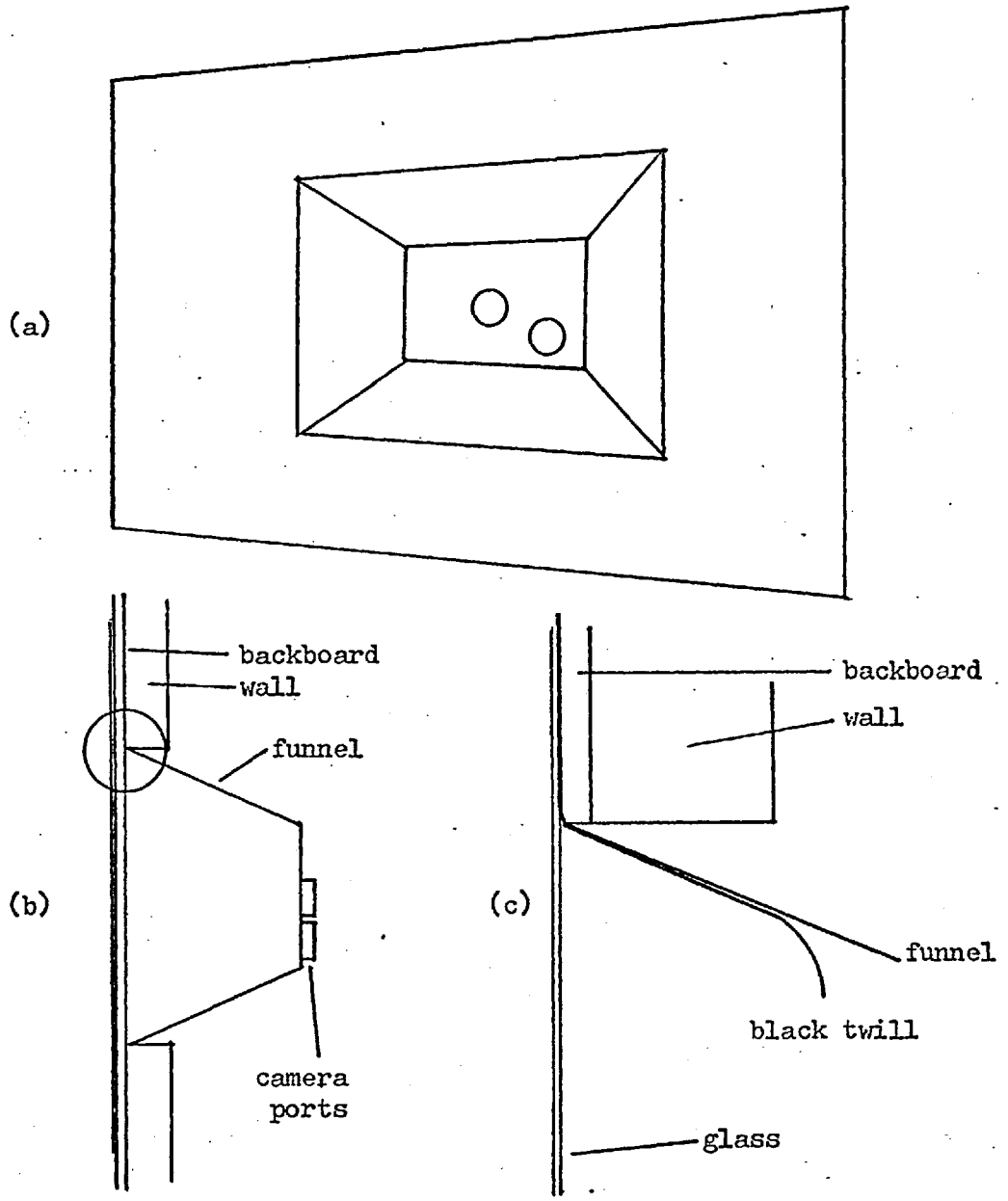


Figure 3.2 Details of the construction of the 'two-way blackboard'.
(a) view from the'lounge'with the dark glass removed
(b) side view showing how the 'funnel' protudes through the wall behind the blackboard,to incorporate the camera
(c) fine detail of the area circled in b,showing the black cloth inserted between backboard and dark glass.

possible the view which the proximal conversant would have when he looked at the other (Figure 3.1).This arrangement meant that when either conversant looked at the other,he was also looking into the eye of a silently running camera!

The two resultant video-images were simply superimposed before being recorded on video-tape.Each image was shifted slightly off-centre,so that both appeared clearly in the video-recording (Plate 2). The advantage in 'ghosting' the images over one another,rather than splitting the screen via blanking techniques, was that the conversant did not disappear during the occasional nods of his head; as he moved towards the centre of the screen, his features (especially the eyes) remained distinguishable on top of the other's face.

In order to record a useable picture,some attention was given to lighting,not because the cameras required more than ordinary room illumination,but rather to eliminate the differentials which shadowed one side of the face,or blackened the eye-sockets.Since the laboratory had windows,it was necessary to moderate the daily variations in sunlight with the vanes of the venetian blinds. In addition,six 150-watt spotlamps were placed on the dark side of the conversants. These were fixed vertically behind screens,near the ceiling,and their light was diffused downwards by polystyrene reflectors,thus eliminating shadows around the nose and eyes. They were not too obtrusive. When the experimenter introduced new sub-

Plate 2(a). Example of the video-recording. Only the person on the right is 'looking' at the other.

Plate 2(b). In this example, both persons are 'looking', so that mutual glance occurs.

jects,the need for extra lighting was in any case attributed to the video-telephone.

Most of the technical difficulties in this project arose in recording sound. If a very accurate transcript of an ordinary conversation is to be prepared,then the conditions for recording sound must be optimal. Voice levels range from one extreme to the other;but if the microphone detects a whisper,it must be shielded from scuffling feet and other extraneous noise. Talking informally, a person often speaks into the floor or up to the ceiling, or shifts his head rapidly through several positions. Since he thus casts his voice in varying directions,relative to a fixed microphone,the recorded volume varies. The pilot studies had shown that,though these altering levels may be of no consequence when one is a live participant in a conversation,they cause great difficulty when an observer attempts,weeks or months later,to reconstruct each syllable.

With this in mind,the laboratory was lined with sound-insulating material,and hung with curtains. A rug was laid on the floor to dampen the shifting feet of the conversants. The windows had to be kept closed to exclude the din of the road.

The microphones were purpose-built,small and light so that they could be easily hidden near the conversants. In the best arrangement, they were nestled at the centre of the cone (where the magnet would normally be) in dummy loudspeakers. The inside of these 'speakers' was blacked out,and the mouth of the cone was covered with sound-

transparent grill-cloth (the 'speakers' are visible in Plate 1b).

So disguised,the microphones could be placed very close to the two chairs,and their trailing wires would cause no alarm. One microphone was placed within arm's reach of each conversant;their separate signals were not immediately mixed,but were recorded on the two channels of a stereo taperecorder. Since the proximal conversant tended to be much louder than the distal at each microphone, the distinct channels could be used to clarify the transcript when both conversants spoke at once.

However,the video-taperecorder had only one sound-track available,so that the two signals were mixed and then added to the visual record of the conversation. During an experimental session, both the sound and vision were continuously monitored by the experimenter. The level metres on the respective taperecorders were supplemented by earphones and a large video-screen.

When an adequate sample of natural conversation had been collected,the sham-experiment began (see section 3.4). As mentioned earlier,one terminal of the video-telephone system was located in the lounge; the second was in an adjacent room. These devices had been built by Stapley in the course of experiments on the visual aspect of communication (STAPLEY,1972). They consisted of small television monitors viewed at right-angles via a half-silvered mirror,such that a camera could be placed directly in front of the viewer. Here again,when the viewer looked at the other conversant

Plate 3. One terminal of the video-telephone link used in the game part of the experiment.

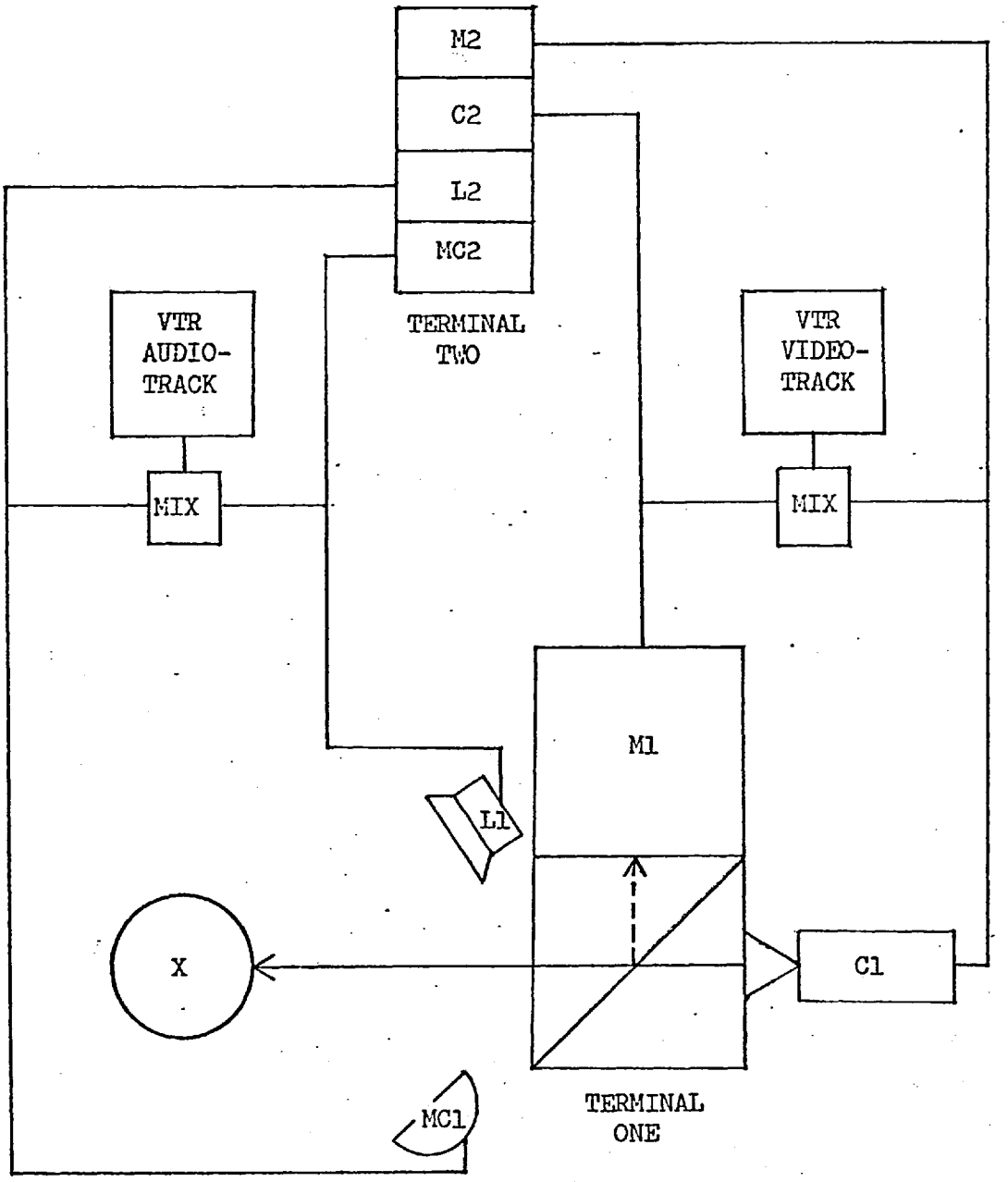


Figure 3.3 Schematic diagram of the video-telephone network. Terminal one is drawn in detail to show how the half-silvered mirror is positioned at 45 degrees to reflect the video-image towards the viewer,X,while allowing the camera to look through this image. The camera's line of regard is indicated by the solid line,the viewer's line of regard by the broken line. The signals from the two terminals are superimposed in the separate mixers,then synchronously recorded on the audio- and video tracks of the same video-taperecorder. C=camera, L=loudspeaker, M=video-monitor, MC=microphone, VTR= video-taperecorder.

presented on the screen,he was looking into the eye of the camera (Figure 3.3 and Plate 3). Conveniently,the half-silvered mirror also obscured the camera of the terminal in the lounge during informal conversation.

When the sham-experiment began,the second terminal was switched into the video-recording network,to replace the camera located behind the two-way blackboard,and the monitor located in the first terminal (in the lounge) was turned on. As the conversants played the game via the video-telephone network,the two visual images were superimposed and recorded as before. The resultant record was essentially identical with the type shown in Plate 2 .

In the sham-experiment,sound recording was much more straightforward,since the constraining need to disguise equipment did not exist. Each conversant had a high quality microphone immediately in front of him. Consequently,sound levels and clarity were so good that it was not necessary to make the two-channel recording;the signals were mixed and added to the visual record on the video-tape. Of course,the signal from each terminal was sent to a small loudspeaker located above the other terminal,before being mixed.

The video-telephone system used here operated at 625 lines per frame,giving 512 active visible lines (compared with 250 active lines in the Bell Picturephone Mod.II). The viewer's screen was 7¼ inches wide by 5½ inches high. Frequency response of the audio channel was 200 to 3500 HZ.,somewhat better than telephone standards. Specific details on all equipment will be found in Appendix D.

3.2 Selection and matching of subjects

For convenience,all the subjects were drawn from Imperial College. Pilot studies had shown that each conversation produced a very large amount of data,that there were large variations in conversational style,between individuals and between the sexes, and that setting-up the conversations involved many practical difficulties. Therefore,the author decided to sacrifice generality of the results in order to make a more complete study of as small a group as possible.

In the initial phase of the experiment,twelve males were approached in the student common room by the author. Each was asked to participate in an experiment on video-telephones in the Department of Electrical Engineering, an experiment which would involve talking to a partner over a prototype device. Each would be required to participate in 3 or 4 sessions,with payment of 37½ pence per time. Each was asked to bring a friend to take part in the first session (thus a 'friend' was operationally defined as 'someone who can be persuaded to join oneself in the experiment').

Twelve pairs,composed of undergraduate students in mathematics, science or engineering,ranging in age from 17 to 23,were formed in this way. The author hoped that these pairs would provide a broad sample of scores on the FIRO-B questionnaire. From these twelve,six pairs were selected to participate in the second and third sessions, thereby providing repeated measures on the same individuals.

In the first session,the pairs were composed of 'friends'; in the second and third sessions,new pairs were formed by matching members of the original pairs so that each new pair was composed of 'strangers'. This matching was based on the FIRO-B scores obtained from each individual in the first session.

FIRO-B (Fundamental Interpersonal Relations Orientation-Behaviour) is a personality scale designed by Schutz "...to measure how an individual acts in interpersonal situations,and ...to provide an instrument that will facilitate the prediction of interaction between people",(Schutz,1967). Table 3.1 presents in essence the type of behavioural traits which the FIRO-B questionnaire is designed to scale.

The subject is required to rate his own behaviour on a six-point scale; there are nine items for each of the six types of behaviour in Table 3.1. The questionnaire can be completed in about five minutes.

If the subject's rating of his own behaviour equals or exceeds an empirically defined level for each item,then his response to that item is positive; his score,for each type of behaviour in Table 3.1,is the number of positive responses which he makes to the 9 relevant items. In Table 3.2,the mean scores for the 6 types obtained in the present sample are given.

Schutz suggests (1960) that the compatibility of any two people can be assessed by inserting their two sets of scores on

any behavioural dimension into one of 3 formulae. These formulae are all simple ways of quantifying the difference between what each person expects from the other, and what the other is prepared to give; they are given in Table 3.3.

In the present study, pairs of conversants who considered themselves friends were available; consequently, an empirical criterion of 'compatibility' could be derived from their scores. Their scores on the affection dimension, as it turned out, gave the smallest range of values for compatibility, regardless of which of the 3 formulae was used. (In words, the friends were most compatible with respect to giving and receiving affection.) In fact, the sum of the different compatibility scores, $\Sigma(K^A)$, for each of the pairs of friends seemed to be a most illuminating figure (Table 3.4).

For two of the pairs, the sums of the compatibility scores were 1.7 and 2.4 standard deviation units above the mean for all the pairs, whereas only one other value was marginally above this mean. Both of these pairs informed the author at the outset that the original 'friend' was indisposed, and that a substitute had been found at the last moment. (One of these pairs declined to take part in the natural conversation part of the first session, and so was eliminated from the main experiment). There was thus an a priori reason for thinking that these two pairs were not composed on the same basis as the others; therefore, their scores were dropped from

the compatibility calculations.

As a result, exchange of affection emerged as a most likely criterion of compatibility for friends (see asterisked values in Table 3.4). Consequently, this was used as the standard for forming new pairs of strangers for the second and third sessions. Although it would have been desirable to compose pairs which were both compatible and incompatible according to this criterion, in order to test its utility, the smallness of the sample prevented this. Six new 'highly compatible' pairs were selected for the second session; and these were re-arranged to form six similarly compatible pairs for the third session. For these twelve pairs, the formula for exchange of affection gave the following values: mean=2.3; S.D.=1.8; range=0/+6.

3.3 Design of the experiment.

In order to minimise the effects of individual variablity, the author decided to make repeated measurements on one group of subjects. This also permitted an examination of changes in conversational style as each conversant spoke with different people and under different conditions.

Two factors were of primary interest: the degree of friendship of the conversants (F); and the conditions prevalent in each period of interaction (P). The two levels of friendship were established simply by arranging for each subject to bring a friend to the first

session (F1), then ensuring that each met a stranger in subsequent sessions (F2). Three levels of period were established by asking each pair of subjects to play a game via a video-telephone link during one interval,and by removing all such constraints during two similar intervals. The three conditions thus formed were natural conversation preceding the game (P1,or PRE), game-playing (P2,or GAM), and natural conversation following the game (P3,or POS).

Figure 3.4 shows the pairs of subjects which participated in each of the sessions. Since the author had found in pilot studies that pairs of strangers did not reliably provide data on all levels of P, the F2 session was replicated,as shown.

Figure 3.5 presents the factorial design which was derived from the plan in Figure 3.4 so that the maximum number of complete sets of data (n=9) was available in each cell of the design.

3.4 Procedure.

When a prospective subject was contacted, a definite time for his arrival with a friend was agreed upon. If possible, the sessions were held shortly after lunch,for several reasons: most students had a few free hours at that time,hours usually spent relaxing in the company of others,and it was a time when a cup of coffee could have a very persuasive effect.

F	P	SUBJECT	SESSN
F1 FRIENDS	P1 PRE P2 GAM P3 POS	A-B C-D E-F G-H I-J K-L M-N O-P Q-R S-T U-V	1
F2 STRANGERS	P1 PRE P2 GAM P3 POS	A-D C-G E-B F-J I-H K-J	2
F2 STRANGERS	P1 PRE P2 GAM P3 POS	A-L b-l C-F E-H G-I K-D	3

Figure 3.4 Plan of the experiment. Subjects are listed in conversation-pairs, each letter representing one subject. The F2 part of the experiment was replicated to increase the amount of data available. One pair, b-l, missed the replicating session.

F	P	SUBJECT
F1 FRIENDS	P1 PRE P2 GAM P3 POS	A C D E F G H K L
F2 STRANGERS	P1 PRE P2 GAM P3 POS	A C D E F G H K L AD CF AD EH CF CG EH KD AL

Figure 3.5 The factorial design derived from the plan in the above figure so as to give an equal n=9 per cell. Each letter represents data on the social interaction of the corresponding subject. In F2, the subscript letters (e.g. AD) indicate which of the two available conversations was used as data.

Upon arrival,the subject and his friend were asked to complete the FIRO-B questionnaire. They were told that the results would be used in composing groups of subjects for the subsequent sessions; they were assured that the results were confidential. As they finished the questionnaire,they were casually informed of some of the problems involved in assessing communications technology,problems to which the experiment was addressed. They were ushered into the lounge,and the video-telephone terminal was briefly displayed. Then they were asked to make themselves confortable for a few minutes whilst the experimenter prepared the equipment in the next room.

The experimenter left the lounge,and turned on the apparatus for recording sound and vision. On occasions when the subjects seemed uneasy,or failed to seat themselves,the experimenter reentered the lounge to flick switches on the terminal or otherwise appear to be concerned with the equipment.

The aim was to collect a five-minute sample of normal conversation from each pair. When this was achieved (or,as in a few cases, when the pair became very restless), the experimenter returned to the lounge,commenting that the equipment was ready. He turned on the monitor of the video-telephone terminal,as obviously as possible. As the screen lit up,he instructed the subject opposite the monitor to remain,and led the other to the terminal in the adjacent room. In a few minutes,both terminals were operating,and the subjects

were allowed to test the sound levels and otherwise accommodate themselves to the system. Then they were introduced to the game which they were to play via the video-telephone link.

The rules for the Deutsch-Krause Trucking Game were handed to each subject (see Appendix [illegible]). A large copy of the playing surface was available on a separate sheet of posterboard. Markers were also at hand. The players were instructed to begin playing as soon as they were familiar with the rules; then,as they started to play, the rules were removed by the experimenter. (It had been found that the presence of the rules distracted the players' attention from the screen,and obviated much lively discussion about 'right' and 'wrong'.) Play was allowed to continue for ten minutes,although only the first five were recorded.

At the end of this period,the players were told that the experiment was over, and were asked if they would like coffee. On almost all occasions, the answer was 'yes', so two cups of coffee were carried into the lounge by the experimenter,and placed on the table opposite the chairs. The second subject followed his cup of coffee,to rejoin the first. The experimenter then turned off the monitor in the lounge,with a flourish,and left on the pretext of getting the money which the subjects had earned in participating. He then re-activated the devices recording the activity in the lounge.

A cup of coffee proved to be a most powerful instrument of persuasion. Even the subjects who had been most uneasy during the initial period of informal conversation lingered in an apparently relaxed state until the experimenter was forced to drag them from the room! (This was particularly true of the pairs of strangers.) Again, the objective was to collect a five-minute sample of normal conversation; it was met in 21 of the 23 conversations.

This, the procedure for the 'friends' session, was essentially repeated for the strangers. (Of course, the pairs of strangers had to be composed, as discussed earlier, and suitable appointments had to be made.) The only differences were that the FIRO questionnaire was no longer necessary, and the subjects, arriving separately, were cursorily introduced to one another (e.g. 'Oh, this is Mr. Brown from mechanical engineering; have you met him before?' On most occasions, the answer to this last question was something like 'No, but I've seen him around.').

The twelve subjects who met as strangers in the second session returned for a third session (except for one pair, which disappeared from view just before exams began). When all of the sessions were complete, the subjects were informed of the true nature of the experiment, and invited to inspect the video-tapes.

3.5 Data.

Two broad classes of data were derived from the experimental sessions: transcripts of what the conversants said to one another; and a record of the 'interaction synchrony',the amount of time spent in various activities (talking,looking at the other,etc.).

The source of the transcripts of the samples of natural conversation was the two-channel sound record. This recording was used,not only because it allowed passages of simultaneous speech to be unravelled, but also because the number of re-plays involved in making each transcript belaboured the primitive mechanical system in the video-recorder. For the latter reason,even the more intelligible game-playing behaviour was transferred from video- to audio-tape for the transcription process.

A very exact transcript of the utterances of the two conversants was made in ordinary English (rather than,say,phonetic script). The author therefore relied on his intuitive grasp of the language to interpret changes in stress and pitch; such details were only recorded in the placing of question marks. Otherwise,the transcript was left unpunctuated. Howevever,spaces were left to indicate pauses. Repetitions,false starts,stutters were of course entered in the transcript. Nonverbal utterances were recorded in a conventional way (hmmm,uh huh,ohhh,etc.).

Most speech seems to 'run on',in that the separation of words seems to be minimal. Some phrases,especially cliches,can be delivered

at the rate of 8 to 10 words per second (measurements in the present data). The end of the linguistically defined phrase is known a as a terminal juncture,which may be marked by a very short pause- 1/100 second- or a very long pause- 1.03 seconds or more (BOOMER, 1965). BOOMER had earlier found that listeners do not easily detect pauses of .5 second when they occur at terminal junctures,but do detect smaller pauses of .2 second if they occur elsewhere. The latter type of pause has come to be called the "hesitation pause".

In the study of hesitation pauses, BOOMER used this value of .2 second as the lower limit of electronic measurement (BOOMER,1965). However,the author found that .2 second was only slightly greater than the time required to start and stop a stopwatch. Since the upper extremes of hesitation were of more interest here, .5 second was used as the lower limit of the pause. As the transcripts were being prepared, such pauses were measured and recorded in the appropriate space.

When the transcript for a particular sample was complete,the looking behaviour of each conversant was superimposed upon it. The video-record of the sample was used to this end: when one conversant looked at the other,the duration of his glance was marked by a line beneath the concomitant words in the transcript (Figure 4.1). Glance was thus synchronised with what was being said by either conversant.

Preparing and marking the transcripts was an extremely tedious process. On average,it consumed one hour for every minute of the sample! However,the experimenter considered the time well spent, for the product was not only of intrinsic interest,but essential for the interpretation of the second class of data.

This second class of data was gleaned from the video-tape by re-playing it for a panel of four observers. The observers were isolated in a sound-proof room,and so could devote their attention to three television monitors displaying the video-image. The sound track was reproduced at high volume by two loudspeakers. Colleagues, all graduate students in electrical engineering (hence,not predisposed to any outcome) formed the panel; nine participated at different times, but the same group of four was used in the majority of occasions.

One observer attended to the speech of conversant X, and pressed a button while X talked; the second observer attended to the glance of X, pressing a button while X was looking at the other conversant, Y. Similarly,the third and fourth observers attended to the speech and glance of conversant Y. The four buttons activated four tracks of a paper punch,such that a hole was made for every .1 second that the respective button was depressed; a fifth track recorded elapsed time in intervals of .1 second.

The resultant paper tape was read on the PDP-15 with the aid of a programme specially prepared by Dr. Peter Goddard. The programme

printed out,for each sample,the average duration, and cumulative duration as a percentage of total time,of each of the following interpersonal events: X looks (X LK), X talks (X TK), X looks while Y looks (X+Y LK), X talks while Y talks (X+Y TK), X looks while talking (X LK+TK), X looks while listening (X LK+Y TK). Here,'looks' means 'glances at the other conversant',and 'talks' means 'makes a continuous vocal utterance'; and since X stands for any conversant and Y for his partner in conversation, each sample produces two complete sets of data.

The frequency of each type of interpersonal event was also of interest. However,in place of the raw value,a standardised score,frequency per minute,was obtained by multiplying the cumulative duration in percent of each type of event by 60 (seconds), then dividing by the average duration of this event.

To assess the accuracy of the observers,the tapes for 4 experimental sessions (i.e. 3 five-minute samples per session) were measured a second time. The correlation between the first and second measurement of cumulative and average duration is presented in Table 3.5.

On two of the re-plays,the same set of observers performed the same task as in the original measurement; on the other two, a different set of observers made the measurement, so that two distinct estimates of accuracy were available. Percentage error in each case

was calculated by dividing the modulus of the difference between the first and second measurements by their mean, then multipying by 100%.

Percentage error $= 200. \frac{M_1 - M_2}{M_1 + M_2}$ where M represents a measured value.

Table 3.6 presents the mean percentage error accruing between two measurements by the same set of observers, and between two measurements by different sets of observers.

In general, the measuring technique appeared to be reasonably accurate, particularly so in the case of 'looking'. This was to be expected, for special care was taken to record a full-face image of each conversant. The major deficiency was in the measurement of talking. This task proved to be much more difficult than anticipated; casual speech tends to start and stop abruptly.

Using the same set of observers twice did not seem to produce consistently better or worse results than using two sets of observers- at least in this small sample.

3.6 Statistical analysis.

The purpose of this section is to give an overview of the statistical treatment of the numerical data. Details are given in the discussion of specific results.

The experiment was designed to facilitate the use of analysis

of variance. Since each sample provided information on at least six types of interpersonal event, a new tool,multivariate analysis of variance,was used.

Multivariate analysis of variance is an analogue of univariate analysis. Briefly,the principle is the same,except that the variance of a set of variables,rather than a single variable,is determined via matrix algebra. Main effects and interactions are tested against the appropriate error term,with reference to degrees of freedom calculated from the number of levels of the tested factor,the size of the sample,and the number of variables in the set. The tested value is not an F-ratio,but rather Wilk's Lambda criterion; and the critical value is found in a table specially derived from the F-table by Rao (COOLEY and LOHNES,1971).

Very fortunately,library computer programs for the performance of this and other types of multivariate analysis (transgeneration,asymmetrical correlation,discriminant analysis,multivariate analysis of variance,etc.) are available in the BMD package (BMD,1968). However, the University of Miami MANOVA programme for the CDC 6600 was found to be more flexible and informative for multivariate analysis of variance (CARTER, 1969).

Both the multivariate analysis of variance programmes could be adapted to almost any type of factorial design. They conveniently determined whether the specified factors were affecting up to 40 variates and co-variates. They also performed univariate analysis

on each of the constituent variables. Consequently, they were extremely useful in sorting out which factors and which variables deserved closer scrutiny.

Although homogeneity of error variance and normality of within-cell distributions are no longer considered critical conditions for analysis of variance (WINER,1962,p.219), raw data in the form of percentages,or numbers of seconds,or events near zero,were appropriately transformed. In a few scattered cases,the effect was rejection of the null hypothesis which had been accepted when the analysis was based on the raw data.

One problem which assailed the use of analysis of variance in this experiment was the independence of sets of data obtained from each of two conversants. Figure 3.5 in the section on experimental design shows that,in the F2 part of the experiment, 6 of the sets of data were derived from 3 pairs of conversants; if the behaviour of one member of the pair determined the behaviour of the other,then the two sets were not independent,and an assumption underlying analysis of variance was violated.

One way of avoiding this dilemma,without losing valuable data, is to use only pairs of subjects,and treat the influence of paired-data as a dummy factor. With the same type of data,STAPLEY (1972) did exactly this,and found that the pairing did not significantly

affect the variance. Furth ermore,the data at hand suggested that the performance of one conversant was related to his partner's under only some of the many conditions prevailing in this experiment (see Table 4.2). Consequently, the author chose to use as much data as possible,since the results have largely heuristic value at this exploratory stage.

Dimensions of behaviour	Expressed behaviour	Wanted behaviour
Inclusion	(e^I) I make efforts to include others in my activities	(w^I) I want others to include me in their activities
Control	(e^C) I try to exert control over people and events.	(w^C) I want others to control me
Affection	(e^A) I express friendly feelings towards others	(w^A) I want others to express friendly feelings to me

Table 3.1 Behavioural traits scaled by the FIRO-B questionnaire.

Inclusion		Control		Affection	
e^I	w^I	e^C	w^C	e^A	w^A
4.7	3.8	3.8	2.4	3.0	4.6

Table 3.2 Mean number of positive responses to the nine items for each type of behaviour, over all subjects (N=24).

Type of compatibility	Formula
exchange	$_{x}k = \left\|(e_i+w_i)-(e_j+w_j)\right\|$
reciprocal	$_{r}k = \left\|e_i-w_j\right\|+\left\|e_j-w_i\right\|$
originator	$_{o}k = (e_i-w_i)+(e_j-w_j)$

Table 3.3 Formulae for calculating the 'compatibility' of any two people on the basis of their FIRO-B scores.For any person,i,and another,j, e= expressed, w= wanted behaviour on any dimension (i.e. Inclusion,Affection, Control).

	Affection				Other dimensions			
	$_{r}k^{A}$	$_{o}k^{A}$	$_{x}k^{A}$	$\Sigma(k^{A})$		$_{r}k^{C}$	$_{r}k^{I}$	$_{o}k^{C}$
mean	5.0	-3.5	2.7	4.3	mean	4.2	3.3	3.3
	4.4*	-4.0*	1.6*	2.2*				
SD	2.1	2.2	2.7	5.3	SD	2.9	2.6	4.2
	1.7*	2.7*	1.3*	2.5*				
range	+2/+9	-7/+1	0/+9	0/+17	range	+1/+10	0/+10	-5/+9
	+2/+7*	-7/+1*	0/+3*	0/+7*				

Table 3.4 Values for 'compatibility'. In the case of Affection,the values obtained by application of all 3 formulae are given;the sum of these , $\Sigma(k^{A})$,is also given. For the other dimensions(Control,C,Inclusion,I),only sample values are presented.Optimal compatibility: k=0. The values asterisked were obtained by dropping two pairs,as explained in the text;otherwise,number of pairs = 12.

CUMULATIVE DURATION

PERIOD	X LK	X TK	X+Y LK	X+Y TK	X LK+TK	X LK+Y TK
PRE	.687	.937	.950	.970	.881	.971
GAM	.978	.699	.983	.558	.820	.834
POS	.791	.949	.989	.389	.987	.856

AVERAGE DURATION

PERIOD	X LK	X TK	X+Y LK	X+Y TK	X LK+TK	X LK+Y TK
PRE	.941	.706	.936	.839	.568	.098
GAM	.843	.776	.894	.191	.799	.792
POS	.739	.567	.758	.426	.285	.498

Table 3.5 Correlations between first and second measures of the cumulative and average duration of 6 variables, by a panel of 4 observers. The same segment of video-tape was presented to the observers for the first and second measurement. The number of comparisons, N=8, for each correlation.

	X LK	X TK	X+Y LK	X+Y TK	X LK+TK	X LK+Y TK
GAME	5.1	22.2	4.0	53.0	22.1	13.3
NATURAL	3.5	15.1	3.1	70.0	14.2	11.8

(a) Percentage error in two measurements by the same panel.

	X LK	X TK	X+Y LK	X+Y TK	X LK+TK	X LK+Y TK
GAME	1.2	10.1	5.5	68.0	14.0	6.7
NATURAL	20.8	9.0	10.8	70.0	14.0	13.2

(b) Percentage error in two measurements by different panels.

Table 3.6 Percentage error in the measurement of cumulative duration for 6 interpersonal events occurring in game-behaviour,and in natural conversation. Error was assessed,in one case,by having the same panel of observers'measure'the same tape on two occasions; and,in the other case,by having two different panels 'measure'the same tape. Error was calculated by dividing the modulus of the difference between the first and second measurements by their mean,then multiplying by %100. The values in the table are the means of 4 independent calculations,except in the case of mutual glance and joint utterance,where n=2.

Part II-B: Results

Results: General Comments

Results: general comments

The methods described in Chapter 3 largely achieved their ends. The video-telephone experiment served as an excellent disguise for the main purpose of the study. People willingly participated,for payment,in the 3 sessions. In the periods preceding and following the game,their interaction seems to have been 'natural'. There are several reasons for assuming this: the dyads broached a very wide range of topics,some of them very intimate; one occasional topic was the experimenter-obviously,the conversants didn't believe that he was listening (see Figure 4.1); in the case of friends,references which were very obscure to the experimenter were made and understood by the dyad; and,even in the few cases where the idea that they were being watched occurred,the conversants took no action,but turned to other topics.

Movements of the conversants caused some difficulties in the period preceding the game. It was the view from the window which attracted attention. Unfortunately,obscuring it completely would have discredited the 'lounge' atmosphere. But,for the most part, members of the dyads remained fixed in their chairs; this was true without exception when coffee was presented after the game. Shifts in posture within the chairs were fully accommodated by the method of overlapping the images.

In the first session,the game achieved its limited purpose. However,as the participants returned for their second and third session,the game became very boring; the participants on several occasions agreed to stop playing,and merely conversed. This was not discouraged,for the goal of the game was to encourage interaction. As it turned out,the occasions whereupon this happened provided a useful source of data on the effects of the game,and of television as a medium of interaction. If the goal had been to perpetuate the game,it could have been rendered less boring by altering the rules (e.g. by placing tolls on the gates,or by changing the balance of power),or by removing the playing-boards as well as the rule sheets.

The FIRO-B questionnaire elicited a few queries,because of its obviously psychological nature. It was vaguely explained as a means of matching subjects for subsequent sessions.

Each of the next four chapters deals with a different type of data obtained in the experiment. Chapter 4 presents a description of the conversants' synchronisation of speech and glance,a description derived from the observers who reviewed the video-tapes. Chapter 5 relates the social performance of the subjects- their looking,talking,etc.- to their behavioural traits,as assessed by the FIRO-B questionnaire. Chapter 6 looks at another aspect of synchrony,the pause. Here,the point of interest was the listener's differentiation of pauses which signalled that the speaker had

nothing more to say from other types of pause. Finally, Chapter 7 offers a sample analysis of the transcripts of conversation, and of the transcription process itself.

Part II-B: Results

Chapter 4. Interaction Synchrony

Prologue

In 1967, CONDON and OGSTON used the term "interactional synchrony" to describe the co-ordination of movement in speaker and listener. Herein, the author has suggested that a shortened form, "interaction synchrony" be used to encompass all types of co-ordination which occur in social discourse (section 2.3.).

The present experiment focussed upon synchrony of speech and glance. This was assessed by re-playing video-tapes of the interactions for a panel of observers; from their measurements, the author prepared data on six classes of interactive behaviour (looking, speaking, looking while listening, etc.) for each member of each dyad (section 3.5.). This chapter presents that data.

4.1. Changes in Conversational Style

In the second and third sessions, 10 of the 12 subjects conversed with a different person on each of two occasions. The first step in the analysis of the data was to compute the correlations between the performance of any given subject on the first occasion and his performance on the second. The statistical significance of these correlations, rather than their raw values, is shown in Table 4.1.

The data indicated that the way the conversamt speaks and looks does not remain constant (X looks while X talks during the POS period being the one exception to this generalisation). However, since time was completely confounded with both factor P, (Period) and change of partner, an exact interpretation of this result cannot be made. The number of comparisons (N) available in the PRE period was so small that the lack of significance should not be taken as proven; on the other hand, Table 4.2. shows that an N of 6 or more can provide a correlation

that is significantly greater than zero.

Bearing the above reservations in mind, it may be said that the different samples of the same person provided statistically independent measures for the variables in Table 4.1. Consequently, both samples obtained from the subjects in the F2 part of the experiment were used to determine the correlation between the performance of each conversant and the performance of his partner. This is displayed in Table 4.2.

The salient feature of Table 4.2. is the contrast between the performance of 'friends' and the performance of 'strangers': the conversant's use of speech and glance did not correlate significantly with that of a partner whom he knows, but did correlate, at some points in the experiment, with the use of speech and glance by a partner who is a stranger. Conversing with a stranger seems to have a more pronounced effect upon the duration of interactive events than upon the proportion of total time given to each of them (the contrast is stronger in Table 4.2.(b)). There is a suggestion, in Table 4.2.(b), that the effect was stronger in the second and third periods of conversation between strangers, but the small N available for the PRE period recommends caution.

The result indicated that the conversant, in interacting with a stranger, adjusts his conversational style to match that of the stranger. This appears to be his solution to the difficult problem of co-ordinating his own speech patterns with patterns which are at the outset unknown. On the other hand, it appears that in speaking with a friend, the patterns are sufficiently known that a simple matching of speaking styles is not necessary.

4.2. Effects of Friendship (F) and Type of Interaction (P)

To assess the difference in performance associated with the two factors Friendship and Period, multivariate analysis of variance was performed, following the factorial design in Figure 3.5. The six variables in Table 2 were used as criteria measurements; to homogenise variance (WINER, 1962) the raw data were transformed thus: for cumulative duration (per cent), $x_T = 2 \text{ arc sin } \sqrt{x_i}$; for average duration, $x_T = \log_{10}(x_i + 1)$, where x_T is the transformed score, and x_i is any raw score. The analysis was quite sensitive, since measures were 'within-subject' for both factors. Table 4.3. presents the results, together with the univariate F ratios obtained by considering only one criterion at a time.

The frequency of each type of interactive event was also considered. In this case, a standardised score, frequency per minute, was used instead of the raw values: for each type of event, frequency per minute = cumulative duration in per cent x 60 sec., divided by average duration (sec.). After suitable transformation ($x_T = \sqrt{x_i} + \sqrt{x_i + 1}$), these standardised scores were treated via multivariate analysis of variance. The results are in Table 4.4.

Friendship was not a statistically significant factor in the case of cumulative duration, average duration, nor frequency. Only one of the interactions, that between Friendship and subjects in the case of average duration was significant.

However, for cumulative and average duration, and frequency, there were statistically significant differences between the levels of the factor Period, when all six criteria were considered together. The univariate tests, and the correlation between each of the criteria and

their composite score (COMP. in Tables 4.3. and 4.4.) indicated that, for average duration, X Talk, X Talk + Look, and X Look + Y Talk contributed most to the significance of this factor. For frequency, X Talk and X + Y Talk were the major contributors. In the case of cumulative duration, none of the criteria was individually significant.

Inspection of the cell means for average duration (Table 4.5) shows that the periods of normal conversation, P1 and P3, gave approximately identical figures, which are quite different from the figure for the game period, P2. The same is true for frequency.

4.3. A Closer Look at Factor P

In the present sample, there was no difference in behaviour between friends and strangers on the set of interaction measures used. There was a difference, for all subjects, between performance in normal conversation and performance in the game situation. This difference could be attributed to two facets of the game period: first, interaction in the game period occurred via a video-telephone system rather than face-to-face, as in normal conversation, second, interaction in the game period was constrained by the rules and objectives of the game, rather than those of normal conversation.

To differentiate between these alternatives, the game period was re-assessed: in 4 samples in the F2 part of the experiment, "game behaviour" and "normal conversation" both occurred as the participants used the video-telephone. These two types of interaction look very different in transcript (Figure 4.1). Samples of each type were measured by a panel of observers, as described earlier, and the resulting criteria scores were examined via analysis of variance, with

I go to uh three

N I'LL MOVE TO THTHTHREE

uhm yeah hang on you're at one now aren't you

I'M AT THREE YEAH I WAS NOW I MOVED TO THREE

ohh yes ok ah I'll move to one 'n I collect my ten pounds and take it back

I'LL MOVE TO FIVE

uhm I'm not going to let you through my gate

OH WELL IN THAT CASE IN THAT CASE **** OFF

that's nice isn't it good god

Y' CAN DO ALL SORTS OF THINGS ON THIS TV IT'S PRETTY GOOD ACTUALLY NOW IF THEY CONNECT UP SORT OF THE LOCAL BOOKMAKER AND THINGS YOU KNOW IT'S IT'S QUITE A GOOD IDEA WELL IT'S NOT A BAD SYSTEM REALLY QUITE UH IT'S A BIT SORT OF JERRY BUILT

AH HE'S NOT LISTENING

uhhh what are y'talking about he's not listening

CAN'T Y' HEAR

yeah vaguely

VAGUELY YEAH IT'S NOT VERY LOUD HAVE T' GET NEARER THE MIKE

yeah

SELL HIM SELL HIM A MICROPHONE SOMETIME

Figure 4.1 Transcript of the vocal utterances of X and Y, during GAME. One conversant is indicated by lower case letters, y, the other by capitals, X. X looks at y=————; y looks at X=– – – –. The 'conversational' type of interaction is judged to begin after the **** OFF which ends the game.

'game' versus 'normal' behaviour as the lone factor. The results of this repeated-measures analysis for 8 subjects are presented in Table 4.6..

For cumulative and average duration, joint utterance was the only criterion which did not show significant difference between game and natural behaviour. The means for the others (Table 4.8.) demonstrate that as the participants stopped playing the game and began to converse more naturally, their style of interaction shifted towards that seen in 'informal' interaction, in the periods preceding and following the game. The proportion of time spent in each type of activity (except joint utterance) increased as they changed from game to natural behaviour. Since the frequency of each type of event rose only in the case of mutual glance (X + Y LK) and looking while talking (X LK + TK), the increase can be attributed to the significant increase in the average duration of each event.

The means in Table 4.8 suggest that the shift from game to natural behaviour in period P2 took an extreme form. A statistical comparison of natural behaviour occurring via video-telephone with natural behaviour occurring face-to-face (Table 4.7) indicated that the major difference between the two is that mutual glance had a greater mean length, and so occupied a larger proportion of total time when the video-telephone was used. Both speaking and joint utterance were more frequent events in natural behaviour over the video-telephone.

A third comparison (Table 4.9) differentiated the effects due to conversing via video-telephone from those due to different types of interaction. Data from the same 8 subjects was used to compare game

behaviour with natural behaviour occurring face-to-face. Frequency of speaking and of joint utterance was higher during the game; frequency of mutual glance was lower. The proportion of time spent in mutual glance and looking while talking was lower in the game. And the average length of utterance, and looking while listening was shorter during the game. Add these to the results in Tables 4.6 and 4.7, and the complex picture presented in Figure 4.2. emerges.

4.4. General Discussion

Figure 4.2. charts the changes in behaviour which are induced by imposing two types of conditions upon interaction: (1) the constraints of a game rather than those of normal conversation and (2) mediation by video-telephone in place of face-to-face conversation. Normal behaviour is taken as a base-line, and deviation is plotted as a percentage of the base level. The constraints of the game reduced the frequency of mutual glance hence the amount of mutual glance, the amount of looking while talking and the mean length of talking and looking while listening. These constraints increased the frequency of talking, and the frequency of joint utterance. Television, on the other hand, increased the amount and mean length of mutual glance, and it also increased the frequency of talking and joint utterance.

The effects of game-playing and television are dramatically contrasted in Figure 4.2 (c). The 6 types of interpersonal event in this figure were not significantly changed, by these two factors, from the levels seen in normal face-to-face conversation. However, during conversation, television uniformly increased the levels of these activities, while game-playing uniformly decreased them. Consequently,

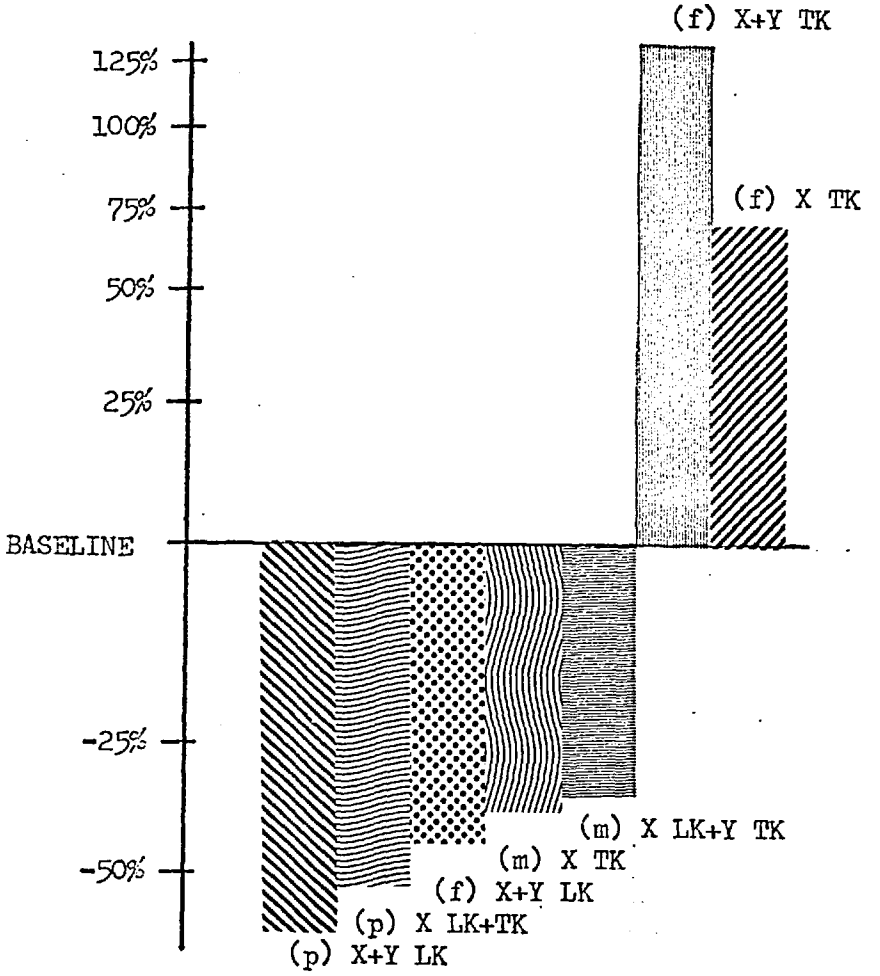


Figure 4.2 (a) Distinct changes in interpersonal events induced by the constraints of game-playing, as a percentage of the base level seen in face-to-face conversation. The peak (or nadir) of each deviation from the baseline is statistically significant.
(f)= frequency (m)= mean length (p)= proportion i.e. cumulative duration as a percentage of total time.
(Figures 4.2 (b) and (c) follow; see also Appendix E).

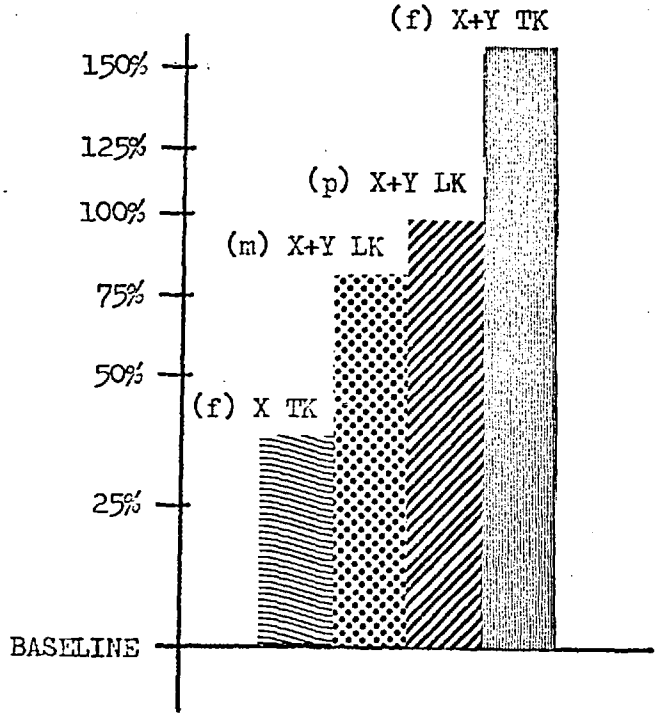


Figure 4.2 (b) Distinct changes in interpersonal events induced by television as a medium of conversation, as a percentage of the base level seen in face-to-face conversation. The peak of each deviation from the baseline is statistically significant. (f)= frequency (m)= mean length (p)= proportion, i.e. cumulative duration as a percentage of total time.

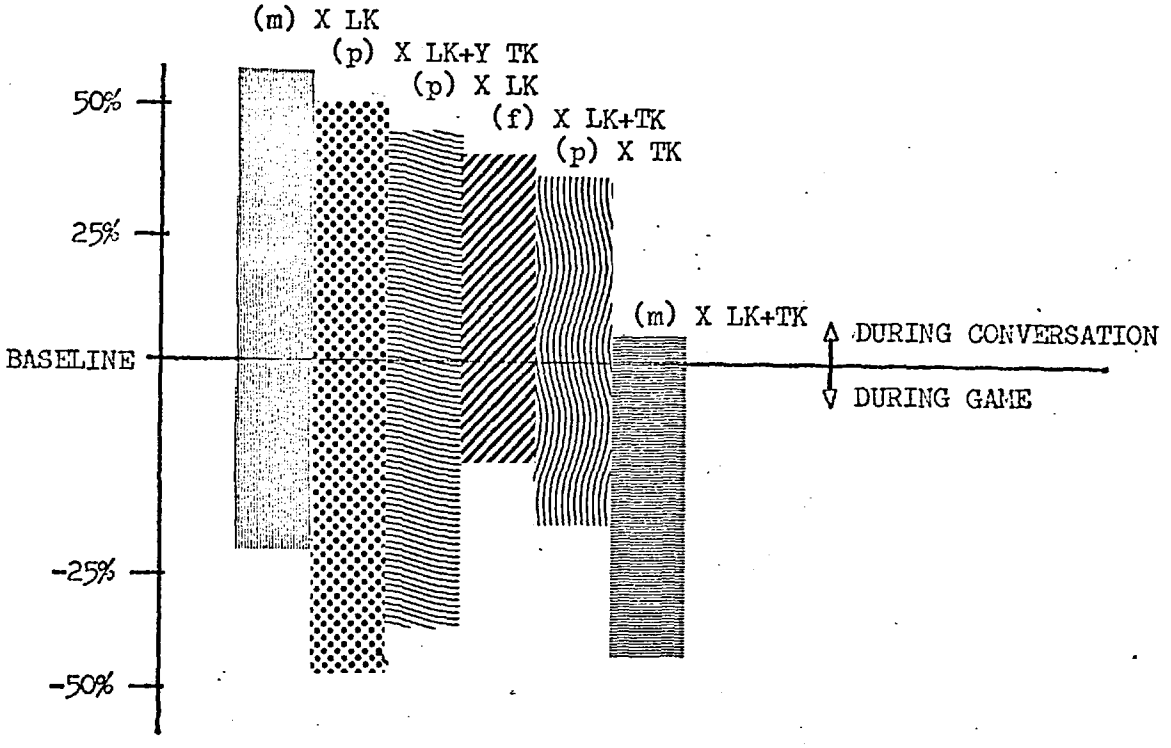


Figure 4.2 (c) Differential changes in the same interpersonal events induced by television and by game-playing, as a percentage of the base level seen in face-to-face conversation. During conversation via video-telephone, television shifted behaviour above the baseline; during game-playing, the constraints of the game had the opposite effect. Here, deviations from the baseline are not significant; however, the differences between peaks and nadirs are statistically significant for all six events. (f)= frequency (m)= mean length (p)= proportion, i.e. cumulative duration as a percentage of total time.

for all 6 events, the differences between the peaks seen in conversation, and the nadirs seen in game playing are statistically significant.

4.5. The Effects of Game-Playing on Interpersonal Behaviour

The game-plyaing situation had profound effects on interaction. Although the amount of time spent in speaking was not greater than normal the utterances become shorter and more frequent. This can be attributed to the nature of the game, which required the exchange of simple bits of information, namely, where each player was moving (Figure 4.1.). The point of interest here is that, with this change in verbal behaviour there was a change in the use of glance. The proportion of looking might be expected to drop, since the game required the participants to look at their playing-boards between moves, and the game was mildly competitive. This was not the case, for there was change, not in the amount of looking, but in the way that looking occurred. There was a smaller proportion of looking while talking, and the mean length of glance while listening was shorter. The sample in Figure 4.1. illustrates a trend seen throughout the game period: the speaker looked at the listener only near the end of his own utterance, then looked away shortly after the listener began to speak. When this pattern of looking prevails, mutual glance will be very infrequent. The data show that this was the case; although its mean length did not change, mutual glance bocomes much less frequent, and occupied a smaller proprotion of time during the game.

This suggests that, during the game, the pattern of looking was determined by the pattern of speaking, that very little visual interaction was occurring. STAPLEY (1972) has devised a simple formula for

determining the amount of mutual glance to be expected if two conversants co-ordinate their glances with their speaking and listening behaviour. Briefly, the formula gives an estimate of the amount of mutual glance which is due to chance overlap of 'X looking while talking' and 'Y looking while X is talking'.

$$\text{expected mutual glance} = \frac{(B_X)(A_Y)}{U_X} + \frac{(A_X)(B_Y)}{U_Y} + \frac{(L_X - A_X - B_X)(L_Y - A_Y - B_Y)}{T - U_X - U_Y}$$

where

U_X = total duration of utterance by X

U_Y = total duration of utterance by Y

A_X = total duration of X looks at and listens to Y

A_Y = total duration of Y looks at and listens to X

B_X = total duration of X looks at Y while talking

B_Y = total duration of Y looks at X while talking

L_X = total duration of X looks at Y

L_Y = total duration of Y looks at X

T = total duration of the interaction

For each sample of conversation used in the comparison of 'game' with 'natural' behaviour, a value for expected mutual glance was calculated. This value was subtracted from the value for mutual glance actually obtained in the respective conversations. The 'expected' and 'difference' scores were appropriately transformed to remove negative values and homogenise variance, then used as criterion measurements in analysis of variance. Again, all comparisons were within-subjects.

The fact that significantly different amounts of mutual glance were expected from 'game' and 'natural' behaviour (Table 4.10) reflects

the difference in verbal behaviour between playing a game and conversing normally. The data shows that, in the case of conversation, this expectation was exceeded, and, in the game, the much lower expectation was not met. In fact, it can be shown by applying the Wilcoxon matched-pair signed rank test (SIEGEL, 1956) to all the data for the game period that there was no real difference between the amount of mutual glance expected and the amount obtained. On the other hand, the data for 'informal' conversation show, for the most part, real and positive differences (Table 4.11).

In other words, the players in the game co-ordinated their glances at one another with their speech, so that mutual glance was the result of chance overlap of one player looking while speaking and the other player looking while listening. This interpretation is also supported by a curious result in STAPLEY (1972). Using the same video-telephone link and game, STAPLEY examined changes in looking behaviour as the medium varied from monochrome image, to cartoon image, to audio channel alone. Of course, in this last condition, the separated subjects could not see one another; but they continued to look at the blank screen. There was no visual feedback from glance; consequently, the amount and average duration of looking dropped. However, the lack of this feedback did not affect looking synchrony, for the amount of 'mutual glance' obtained was not significantly different from that expected if the subjects were co-ordinating their looking with their speech!

On the other hand, in normal conversation, there was significantly more mutual glance than could be accounted for by this mechanism. In normal conversation, there seemed to be a small but statistically significant amount of mutual glance which was due to visual rather than

verbal interaction. This has been rigourously demonstrated for strangers, since the samples wherein both game and natural behaviour occurred adjacently happened to involve strangers. However, application of Wilcoxon's test to the differences obtained from friends indicates that, in this respect, they used glance in the same way as strangers.

4.6. The Effect of Television as a Medium of Interpersonal Behaviour

When television mediated interaction it had very complex effects on behaviour (Figure 4.2.). Since mutual glance was partly determined by visual interaction in normal conversation (Table 4.11) an artifical visual medium such as television should have increased this type of activity; and so it did. In fact, it increased all types of looking, at least marginally. For some reason it also increased the frequency of speech (and hence, joint utterance) during conversation. These increases in looking and speaking may both have been due to the fact that the video-telephone presented, almost immediately, a physically distant event, thereby intensifying both the awareness of the other, and the feeling of being watched. 'Curiosity' may have led to more looking, and social uneasiness to more speaking. In this regard, it should be noted that the video-telephone focused attention on the other person, since only a head and shoulders image of him was available. One effect of this was to eliminate nuance in the direction of gaze; the difference between looking at the other and looking away became very sharp.

Similar changes in behaviour have been attributed to the physical rather than social distance between the conversants. When the other

person is viewed on a television screen, he appears to be at a greater distance than the size of the retinal image warrants (STAPLEY, 1972). As the distance between two conversants increases, the amount of mutual glance which is related to both speaking and listening increases (STEPHENSON, RUTTER and DORE, 1972). Conceivably, the video-telephone used in the present experiment influenced the conversants to behave as if if they were more distant than in the face-to-face situation.

Similarly, the effect of television was to increase looking, speaking, and looking both while speaking and while listening, although the higher levels were not statistically different from those seen in face-to-face conversation. But this was the case only when television mediated conversation, for the medium interacted in an interesting way with the type of exchange. This interaction is charted in Figure 4.2 (c): during conversation, television exerted its typical influence on interpersonal behaviour; however, when the type of social intercourse changed, the constraints of the game gained ascendancy over the effects of the medium of exchange. So, in normal conversation, the apparent distance between the conversants was probably salient in shifting behaviour in one direction, whereas, in the game, the pattern of verbal interaction shifted behaviour towards the opposite pole.

4.7. Summary

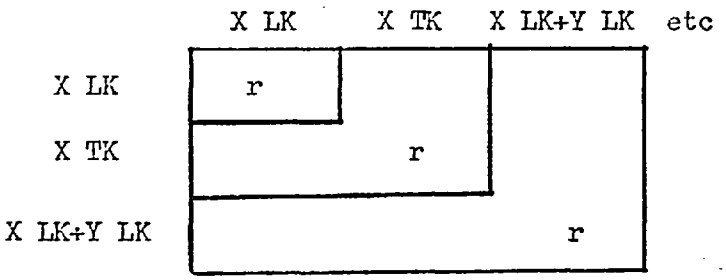
In this study, statistically real differences in interactive behaviour have been produced in the laboratory. This has been accomplished by selective matching of conversants and by manipulation of the conditions under which they meet. Apparently, these conditions can be manipulated in such a way as to induce 'natural' conversations,

for the transcripts show that the conversants relaxed completely over long periods, broached intimate areas of discourse, and behaved in a manner suggesting that they did not feel themselves observed. Reference data for the study of the effect of relevant factors on a given population can thus be obtained.

For a limited sample of male university undergraduates, this study has shown that the degree of friendship and the type of constraints placed on interaction determined some of the qualities of conversation. For the set of variables used, friendship was not a strong factor: a greater degree of friendship influenced the behaviour of different people in different ways, and so did not uniformly change behaviour; however, strangers did appear to match their performances in talking to one another more than friends;

The type of constraints placed upon interaction had a much greater effect. The imposition of conflicting goals and rules of conduct (as in the *game* period) significantly decreased looking at the other, apparently by shifting verbal interaction to a pattern which restricted the frequency and length of glance. Constraints similar to those in the game period perhaps operate in interviews or formal negotiations.

Mediation of interaction by television had generally opposite effects on looking at the other, probably by convincing the conversants that they were physically more distant from one another than they would be in face-to-face conversation.



(a). For any cell in the factorial design, the variables to be correlated are arranged on two axes, as shown. (r= coefficient of correlation). In the following tables, the diagonals for each cell are vertically collapsed.

		N	X LK	X TK	X LK+Y LK	X TK+Y TK	X LK+TK	X LK+Y TK
	PRE	3	NS	NS			NS	NS
F2	GAM	10	NS	NS			NS	NS
	POS	9	NS	NS			05	NS

(b). Correlation for cumulative duration of events: statistical significance of r (i.e. of r>0 via Student's t) rather than r is presented. Critical level of significance is .05.

		N	X LK	X TK	X LK+Y LK	X TK+Y TK	X LK+TK	X LK+Y TK
	PRE	3	NS	NS			NS	NS
F2	GAM	10	NS	NS			NS	NS
	POS	9	NS	NS			NS	NS

(c). Correlation for average duration of events, as in (b) Critical level of significance is .05.

Table 4.1 Correlation between the performance of any given subject in the second session and his performance in the third session. In each session, the subject conversed with a different 'stranger'.

		N	X LK	X TK	X LK+Y LK X TK+Y TK	X LK+TK	X LK+Y TK
	PRE	9	NS	NS		NS	NS
F1	GAM	11	NS	NS		NS	NS
	POS	11	NS	NS		NS	NS
	PRE	6	NS	NS		NS	NS
F2	GAM	11	.02	NS		.001	NS
	POS	10	NS	NS		NS	NS

(a). Correlation for cumulative duration of each event as a percent of total time.

		N	X LK	X TK	X LK+Y LK X TK+Y TK	X LK+TK	X LK+Y TK
	PRE	9	NS	NS		NS	NS
F1	GAM	11	NS	NS		NS	NS
	POS	11	NS	NS		NS	NS
	PRE	6	NS	NS		NS	NS
F2	GAM	11	.02	NS		.01	.01
	POS	10	NS	.05		.05	.05

(b). Correlation for average duration of each event.

Table 4.2 Correlation between the performance of any conversant and the performance of his partner in the same conversation, assessed over cells of the factorial design. Statistical significance ($r>0$) rather than r is presented. Critical level of significance is .05 unless otherwise specified.

SOURCE	F	DFhyp	DFerr	P LESS THAN	CANONICAL r	
Fxsubj.	1.205	48.0	58.187	.247	.886	
Pxsubj.	1.402	96.0	69.142	.069	.940	
FP	.939	12.0	22.0	.528	.710	
F	.685	6.0	11.0	.666	.522	
P	2.353	12.0	22.0	.039 SIG	.820	
X LK	1.324	2	16	.294	.283	COMP
X TK	1.196	2	16	.328	-.228	COMP
X+Y LK	2.305	2	16	.132	.368	COMP
X+Y TK	2.757	2	16	.094	-.380	COMP
XLK+TK	.237	2	16	.792	-.042	COMP
XLK+YTK	2.117	2	16	.153	.353	COMP

(a). Results of multivariate analysis for cumulative duration.

SOURCE	F	DFhyp	DFerr	P LESS THAN	CANONICAL r	
Fxsubj.	1.642	48.0	58.187	.036 SIG	.891	
X LK	2.244	8	16	.080	.500	COMP
X TK	2.420	8	16	.063	-.048	COMP
X+Y LK	4.788	8	16	.004 SIG	.725	COMP
X+Y TK	1.814	8	16	.148	-.127	COMP
XLK+TK	1.910	8	16	.129	.107	COMP
XLK+YTK	3.133	8	16	.025 SIG	.297	COMP
Pxsubj.	1.088	96.0	69.142	.358	.914	
FP	.888	12.0	22.0	.571	.682	
F	1.176	6.0	11.0	.385	.625	
P	3.445	12.0	22.0	.006 SIG	.888	
X LK	.824	2	16	.456	.141	COMP
X TK	17.109	2	16	.001 SIG	.752	COMP
X+Y LK	1.524	2	16	.248	.154	COMP
X+Y TK	1.141	2	16	.344	.134	COMP
XLK+TK	5.165	2	16	.019 SIG	.414	COMP
XLK+YTK	10.431	2	16	.001 SIG	.508	COMP

(b). Results of multivariate analysis for average duration.

Table 4.3. Analysis of variance for factors F and P. Results of multivariate tests, using Wilks' Lambda criterion, are given first. Only when these are significant at $\alpha=.05$ are the relevant univariate tests results shown. COMP indicates that the adjacent figure is the correlation between the single variable and the composite of all variables. FPxsubjects=error term.

SOURCE	F	DFhyp	DFerr	P LESS THAN	CANONICAL r
Fxsubj.	1.533	48.0	58.187	.060	.855
Pxsubj.	1.090	96.0	69.14	.356	.931
FP	1.728	12.0	22.00	.128	.817
F	.520	6.0	11.00	.782	.470
P	4.020	12.0	22.00	.002 SIG	.914
X LK	.855	2	16	.444	.021 COMP
X TK	16.433	2	16	.001 SIG	.630 COMP
X+Y LK	.854	2	16	.444	-.103 COMP
X+Y TK	8.031	2	16	.004 SIG	.444 COMP
X LK+TK	.613	2	16	.554	.123 COMP
X LK+Y TK	1.203	2	16	.326	.144 COMP

Table 4.4 Results of multivariate analysis for frequency/minute.

		PRE(P1)	GAM(P2)	POS(P3)
AVERAGE DURATION (SECS.)	X TK	2.30	1.42	2.11
	X LK+TK	1.18	.93	1.17
	X LK+Y TK	1.26	.94	1.52
FREQ. PER MINUTE	X TK	8.05	11.98	7.80
	X+Y TK	2.62	3.79	2.15

Table 4.5 Cell means for the 3 levels of Period. Only the values for statistically significant variables (Tables 4.3 and 4.4) are included.

	VARIABLE	F	DF	P LESS THAN
CUMULATIVE DURATION	X LK	20.761	1,7	.01 SIG
	X TK	7.265	1,7	.05 SIG
	X+Y LK	36.518	1,7	.01 SIG
	X+Y TK	4.107	1,7	.10 *
	X LK+TK	13.871	1,7	.01 SIG
	X LK+Y TK	13.710	1,7	.01 SIG
AVERAGE DURATION	X LK	14.098	1,7	.01 SIG
	X TK	7.037	1,7	.05 SIG
	X+Y LK	12.009	1,7	.05 SIG
	X+Y TK	2.255	1,7	.25 *
	X LK+TK	8.405	1,7	.05 SIG
	X LK+Y TK	5.893	1,7	.05 SIG
FREQUENCY/ MINUTE	X LK	.246	1,7	
	X TK	1.432	1,7	
	X+Y LK	6.725	1,7	.05 SIG
	X+Y TK	4.795	1,7	.10 **
	X LK+TK	5.811	1,7	.05 SIG
	X LK+Y TK	5.305	1,7	.10

Table 4.6 Results of univariate analysis of variance for each of six variables, with 'game' versus 'natural' behaviour as the lone factor. In this analysis, both samples are drawn from the GAME Period, P2, as explained in the text. The asterisks signify that variance due to subjects-within-groups is statistically significant at (*) $\alpha = .05$, or (**) $\alpha = .01$.

	VARIABLE	F	DF	P LESS THAN
CUMULATIVE DURATION	X LK	3.569	1,7	.25
	X TK	1.117	1,7	
	X+Y LK	6.619	1,7	.05 SIG
	X+Y TK	4.073	1,7	.10
	X LK+TK	1.899	1,7	.25
	X LK+Y TK	1.076	1,7	
AVERAGE DURATION	X LK	2.046	1,7	.25
	X TK	.147	1,7	
	X+Y LK	7.298	1,7	.05 SIG
	X+Y TK	1.257	1,7	
	X LK+TK	.014	1,7	
	X LK+Y TK	.100	1,7	
FREQUENCY/ MINUTE	X LK	.738	1,7	
	X TK	5.810	1,7	.05 SIG
	X+Y LK	.690	1,7	
	X+Y TK	91.830	1,7	.01 SIG**
	X LK+TK	4.172	1,7	.10
	X LK+Y TK	2.689	1,7	.25

Table 4.7 Results of univariate analysis of variance for each of six variables.Here,the one-way analysis distinguishes 'natural' behaviour occurring during the GAME Period,P2, from 'natural' behaviour occurring in the INFORMAL Period, P3.The asterisk signifies that the variance due to subjects-within-groups is significant at α=.01.As in Tables 4.6,4.8, the comparison is within-subjects,and n=8.

	VARIABLE	GAME(P2)	NATURAL(P2)	INFORMAL(P3)
CUMULATIVE DURATION	X LK	28	67	48
	X TK	25	42	32
	X+Y LK	7	46	24
	X+Y TK	5	12	2
	X LK+TK	7	27	17
	X LK+Y TK	10	31	21

(a). Means for cumulative duration as a percentage of total time.

	VARIABLE	GAME(P2)	NATURAL(P2)	INFORMAL(P3)
AVERAGE DURATION	X LK	2.09	4.37	2.89
	X TK	1.39	2.31	2.55
	X+Y LK	.95	2.24	1.29
	X+Y TK	.51	.78	.45
	X LK+TK	.74	1.46	1.40
	X LK+Y TK	.95	1.69	1.57

(b). Means for average duration,in seconds.

	VARIABLE	GAME(P2)	NATURAL(P2)	INFORMAL(P3)
FREQUENCY	X LK	8.05	8.54	10.12
	X TK	12.45	10.61	7.86
	X+Y LK	5.61	10.39	11.16
	X+Y TK	5.64	6.52	2.53
	X LK+TK	6.63	10.19	7.54
	X LK+Y TK	6.80	10.04	8.18

(c). Means for frequency per minute.

Table 4.8 Means for cumulative and average duration,and frequency. All means in (a),(b),and (c) were obtained from the 8 conversants used in the analysis presented in Tables 4.6 and 4.7.

	VARIABLE	F	DF	P LESS THAN
	X LK	3.540	1,7	.25
	X TK	.843	1,7	
CUMULATIVE	X+Y LK	153.037	1,7	.01 SIG**
DURATION	X+Y TK	3.843	1,7	.10
	X LK+TK	14.654	1,7	.01 SIG
	X LK+Y TK	2.752	1,7	.25
	X LK	1.570	1,7	.25
	X TK	43.829	1,7	.01 SIG
AVERAGE	X+Y LK	3.670	1,7	.10
DURATION	X+Y TK	.291	1,7	
	X LK+TK	4.350	1,7	.10
	X LK+Y TK	11.480	1,7	.05 SIG
	X LK	1.082	1,7	
	X TK	7.402	1,7	.05 SIG
FREQUENCY/	X+Y LK	8.707	1,7	.05 SIG
MINUTE	X+Y TK	16.541	1,7	.01 SIG *
	X LK+TK	.894	1,7	
	X LK+Y TK	.549	1,7	

Table 4.9 Results of univariate analysis of variance for each of six variables.In this case,the one-way analysis compares 'game' behaviour occurring in the GAME Period,P2,with 'natural' behaviour occurring in the INFORMAL Period,P3. The asterisks signify that variance due to subjects-within-groups is significant at (*)α=.05 or (**)α=.01.

VARIABLE	F	DF	P LESS THAN
Expected mutual glance	13.227	1,3	.05 SIG
Obtained minus expected	18.564	1,3	.05 SIG

(a). Results of univariate analysis of variance with 'game' versus 'natural' behaviour as the lone factor.Both samples are drawn from the GAME Period,P2. The comparison is within-subject,and n=4.

VARIABLE	F	DF	P LESS THAN
Expected mutual glance	2.626	1,3	
Obtained minus expected	.023	1,3	

(b). Results of univariate analysis of variance comparing 'natural' behaviour occurring in the GAME Period,P2, with 'natural' behaviour occurring in the INFORMAL Period,P3. The comparison is within-subject,and n=4.

VARIABLE	GAME(P2)	NATURAL(P2)	INFORMAL(P3)
Expected mutual glance	10.7	45.2	24.0
Obtained minus expected	- 1.0	+ 0.8	+ 1.1

(c). Means for cumulative duration as a percentage of total time,for the samples used in the analysis of variance in (a) and (b).

Table 4.10 Univariate analysis of variance for the percentage of mutual glance expected,and for the difference between expected and obtained values.

		PRE	GAM	POS
FRIENDS	N	9	11	11
	Mean diff.	2.3	3.3	3.1
	P less than	.01 SIG		.01 SIG
STRANGERS	N	6	11	10
	Mean diff.	1.9	2.4	2.2
	P less than	.05 SIG		

Table 4.11 Results of applying Wilcoxon's matched-pairs signed-rank test to the differences between expected and obtained mutual glance for all data. This test considers both the magnitude and the direction of the differences. The mean differences presented above are absolute values, for cumulative duration as per cent total time. Although the means for GAM are the largest, they conceal the fact that nearly one-third of the differences are negative.

Part II-B: Results, continued

Chapter 5. FIRO-B and Social Performance

Prologue

Since the scores on the FIRO-B questionnaire had been used to form pairs of subjects for the second and third sessions, the relation between these scores and social performance required scrutiny. The best approach-forming one set of pairs which were 'compatible' on the FIRO standard, and one set of 'incompatible' pairs, thus establishing another factor in sessions 2 and 3- would have required many more subjects, and more time than available. This approach might have required different procedures, since a remarkably small range of 'exchange of affection compatibility' was obtained by asking pairs of friends to participate. Fortunately, two other routes of attack lay open.

5.1. Analysis of FIRO-B Scores

In using the MANOVA programme, the FIRO scores were conveniently treated as co-variates of the set of interpersonal behaviours undergoing analysis of variance. The data for each subject then comprised his interpersonal behaviour plus his six scores on the FIRO-B. In computing the within-cells regression of the co-variates on the variates, the programme calculated the correlation between each variate and a linear function of all of the co-variates. The author repeated this operation six times, dropping one of the FIRO-B scores from consideration on successive occasions. When the correlation sank to its lowest value, it was concluded that the FIRO score absent on that occasion was contributing most to the correlation between the respective variate and the co-variates. Table 5.1. presents the results of this rather indirect approach (Numerical values can be found

in Appendix A).

Incidentally, the within-cells regression of the co-variates on the variates was statistifally significant for all three types of data-cumulative duration in percent, average duration, and frequency; for each of these three, p = less than 0.001, degrees of freedom = (36,165.2).

The second line of approach was to form post hoc groups of pairs after the experiment itself had been completed. The pairs had been formed on the basis of one criterion of compatibility ($_{x}k^{A}$); but it was possible that these same pairs were not so uniformly compatible by other standards. This was found to be the case, as Table 5.2 demonstrates. By trial and error, 'reciprocation of inclusion', $_{r}k^{I}$, was found to be a calculation which produced a clear split between compatible and incompatible groups of pairs. By inspection, it will be seen that the overall dispersion of values is greatest for $_{r}k^{I}$; and the means of the high and low groupings show the greatest separation.

The next step was to determine whether the groups of pairs thus established had performed differently in the experiment. This was accomplished by applying a very useful technique, discriminant analysis, to the data. In discriminant analysis, a linear function of the differences between the performance of one group and the performance of the other (on the specified set of variables) is calculated. The value of this function is converted to an F, so that the statistical significance of the differences between the groups can be determined. (see MORONEY, 1965, p.316f). A programme for carrying out this operation is available in the BMD Library (BMD, 1968).

No differences between the groups were found in the cumulative duration nor average duration of looking, talking, etc. This was the

case whether natural conversatinn or game behaviour was considered. However, real differences in the frequency of interpersonal events are summarised in Table 5.3. The largest differences between the groups means occurred in the game period, and, specifically, in all of the various types of looking behaviour. However, looking and mutual glance apparently contributed most to the statistical significance of the difference in looking behaviour.

5.2. The Relation Between FIRO-B Scores and Interpersonal Behaviour

The results of treating the FIRO scores as co-variates support common sense notions. For instance, subjects wanting to be controlled spent a small proportion of time talking, even though the average length of their utterances was long; they spent little time looking while they themselves were speaking, and looked infrequently when the other spoke. On the other hand, those desiring to control others spoke more frequently and looked more frequently, especially when speaking.

Subjects expressing affection spent a large proportion of time looking, and those wanting to receive affection made long glances both while they were speaking and while they were listening, and so prolonged the length of mutual glance. This probably explains why they also spent a large proportion of time in mutual glance. Previously, EXLINE, GRAY and SCHUETTE (1965) concluded that women look at a continuously-looking interviewer more than men because they are more inclined towards affective and inclusive interpersonal behaviour. Only the relatinn between affection and looking is confirmed here.

Curiously, in the case of inclusion, the only strong relations

were with joint utterance, and both were negative. It would seem that subjects wanting to be included in social groupings avoided speaking when the other was speaking. Similarly, those wanting to bring others into their sphere spent little time in joint utterance.

None of these results coincide with those presented by KENDON and COOK (1969); but the modes of analysis differ considerably. In general, the present experiment should be expected to be more sensitive than its antecedents to relations between FIRO scores and behaviour, since participants were matched on the basis of these scores. Of course, it may also be the case that the obtained relations prevail only within dyads thus matched.

More information about inclusion was provided by examining the behaviour of the post hoc groups. One group consisted of pairs compatible with respect to reciprocation of inclusion- which means that the degree to which each subject wanted to include other people was nearly equivalent to the degree to which his partner wanted to be included. The other group consisted of incompatible pairs. Note that compatibility does not imply a high degree of inclusiveness; the subjects could desire to exclude one another, and thus be compatible. In fact the means of the raw FIRO scores for the two groups (compatible: expressed inclusion = 4.8, wanted inclusion = 3.3; incompatible : expressed inclusion = 5.1, wanted inclusion = 4.4, out of a maximum of 9.0) are high relative to those found on other dimensions in the present sample (see Table 3.2), but medial in comparison with broader samples (see SCHUTZ, 1967).

The point of interest is that members of the compatible pairs looked at the other more frequently, and shared mutual glance more

frequently, while they were playing the game. In general, the looking behaviour of the compatible pairs approximated the significantly higher level found in natural behaviour (see Table 4.7). On the other hand, the incompatible pairs showed the lower level of looking typical of game behaviour.

In Chapter 4, it has been demonstrated that the constraints of game-playing reduced the frequency of mutual glance (see Figure 4.2) in a sample composed without regard to FIRO inclusion scores. However, this effect did not prevail when people who were compatible with respect to inclusion played the game; they engaged in mutual glance as frequently as they did in normal conversation. The contrast between compatible and incompatible pairs in this respect was highlighted by the performance of five subjects who happened, at different times, to be members of both compatible and incompatible pairs. In the game-period, they engaged in mutual glance much more frequently when they interacted with a oompatible partner (Table 5.4). Almost every glance look at the compatible partner resulted in mutual glance!

5.3. Summary

The relations uncovered here between various types of interpersonal events and behavioural propensities assessed by the FIRO-B questionnaire correspond with common-sense notions of what people do. However, they do not coincide with relations discovered in previous research. One reason for this divergence is the use of different methods for correlation. A second reason is that only in the present project were the members of dyads matched on the basis of any standard (here, it was the FIRO-B scores themselves).

If a conversant was interacting with someone who was compatible with respect to giving and receiving affection, the amount of time that he spent looking at the other was proportional to the amount of affection which he habitually expressed. Similarly, his length of look and amount of mutual glance were related to his need to receive affection. Within this situation, the conversant, when playing a game, engaged in mutual glance much more frequently with a partner whose desire to be included in social groups was compatible with his own propensity to include others. This increase in mutual glance may have been due to synchronising accidents, since the increase in all types of looking behaviour, taken together, was significant. On the other hand, the striking change in behaviour illustrated in Table 5.4. suggests that there was a real increase in the frequency of mutual glance, a trend which ran contrary to that generally produced by game-playing. The author speculates that inclusion-compatible pairs engage in mutual glance more frequently to maintain their accord in this competitive situation.

A broader implication of the results discussed in this chapter is that if the FIRO-B questionnaire is to be used to assess interpersonal traits, then the compatibility calculations have greater predictive value than the raw scores.

	VARIABLE	STRONGEST FIRO-B COVARIATE	
CUMULATIVE DURATION	X LK	expressed affection	(+)
	X TK	wanted control	(-)
	X+Y LK	wanted affection	(+)
	X+Y TK	expressed inclusion	(-)
	X LK+TK	wanted control	(-)
	X LK+Y TK	wanted affection	(+)
AVERAGE DURATION	X LK	wanted affection	(+)
	X TK	wanted control	(+)
	X+Y LK	wanted affection	(+)
	X+Y TK	wanted control	(+)
	X LK+TK	wanted affection	(+)
	X LK+Y TK	wanted affection	(+)
FREQUENCY	X LK	expressed control	(+)
	X TK	expressed control	(+)
	X+Y LK	wanted inclusion	(-)
	X+Y TK	expressed control	(+)
	X LK+TK	expressed control	(+)
	X LK+Y TK	wanted control	(-)

Table 5.1 FIRO-B dimension which shows the maximal correlation with each of the variables. The direction of the correlation is shown in brackets.

GROUP 1: LOW COMPATIBILITY ON INCLUSION

PAIR	$_{x}k^{A}$	$_{r}k^{A}$	$_{r}k^{C}$	$_{r}k^{I}$
C-G	5	5	3	9
C-F	1	3	8	9
I-H	6	6	7	8
K-J	0	8	3	10
K-D	3	7	6	15
mean	3.0	5.8	5.4	10.2

GROUP 2: HIGH COMPATIBILITY ON INCLUSION

PAIR	$_{x}k^{A}$	$_{r}k^{A}$	$_{r}k^{C}$	$_{r}k^{I}$
A-D	1	7	3	5
A-L	2	4	3	4
G-I	3	3	2	6
E-H	4	4	6	5
F-J	1	7	8	4
mean	2.2	5.0	4.4	4.8

Table 5.2 Comparison of 4 calculated measures of 'compatibility'. Exchange compatibility on affection ($_{x}k^{A}$) was used as the criterion for forming the pairs of strangers, in the F2 part of the experiment. Using reciprocal compatibility on inclusion, i.e. ($_{r}k^{I}$) two 'ad hoc' groups (compatible and incompatible) were distinguished in order to examine the relation between FIRO-B scores and social performance. Note that all the pairs used here were composed of strangers.

	VARIABLE	GROUP 1	GROUP 2	DIFFERENCE
	1 X LK	7.50	10.44	-2.94
	2 X TK	12.49	12.45	.04
GAME	3 X+Y LK	5.78	10.82	-5.03
PERIOD	4 X+Y TK	3.72	4.08	- .36
MEANS	5 X LK+TK	6.75	8.73	-1.98
	6 X LK+Y TK	7.39	10.58	-3.19

	VARIABLES	D^2	F	DF	P LESS THAN
	1,2,3,4,5,6	6.26	2.68	6,9	.10
	1,3,5,6	4.78	3.76	4,11	.05 SIG
DISCRIMINANT	1,3,6	3.54	4.04	3,12	.05 SIG
ANALYSIS	3,6	1.81	3.36	2,13	.25
	5,6	.89	1.65	2,13	.25
	1,3	2.75	5.11	2,13	.05 SIG

	VARIABLE	GROUP 1	GROUP 2	DIFFERENCE
	1 X LK	9.34	10.91	-1.57
	2 X TK	6.57	8.08	-1.51
NATURAL	3 X+Y LK	9.95	10.57	- .61
CONVERSATION	4 X+Y TK	2.46	3.31	- .86
MEANS	5 X LK+TK	6.47	7.20	- .72
	6 X LK+Y TK	8.32	9.42	-1.10

	VARIABLES	D^2	F	DF	P LESS THAN
	1,2,3,4,5,6	.85	.36	6,9	
DISCRIMINANT	1,2,5,6	.72	.57	4,11	
ANALYSIS	1,2,6	.82	.82	3,12	
	1,2	.45	.89	2,13	

Table 5.3 Differences in mean frequency for each type of event in the game and natural conversation, for two groups formed on the basis of their FIRO-B scores. Group 1 is composed of pairs who are not compatible on Inclusion scores, Group 2 of pairs who are compatible. The difference is 1 minus 2. The table also gives the results of multivariate discriminant analysis on the differences of the group means. Combinations of variables (indicated by the numbers 1,2,3,etc.) showing the largest differences in means were used for the multivariate analysis. 'D^2' is Mahalanobis' D-squared.

	X LK	X+Y LK
COMPATIBLE PARTNER	16.9	13.8
INCOMPATIBLE PARTNER	14.7	7.3

Table 5.4 Mean frequency of looking and mutual glance for 5 subjects interacting with strangers who were compatible or incompatible with respect to the 'reciprocal inclusion' criterion. The data was taken from the POS period.

Part II-B: Results, continued

Chapter 6. The Pause

Prologue

It is perhaps surprising that there is so much silence in everyday conversation. In the present sample, it occupied between 16 and 50 percent of the total time spent in interaction, (Table 4.8a). A long silence between conversants can sometimes produce discomfort; there is an old adage which claims that the strength of a social relationship between two people is measured by the length of silence that they will endure together. If there is any truth in this, the friends in this experiment should have accepted longer silences than the strangers. But, for both, the timing of the speaker-switch presents an interesting problem; as the speaker's pause between bursts of speech becomes increasingly long, why doesn't the listener 'take the floor'? In this chapter, this problem is examined.

6.1. Classification of Pauses

Since the primary interest in pauses here lay in their relation to synchronisation of speech by the conversants, silence as detectable by a 'participant observer' was the appropriate datum. Therefore, 0.5 seconds was adopted as the lower limit of pause. Silences of this length or greater were marked in the transcripts. The completed transcripts were then used to sort the pauses into 3 categories: (1) pauses that occur between the phrases of one speaker = juncture pauses; (2) pauses that occur between the last phrase of one speaker and the first phrase of the second speaker = pauses that delineate speaker-switch; and (3) pauses that occur within the phrases of one speaker = hesitation pauses. The 3 categories taken together provided an estimate of what the conversants judged to be a comfortable length

of silence, and how long the listener waited before assuming that the speaker had finished, that it was his turn to speak.

As the transcripts were being prepared from the audio-tape, speech was intuitively grouped into phrases. These phrases probably approximated the phonemic phrase, even though the author had not been trained in Trager's "suprasegmental analysis". The phonemic phrase has been defined as "....a phonologically marked macrosegment which ..... contains one and only one primary stress and ends in one of the terminal junctures /I,II,#/." (BOOMER, 1965, p.161); the definition, in fact, attempts to codify our everyday notion of phrasing.

In practice, a speech-burst like "you can go to number ten" was classed as a oomplete phonemic phrase, whereas "you can go to" was judged as an incomplete phrase. As has been noted in previous work, the occurrence or absence of a pause did not reliably mark complete or incomplete phonemic phrases. A pause following the complete phrase was categorised as between phrase; a pause following the incomplete phrase was categorised as within phrase. Similarly, utterances of the type "yeah", "oh", "uh huh", and false starts like "thr" were treated as incomplete phrases.

The categories defined here correspond essentially to those used by BOOMER (1965) and JAFFE and FELDSTEIN (1970). Since the latter found, in a large sample, that speaker-switch occurred after a terminal juncture 21 times more frequently than elsewhere, only such speaker-switches were examined here. Commonly, utterances like "mmm", "oh", etc., have been treated as filled hesitation pauses; the measured pause then included these vocalisations plus the subsequent silence. However, in the present work, the measured hesitation followed, rather

than included, these brief vocalisations.

It is important to note that all the pauses were defined with reference to a linguistic standard, the phrase, observed in the transcripts. On the other hand, the utterance, as used in Chapter 4, was defined as a continuous burst of speech by one speaker, as perceived by the panel of observers. The terms 'phrase' and 'utterance' are used to distinguish the results of these two types of assessment. Since human observers listening to connected speech are usually insensitive to pauses, even long ones, following phonemic phrases (BOOMER, 1965), the events 'phrase' and 'utterance' do not necessarily coincide.

6.2. Statistical Analysis

For each sample of conversation, a mean length and frequency of each type of pause was obtained. Since each datum represents the performance of a pair of subjects, the number of independent samples was halved. As a result, little information was available about pauses in the PRE period, so a simplified factorial design was used for analysis: two levels of F (friends vs. strangers, comparisons between pairs) and two levels of P (GAM vs. POS periods, comparisons within pairs). Data from ten conversations was available in each cell.

Raw scores were transformed as follows: for mean length, $x_T = \log(x_i + 1)$; for frequency, $x_T = \sqrt{x_i} + \sqrt{x_i + 1}$. The resultant values were examined via multivariate analysis of variance and by independent univariate analysis of variance. The outcome is presented in Tables 6.1, 6.2, 6.3 and in Figure 6.1.

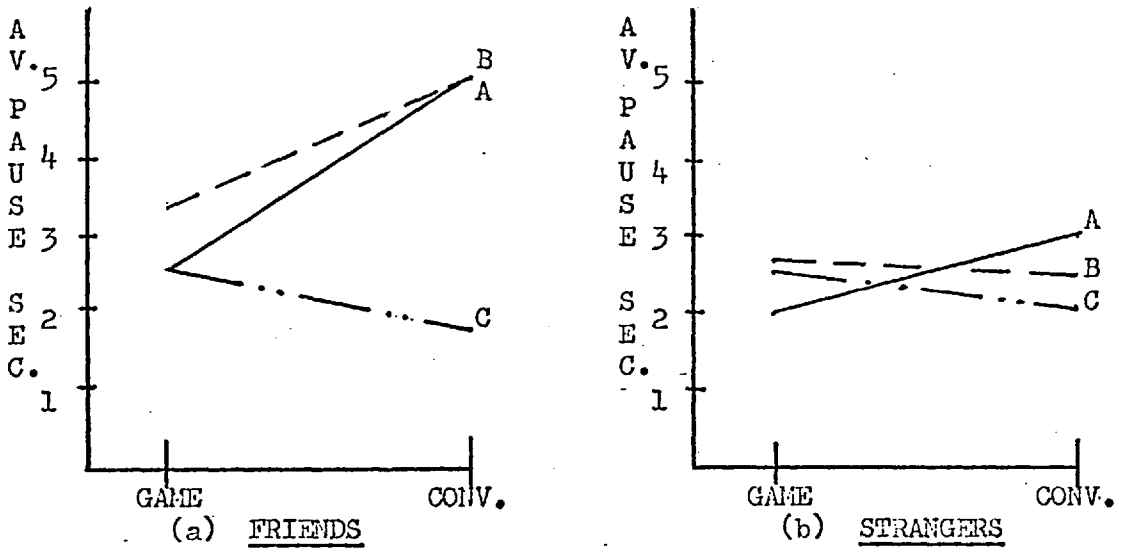
6.3. Results

Factors F and P both affected the length of pauses between phrases by the same speaker. Factor F alone affected the length of pauses at the 'speaker switch', and factor P alone affected the length of pauses within phrase. Figure 6.1 depicts the changes in more detail. Figure 6.1 (a) indicates that friends paused longer between phrases in the 'natural' period than in the game period, but made shorter pauses within phrase. Figure 6.1 (d) shows that, within the 'natural' period of conversation itself, friends paused much longer between phrases, and marginally shorter within phrase than strangers did. Figure 6.1 (b) and (c) do not show any major trends.

The frequency of pauses was largely unperturbed by changes in factors F or P. The sole exception was the frequency of pauses between phrases by the same speaker, which increased with the change from game to 'natural' conversation. (Table 6.4). Since most of the results were not statistically significant, diagrams of frequency were not prepared. Conceivably, the occurence of pauses is dependent upon the moment-to-moment progress of interaction, not upon durable characteristics of the speakers. This argument is supported by the fact that the only significant difference in frequency occurred between game and natural conversation, where the moment-to-moment progress was visibly different (Figure 4.1).

6.4. Pause and Speaker Synchrony

A pause is a temporary break in the continuity of speech. When such a break occurs in the speech of one member of a dyad, the other might take this as a cue to begin speaking. If this cue lies in speech



Differential effects of two modes of interaction on pause length for friends and pause length for strangers.

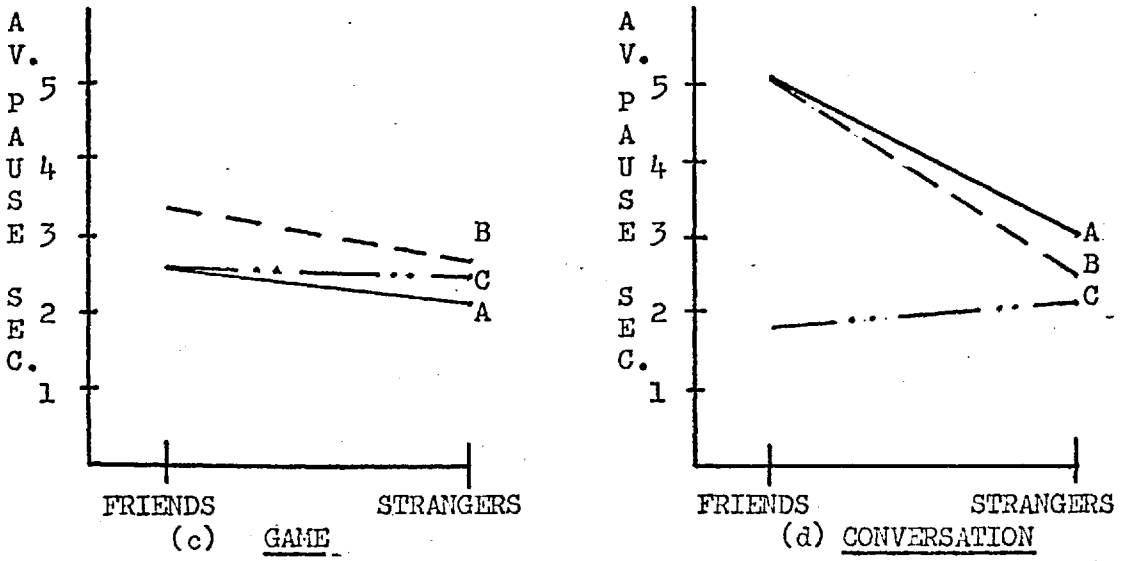


Figure 6.1 Differential effects of two degrees of acquaintance on pause length in the game and pause length in natural conversation. Mean lengths for each of 3 types of pause are given: type A= between phrase, type B= between speakers, type C= within phrase. The lines connecting points are for clarity only; they are not intended to depict the nature of change.

continuity alone, then the pause occurring before another speaker commences should be longer than the pause occurring between consecutive phrases by the same speaker. In the present data, such was not the case: the pause occurring before speaker-switch was roughly the same length as that occurring between one speaker's phrases. Furthermore, the lengths of the two types of pause displayed parallel changes as the type of interaction or the degree of acquaintance was varied (Fig. 6.1). This suggests that the cue for speaker change lies elsewhere.

One cue is the terminal juncture. The terminal juncture is a linguistic boundary, marking the end of the phonemic phrase (see also the end of section 2.2.1). The 'juncture pause' is typically longer than the any 'hesitation pause' occurring within a phonemic phrase (BOOMER, 1965; JAFFE and FELDSTEIN, 1970; and the present data, in some cases). BOOMER has interpreted both juncture and hesitation pause as temporary halts occurring as the speaker formulates the next phrase. But there are some differences between the two types of pause; one stands between one completed unit and the beginning of the next, the other occurs after the speaker has made a 'false start' and decided to say something else, or has found that he hasn't completely formulated his phrase. One, the juncture pause, may therefore mark long-term planning; the other, hesitation pause, may indicate shorter-term 'repair' planning. Another difference is that speaker-switch occurs much more frequently following juncture pause than hesitation pause (the ratio derived by interpolation from the results of JAFFE and FELDSTEIN, 1970, would lie between 21:1 and 25:1).

When friends played the game, pauses between phrases were significantly shorter, those within phrase significantly longer, than

in conversation. Evidently, there was a change in the location of the planning pause; in the game, planning appeared to occur, characteristically, after an initial "uhm" or "yes" (Figure 4.1). This may be due to two interacting facets of the game: first, the structure of the game prescribes short verbal exchanges about position of pieces, etc. (Figure 4.1, and Table 4.8), so that there is less demand for long-term planning; secondly, the structure of the game also suggests the point at which speaker-switch should occur, namely, after one player has announced his position. Speaking time is thus made available to the other player, after a short juncture pause; he signals that he is taking the opportunity to speak ("uhm", "yes"), then pauses to determine his response to the other's remark (in the game, the response is in terms of action as well as words). In conversation, however, bursts of continuous speech are longer, and more complex. Change in the structure of interaction may therefore explain why, in the case of friends, the latency of speaker-switch paralleled the latency of the speaker's phrases.

Another cue for speaker-switch lies in the glance of the speaker, signalling that he is about to stop speaking; or, in the glance of the listener, signalling that he wants to take over (KENDON, 1967). For either of these glances to be effective, the other must look at the same time, occasioning 'eye contact'. Examination of the transcripts revealed the following trends: pauses within phrase tended to be concomitant with glance by the listener alone; there tended to be no looking at all during pauses between phrases; and, switching-pauses tended to be immediately preceded by mutual glance! ('Immediately preceded' means that mutual glance terminated at the juncture marking

the beginning of the pause. Because of the effort involved in sorting the great number of combinations of pause and glance, the foregoing is an estimate based on a random sample of 8 informal conversations).

The first tendency is congruent with the theory that pauses within utterance occur as the speaker decides how he will continue (BOOMER, 1965). The third suggests that mutual glance may carry some clue that the speaker has finished (e.g. he has looked up to meet the glance of the listener at the end of his utterance). In any case, the pause leading to speaker-switch seems to differ from the pause between phrases with respect to looking behaviour.

Probably, both of these types of cue are operating. KENDON (1970) has shown that the listener is able to anticipate speech in matching his pattern of movement with the speaker's. The listener may anticipate a terminal juncture, and look at the speaker as this approaches; a reciprocation of this glance may be the speaker's signal that speaking time is available to the listener. It has been demonstrated here (section 4.5) that looking behaviour is essentially dependent upon verbal behaviour in the game, but not in conversation. The changes in the pause behaviour of friends may then be attributed primarily to differences in the structure of verbal interaction between game and natural conversation.

Unfortunately, this explanation cannot, at the moment, be applied to the data for strangers. For strangers, pause lengths did not show great differences between game and informal conversation. Strangers also showed anomalous pause behaviour in informal conversation; their pauses clustered around a significantly shorter length than friends

pauses. Comparing (a) and (d) in Figure 6.1 gives the impression that talking informally to strangers has the same effect on pause length as playing the game. It may be that dialogue between strangers was more structured. On the other hand, it may be that the conversants kept pauses shorter when interacting with someone whose conversational style, synchronising habits, and so on, were unknown. Or, finally, the strangers' higher speech rate may have been due to the tension of first encounter.

6.5. Summary

Table 6.5 makes a rough comparison of the present results with those of two previous studies. The present values are considerably greater, for several reasons.

Although JAFFE and FELDSTEIN (1970) used a naive participant's judgement to set the pause threshold, their lower boundary of pause was closer to the 0.2 seconds used by BOOMER (1965) than the author's 0.5 seconds. Furthermore, previous researchers used electronic detection, which greatly increased their sensitivity and accuracy in the lower regions; both used different types of speech sample differing from the ones herein; and their projects had different goals.

The primary purpose in measuring pause in this project was to examine its role in speaker synchrony. The enigma was, why doesn't the listener take the floor every time the speaker pauses? In this regard, the longer pauses, those perceivable by a participant, were appropriate data.

In dialogue between friends, pause length showed consistent variation with the type of interaction. This was attributed to the

differences in verbal behaviour between game-playing and natural conversation. It was suggested that the occurence of a terminal juncture and mutual glance interact to determine speaker-switch.

In dialogue between strangers, pause length remained uniformly short, at about the level seen in the game between friends. Several reasons - differences in verbal structure, difficulties in synchrony, tension due to first encounter - were advanced to account for this. Fruther study of the transcripts of speech and glance may enable the author to decide among some of these alternatives.

	SOURCE	F	DFhyp	DFerr	P LESS THAN
AV.DURATION	F	5.166	3	16.00	.05 SIG
	P	3.809	3	16.00	.05 SIG
	FP	0.775	3	16.00	
FREQUENCY	F	1.440	3	16.00	
	P	2.362	3	16.00	.25
	FP	0.320	3	16.00	

Table 6.1 Results of multivariate analysis considering all 3 types of pause.Factors F(Friendship) and P(Period) each have 2 levels; both are assessed 'within subject',with n=10 per cell.Error term is FP x subjects-within-groups.

PAUSE TYPE	SOURCE	F	DF	P LESS THAN
BETWEEN PHRASE	F	6.675	1,18	.05 SIG
	P	4.686	1,18	.05 SIG
	FP	1.196	1,18	.25
BETWEEN SPEAKERS	F	7.092	1,18	.05 SIG
	P	0.443	1,18	
	FP	1.768	1,18	.25
WITHIN PHRASE	F	0.236	1,18	
	P	8.077	1,18	.05 SIG
	FP	0.099	1,18	

Table 6.2 Univariate analysis of variance on the average duration of each of the types of pause.

PAUSE TYPE	SOURCE	F	DF	P LESS THAN
BETWEEN PHRASE	F	1.183	1,18	
	P	7.812	1,18	.05 SIG
	FP	0.248	1,18	
BETWEEN SPEAKERS	F	0.587	1,18	
	P	0.238	1,18	
	FP	0.113	1,18	
WITHIN PHRASE	F	4.279	1,18	.10
	P	0.219	1,18	
	FP	0.638	1,18	

Table 6.3 Univariate analysis of variance on the frequency of each of the types of pause.

PAUSE TYPE		AVERAGE DURATION (SEC.) GAM	POS		FREQUENCY GAM	POS
BETWEEN PHRASE	FRN.	2.6	5.1	FRN.	3.0	5.2
	STR.	2.1	3.0	STR.	2.6	5.8
		GAM	POS		GAM	POS
BETWEEN SPEAKER	FRN.	3.4	5.1	FRN.	5.3	5.1
	STR.	2.7	2.5	STR.	5.4	3.2
		GAM	POS		GAM	POS
WITHIN PHRASE	FRN.	2.6	1.8	FRN.	3.2	2.1
	STR.	2.5	2.1	STR.	6.1	4.1

Table 6.4 Cell means for average duration and frequency of each type of pause. FRN.= Friends,F1; STR.= Strangers,F2. The n per cell is 10.

SOURCE		STRUCTURED INTERACTION J.P.	H.P.	S.P.	INFORMAL CONVERSATION J.P.	H.P.	S.P.
BOOMER (1965)		1.03	.75				
JAFFE and FELDSTEIN (1970)		.84*		1.4	.77**	.66**	
PRESENT RESEARCH	FR.	2.6	2.6	3.4	5.1	1.8	5.1
	STR.	2.1	2.5	2.7	3.0	2.1	2.5

(a) Length of 3 types of pause measured in 3 different studies. J.P.= juncure pause(between phrase) H.P.= hesitation pause (within phrase) S.P.= speaker-switch pause(between speakers) FR.= pairs of friends STR.= pairs of strangers.All values are in seconds

* note that the voice relay confuses H.P. with J.P.

** from p.23,JAFFE and FELDSTEIN,1970;other values from appendices.

SOURCE	STRUCTURED INTERACTION	INFORMAL CONVERSATION
JAFFE and FELDSTEIN (1970)	1.90	1.40
PRESENT RESEARCH	1.39	2.55

(b) Length of utterance in 2 different studies.All values are in seconds.

Table 6.5 Comparison of data obtained in the present research with the results of previous studies.

Part II-B: Results, continued

Chapter 7. The Transcripts

Prologue

Transcripts of verbal performance, with the looking behaviour superimposed upon it, comprise the non-numerical information about interaction. In the previous chapters, the transcripts have proved valuable in making certain distinctions - like the one between 'game behaviour' and 'informal conversation' within the game GAM period, or the distinctions among the three types of pauses.

Additionally, the transcripts are in themselves interesting. But how are 300 pages of dialogue to be summarised? This problem has yet to be solved. In this chapter, the author suggests several possible lines of analysis, in presenting an extended example. This chapter samples a series of conversations and attempts to illustrate types of "content analysis". The comments are restricted to natural conversation, for the dialogue in the game periods consisted largely of short, rather standardised declarations of position.

7.1. The Significance of Transcripting Errors

Preparation of the transcripts was an unusual task. In a similar occupation, the Hansard reporter or stenographer performs quite differently. The stenographer who sent out a letter beginning "OK, uh, what's his blasted name, Jones, James, yeah, Jervis" would not hold her job very long. The stenographer has an idea of what form the letter should take, and she fits the dictated utterances into that pattern, eliminating "uh", repetitions, mistakes, peculiarities of pronunciation, and so on.

In making the transcripts, the author, as 'participant observer', attempted to capture every utterance - and in so doing found evidence

that, ordinarily, the listener in a conversation is performing in much the same way as the stenographer. The observer's method was to listen to one or two phonemic phrases from the tape, write these down, then re-play the tape to check accuracy. Three types of error were very frequent: (1) false starts, stutters and other speech disturbances were completely overlooked, (2) the transcript paraphrased the actual recording, in using synonyms or rearranging the word order, and (3) misinterpretation of a single word led to long passages in the transcript which were congruent with the misinterpretation, but bore only a vague relation to the recording. (At first the transcriptor thought his hearing was defective; however, during the latter parts of the task, he participated in experiments by a colleague which indicated that his practiced ear was able to detect words embedded in noise more accurately than most people!).

These errors had two implications for a theory of understanding. On one hand, the observer, in the role of an ordinary participant in the conversation, was ignoring speech disturbances which were not relevant to the projected form of the speaker's utterance. (cp. CICOUREL, 1972). That he was re-formulating this expectation in his own terms was revealed in the paraphrasing type of error. This error was reminiscent of the cases mentioned by WERNER and KAPLAN (1963; p.109) where, on being asked to repeat a word, children substituted their own synonym. In a parallel task, BARTLETT (1932) found that most distortion in verbally transmitted stories is introduced by idiosyncratic paraphrasing.

On the other hand, the 'participant observer' was far removed in time from the momentary context of conversation. He was, of course,

a 'participant' in theory, not in fact, which meant that at no time could he contribute to the interaction. Had he been able to do so, after constructing a train of thought based on the type of misinterpretation seen in the third error, his comment would have been irrelevant; the speaker would have been able to set him right. Occasionally, this sort of chain of misinterpretation apparently occurred within the conversation, for the conversants made increasingly divergent utterances, until a point of obvious conflict occurred; then the 'lack of communication' was revealed.

Other related characteristics of conversation contributed to the transcripting errors. The range of topics of discussion over all the samples was very broad, although the strangers tended to concentrate on the course of study or background of the other in the PRE period. Within a given conversation, change in topic was frequently abrupt; and topics often re-appeared after being dropped. For the observer, these changes were sometimes difficult to follow.

Secondly, verbal performance was generally very fragmentary. It did not procede through grammatically ideal statements, but through bits, usually phonemic phrases or smaller units during stutters, false starts, or other speech disturbances. There was a tendency towards "pure predication" - omission of the grammatical subject when it was apparently understood by both parties. VYGOTSKY (1962) notes this and other forms of abbreviation (terseness, syntactic simplicity) between persons in "close psychological contact". Here again, the 'psychologically distant' transcriptor encountered difficulty.

For technical reasons, the transcripts were prepared from the audiotapes. When the video-tape was reviewed in order to superimpose

the looking behaviour, the availability of the visual context permitted clarification of all the most difficult verbal passages. This probably reflects the transcriptor's use of lip-reading (STAPLEY, 1972) and other visual clues which have been discussed in Chapters 4 and 6.

Many of the foregoing remarks are impressionistic. However, they suggest regions to be explored more precisely in the voluminous transcripts prepared by the author. In the meantime, a more detailed discussion of one series of conversations is presented in the next section.

7.2. Content analysis of sample conversations

Since all of the transcripts could not be summarised here, the author decided to present a sample analysis. One subject was selected (via tables of random numbers) from the 12 who participated in all 3 sessions. Four passages of his dialogue are presented in Figures 7.1 to 7.4; he is speaker X in each of these. The first is all of his conversation with a friend which was available in the PRE period. The second is from his conversation with a friend in the POS period. The third and fourth samples are from the PRE periods with two different strangers. Each passage covers approximately one minute of time.

In 3 of the 4 exerpts, the topic of conversation was the experiment itself. In this regard, there was no distinction between friends and strangers; however, it is significant that the discussion of College careers occurred between strangers, at first meeting (Figure 7.4). In the latter case, each described the general qualities of his course of study, rather than the particular details, like "soil mechanics was very good today", as might be expected between friends.

1 the questions are slightly different everytime

2 YEAH YEAH I NOTICED THAT

3 and so your answer you see they want
A DIFFERENT WORD YOU KNOW

4 you to answer they want they want you to put your own

5 meaning on the question

6 HMMM

7 and answer to your meaning

8 THAT'S IT YEAH

9 it's just a way o' measuring the e' extrovert qualities

10 HMMM GOT SOME SMART EQUIPMENT THROUGH THERE

11 Y' KNOW THESE THINGS Y' HAVE FOR ACTION REPLAY THINGS

12 Y'KNOW WHERE THE YOU KNOW PICTURE AND EVERYTHING

13 THEY GOT ONE OF THEM THROUGH THERE

14 BELONGS TO THE COLLEGE COST A THOUSAND QUID OR

15 SOMETHING HE SAID LAST TIME SMART STUFF FANTASTIC VIEW

16 OUT THERE HAVE YOU SEEN IT?

17 naaaa

Figure 7.1 X speaks with a friend in the PRE period. In this, and in the next 3 figures, the following conventions apply: the utterance of X is designated in capitals, THUS; the utterance of Y is designated in small case, thus; X looks at Y= ————; Y looks at X= — — — —; the numerals at the left are merely for location of examples; pauses are indicated by 3 consecutive spaces thus; and, instances of joint utterance are indicated by placing the second burst of speech ½ space below the point of interruption,
thus.

1 / RELATE TO THE DESIGN OF A OF A VIDEOPHONE? //

2 // I MEAN Y' GOT THE SOUND Y' GOT THE PICTURE WHAT ELSE /

3 / CAN Y' HAVE? - - -

4 UNLESS IT'S JUST A PSYCHOLOGY TEST - - - /

5 / might be

6 COULD BE COULDN'T IT ALTHOUGH THEY GONE TO A HELLUVA EXPENSE
yeah

7 FOR A PSYCHOLOGY TEST COURSE THEY'VE HAD TO HAVE

8 ALL THIS APPARATUS HAVEN'T THEY /

9 / yeah /

10 / I MEAN IT'S QUITE ELABORATE STRUCTURE IT'S A LOT ISN'T IT /

11 / APPARENTLY THESE THINGS ARE SIX HUNDRED AND TWENTY FIVE LINES /

12 / WHEREAS THE ONES ON THE TELEPHONE ARE ONLY BE GOING TO BE /
/ A FEW HUNDRED

13 quite a good picture wasn't it //

14 // YEAH ALTHOUGH I GOT I GOT A BIT OF A NOT FUZZ UHH /

15 / WHEN IT'S TOO LIGHT N' IT KINDA ALL GOES WHITE //

16 // hmmm //

17 // Y'KNOW I GOT QUITE A BIT O' THAT SO THAT WHEN YOU GOT TOO /

18 / CLOSE I'M SURPRISED THAT THIS LIGHT /

19 / WAS SUFFICIENT TO GET SUCH A CLEAR PICTURE -

20 Y'KNOW I THOUGHT IT HAD TO BE DEAD STRONG /

21 / LIGHTING ON THOSE

Figure 7.2 X speaks with the same friend as in figure 7.1, but in the POS period.
X SPEAKS; X LOOKS —— ; y speaks; y looks - - -

1 WHO SPONSORS THEM IS IT THE UHM UHM YOU KNOW THE KIND OF A PEOPLE

2 / YOU KNOW OR DO THE GOVERNEMENT DO IT THAT SPONSOR THIS LOT?

3 / oh i have no idea they've a hell of a big grant to support them

4 eleven hundred quid

5 HMMM MMMM IT'S INDUSTRIAL PROJECTS I SUPPOSE THE INDUSTRY THA
hmmm

6 THAT'S DOING IT YOU KNOW IS PAYING THEM ALL SO I DON'T SUPPOSE THEY

7 MIND HOW MUCH THEY SPEND

8 i don't really understand what the purpose of it is

9 / I DON'T UNDERSTAND WHY THEY GIVE YOU ALL THOSE FORMS AT THE BEGINNING

10 / YOU KNOW
i think

11 it's t to uhm just to get the impression of the personality of the

12 // person that you're playing the game with

13 // YEAH

14 and uhm

15 COMPARE THAT WITH THEIR REAL PERSONALITIES

16 // yeah and see how it comes the personality comes out on the television

17 // YEAH

18 maybe we shouldn't be talking to each other

19 // NO THAT'S WHT I THOUGHT

20 there's another game there it's exactly the same except there's only

21 / one gate in it

22 / YEAH

23 / naughty

Figure 7.3 X speaks with a stranger, in the PRE period.
X SPEAKS; X LOOKS ——; y speaks; y looks - - -

1 divide out the notes if they come in divide out the notes

2 come in do about three questions of tutorials which you're

3 supposed to do about five or six or YEAH and then you get a pro-

4 / ject n'y'got a spend all your kinda other time doing your project YEAOW

5 there's always an evening of practicals

6 THAT'S SOMETHING I MISS DOING IN MATHS IS PRACTICALS PROJECTS Y'KNOW

7 / I MUCH PREFER TO DO SOMETHING APPLIED Y'KNOW WHERE I CAN SEE WHAT'S

8 //GOING ON ALL WE DO IS IS WRITE LETTERS DOWN N' ADD THEM UP Y'KNOW

9 / THAT'S ALL WE DO NEVER ANY ANYTHING CONCRETE TO SEE THAT'S WHY YOU

10 KNOW I WISH I'D DONE AN ENGINEERING COURSE LOOK AT THIS COURSE YOU KNOW

11 / but maths is pretty effectively

12 //PARDON

13 //from here maths is really good to be in

14 / APPARENTLY YEAH IT'S ON A PARR WITH CAMBRIDGE AND THAT'S THE ONLY ONE

15 / NEAR IT I THINK YOU KNOW

16 //what is cambridge as good? not better

17 / AHH WELL I THINK CAMBRIDGE GETS THE PEOPLE YOU KNOW I THINK ANYBODY ANY

18 GOOD APPLIES TO CAMBRIDGE FIRST AND THEN TO HERE BUT I DON'T THINK THE

19 / LECTURING'S AS GOOD AT CAMBRIDGE THE COURSE ISN'T AS GOOD YOU KNOW IT'S

20 / JUST GOT THE REPUTATION SO I THINK IF IF YOU GET A DEGREE HERE YOU'RE

// BETTER TRAINED BUT IT DOESN'T GO AS FAR SO EARLY

21 //yeah but it does in the end

22 //YEAH YEAH YEAH IN THE END
the better training

Figure 7.4 X speaks with a second stranger, in the PRE period.
X SPEAKS; X LOOKS ——; y speaks; y looks - - -

7.2.1. Continuity

Much of the dialogue was fragmentary, involving short phonemic phrases rather than grammatical sentences (compare lines 1-2 with lines 9-10 in Figure 7.3). Generally, there were very few speech disturbances of the type "uh", "ah" (filled hesitation pauses). Between friends, there were two instances of repetition, in 7.1, line 4, and 7.2, line 14, but no false starts (note that 'Figure 7.n' is henceforth abbreviated to '7.n'). Between strangers, there were, in one case (7.3), false starts (lines 2, 5) and filled hesitation pauses (lines 1, 10, 14); and in the other case (7.4) none of these. The overall effect is that one of the conversations (7.4) appeared to be relatively smooth and continuous, while the other (7.3) seemed disjointed.

A further contribution to the disjointedness of all the exerpts except 7.2 was the frequent use of "you know" by X. Here is a phrase recurrent as X converses with one friend and two strangers in succession. It thus appears to be a speech habit; it might be considered a filled pause, comparable in function to "uh". However, X seemed to use "you know" in two ways: one seemed to occur when X was searching for a word, characteristically intruding into an incomplete phrase (7.1, line 12; 7.3, lines 1, 2); the second seemed to be a type of emphasis, for it always occurred before or after a complete phrase (7.1, line 3; 7.2, lines 17, 20; 7.3, lines 6, 9; 7.4, lines 6, 7, 8, 9, 15, 17, 19). In both cases, X seemed to be addressing the listener's comprehension: in the first, "you know" carried the import "do you know what I'm talking about, the word I want?"; and in the second, its import was "yes, you do know what I'm

talking about!".

7.2.2. Predication

Significantly, "you know" as an appeal to the other's understanding occurred where predication was in doubt. X never said "you know is bright green". Any utterance may be broken down into two parts, topic and comment (CHOMSKY, 1965, p.221). In English, these correspond roughly to subject and predicate, and the conventional mode of organisation is to state the topic briefly and elaborate upon it in the comment ("right branching"). It would be very strange to make a comment without reference to a topic. On the other hand, having stated the topic, the speaker may search for precisely the right comment, and even suggest to the listener that he anticipate the nature of the unformed comment; this is what X appeared to be doing in the first use of "you know".

Looking behaviour should differ during topic and comment parts of the utterance. The listener should be expected to look during the comment section : topic stated, usually carried over from the previous utterance, the listener should attend to the 'original' part of what the speaker has to say, and to the concomitant visual information in the speaker's face. This expectation was realised in both the dialogues between strangers (7.3, 7.4): the listener generally looked throughout the predicate.

On the other hand, one of the functions of glance for the speaker is to assess the reaction of the listener. He should look in the comment section, for two reasons: first, the comment section probably requires more planning, during which the speaker cannot digest visual

information, so after he has formulated the predicate, the speaker looks as he unfolds it; secondly, only when the speaker is making an 'original' comment about the topic should he expect some reaction from the listener. Both factors probably operate - in any case, 7.3 and 7.4 show that, in addressing a stranger, the speaker looked regularly in the comment part of his utterance. Usually, his look coincided with some sub-section of the comment (e.g. 7.4, lines 2, 7, 8, 17, 18, 20), so that he engaged the listener in mutual glance only during a fraction of the listener's look.

In the present sample of dialogue between friends, the pattern of looking in the predicate appeared frequently in the speaker (7.1, lines 1, 5, 9, 11, 15; 7.2, lines 7, 10, 18), but the listener tends to look throughout the whole utterance. Generally, these two friends made more looks of longer duration, covering several phonemic phrases.

In the case of speaker X, looking behaviour was also related to his use of "you know". When this cliche occurred within the predicate, it was not accompanied by glance at the listener (7.1, line 12; 7.3, lines 1, 2; 7.4, line 9). This is congruent with the argument, advanced earlier, that this use of "you know" filled a space in which the speaker was searching for a word; he could not simultaneously process visual information from the listener.

During his other use of "you know", occurring at the beginning or end of a complete phrase, X usually glanced at the listener (7.1, line 3; 7.2, line 17; 7.4, lines 7, 8, 15, 19). This supports the notion (expressed in section 7.2.1) that this use of "you know" asserted the accordance between speaker and listener.

There are exceptions, where this second type of "you know" was not accompanied by glance (7.2, line 19; 7.3, lines 6,9; 7.4, line 10).

However, the distribution ofthese exceptions reflects the difference in quality between passage 7.4 and the others, a difference previously described in terms of continuity (section 7.2.1). In comparison with 7.4, the other passages are disjointed, broken by speech disturbances, and also have relatively fewer instances of "you know" wherein X appeared to be signalling accord with the listener.

7.2.3. Pure Predication

In some cases, the speaker may omit mention to the topic. Then conversation procedes by comment alone: the speaker may predicate a topic which he introduced earlier (in the present example, 7.1, lines 3, 7, 10, 14, 15); or, the listener may supply a comment in response to a topic mentioned by the previous speaker (7.3, line 15). This type of "pure predication" indicates that the conversants believed that they were communicating effectively. VYGOTSKY (1962) observed that pure predication occurred between people in "close psychological contact", and considered it typical of the thought process itself (wherein the thinker need not remind himself of the topic of his thought). In the present example, pure predication did occur more frequently between friends.

The use of the pronouns "it" and "that" is virtually equivalent to pure predication. The speaker assumes that the topic referred to by "it" or "that" is clear to the listener. These types of predication occurred in the dialogue of both friends and strangers. However, in the case of strangers, the reference was sometimes more cautious. For instance, Y began with "it comes", then immediately replaced the pronoun which apparently seemed vague: "it comes the personality comes"

(7.3, line 16). Similarly, X did the same thing in a grammatically odd way by adding the pronoun's referent to the end of his phrase: "that's something I miss.....is practicals" (7.4, line 6).

In the sample presented here, the modes of predication illustrate the conversants' handling of the problem of meaningful reference. Since the predicate normally conveys the speakers' 'original' contributions on the topic, each conversant must be sensitive to the momentary perceptions and expectations of the other (section 1.10). In one use of "you know", X appears to have asserted the cognitive rapport between himself and his partner; and, in the other use, [illegible] it. Where pure predication proceded smoothly, the conversants were apparently in cognitive accord; but their sensitivity to ambiguous reference was revealed in the cautious use of the pronousn "it" or "that".

7.3. Summary

Both the transcripts and the transcription process provided evidence of how meaningful reference procedes. The type of error made in transcripting suggests that the listener constructs a model of the speaker's projected utterance. The model appears to have been formulated in the listener's own terms. Some types of discrepancy between the model and actual speech (speech disturbances, errors) were ignored.

A sample taken from four conversations involving one subject, X, revealed a relation between a speech habit of X, predication, and looking behaviour. Occurrence of the speech habit seemed to vary with X's perception of the accord between himself and the listener. Another

index of this accord was pure predication, the omission of the grammatical subject.

Part III: Epilogue

Chapter 8. Conclusions and Recommendations

The project seems to have been successful in its major aim- to bring everyday conversation into the laboratory. Particularly in the POS period,over coffee,the participants appeared relaxed, and lingered in a situation free from imposed goals. In short, they had little to do but drink coffee and speak to one another. As the random sample in Chapter 7 shows,their intercourse was very informal (in comparison with the more structured exchange in the GAM period,Figure 4.1).

This difference in appearance between verbal performance in the game and verbal performance in 'natural' conversation was borne out by an examination of the integration of vocal and visual gesture. On one hand,a set of rules and constraints were imposed, and resulted in restricted patterns of looking and speaking; in the absence of imposed constraints,the patterns of looking and speaking were more elaborate. In retrospect,the distinction drawn between 'extrinsic' and 'intrinsic' motivation (Chapter 2) seems to be justifiable.

This means that research into communicative behaviour cannot be insensitive to the problem of sampling. Results obtained through one method of sampling will not necessarily generalise to other situations. Although games are generally considered paradigms of everyday social behaviour,the present project has demonstrated significant differences between the two. Perhaps the next question is, "do other types of extrinsic goals- in interview,or negotiation- impose similar constraints on social performance? or do different

goals impose characteristic patterns?" This project has demonstrated some techniques which might be used in pursuing the problem of typology in communication.

Repeated measures on the same individuals should be a powerful procedure in this regard,and in the study of conversational style. The structure of the present experiment could be fully exploited by 'sandwiching' a manipulative period between two periods of 'normal' conversation. For instance,the power relations in the game period could be radically altered by having an experimenter intervene on the behalf of one of the players. Whether this induced changes in perceived status could be assessed by comparing 'normal' conversation before and after the period of intervention.

Of course,there is a plethora of factors which could be explored, for the study of social interaction as a process is just beginning. Herein,the participants' perceptions and expectations were mildly manipulated by matching them with friends or strangers; the differences in 'vital fields' seems to have had some effect on interaction synchrony and pause behaviour,and on the content of interaction. Study of how cognitive divergence influences interpersonal behaviour should be very fruitful, for the cognitive organisation underlying selective attention and memory should be exposed in conversational transcripts (cp. CICOUREL,1972).

A useful description of social interaction has been provided by the whole set of measures employed here. The sub-set describing

interaction synchrony is sensitive to changes which are perceived qualitatively by an ordinary observer (Figure 4.1); this sub-set is amenable to reliable measurement and automated analysis.

The compatibility scores obtained via the FIRO-B questionnaire are useful tools. Compatibility on reciprocal exchange of affection apparently characterises the relationship "friend",at least under the present circumstances.

Another important source of information is the transcript of verbal performance,with glance and pause superimposed upon it. Unfortunately,preparation of these records is extremely tedious. Where very large samples are required, development of automated techniques would be highly desirable. Generally,the transcription problem has three aspects: one is preparing a synchronous record of speech and glance and pause; the second is transcribing this information onto paper for content analysis; the third is the measurement of its temporal properties. The first problem might be solved by coding, magnetically ,the observers' judgements of glance upon the audio-recording of speech. Then,a skilled audio-typist could magnetically code the verbal performance with particular attention to the temporal relationships; the goal would be to transform the audio record into a synchronous alphabetic record legible to a computer. A computer could then read this tape to reproduce the verbal content,glance,and pause length in printed form; and to measure and analyse interaction synchrony. This type of automation

might be realised through the use of multi-track tape-recording, with a minimum of interfacing hardware.

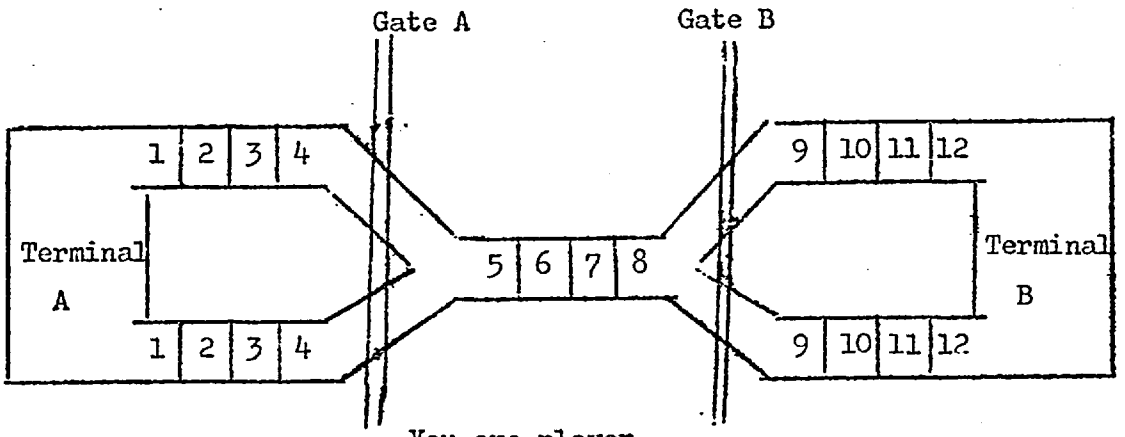
Methods for the automatic measurement of pause length are already in use (e.g. JAFFE and FELDSTEIN,1971). These can digest huge amounts of dialogue rapidly and accurately,through the use of the voice-operated relay. However, as pointed out in Chapter 6 (Table 6.5), the voice-operated relay cannot make a linguistic classification of pauses (e.g. pause in relation to the phonemic phrase;the relay confuses juncture pause with hesitation pause). This can only be done with reference to the verbal performance. In the author's opinion,this shortcoming restricts the applicability of this mode of data-automation.

Methods of dealing with verbal content in a qualitative manner have been demonstrated by CICOUREL(1972), SCHEGLOFF(1971), and in the present project (Chapter 7). So far,these authors have not attempted to summarise large samples; however,non-parametric statistics may be utilised to this end.

APPENDICES

	X LK	X TK	X+Y LK	X+Y TK	X LK+TK	X LK+Y TK
CUMULATIVE DURATION	.487 $_{w}^{I}$	-.855	.655 $_{w}^{C}$	-.579 $_{w}^{C}$	-.325 $_{e}^{A}$	.402 $_{w}^{C}$
AVERAGE DURATION	.707 $_{w}^{C}$	.807 $_{w}^{A}$	.618 $_{w}^{C}$	.136 $_{w}^{A}$	.839 $_{w}^{I}$	.316 $_{w}^{I}$
FREQUENCY	.374 $_{w}^{A}$	.531 $_{w}^{I}$	-.233 $_{e}^{C}$	.540 $_{w}^{I}$	.136 $_{w}^{I}$	-.088 $_{w}^{C}$

Appendix A. Maximal correlation between each individual variable and a set of FIRO-B scores. In most cases, the maximal value is found when one of the 6 FIRO scores is dropped from the set. Where this holds true, the omitted FIRO score is indicated below the correlation. The super-scripts refer to dimensions of behaviour: A= Affection, C= Control, I= Inclusion; e= behaviour expressed towards others, w= behaviour wanted from others.



Rules

1. Each player sets out from his own terminal towards the opposite one, and collects an imaginary £10 when he reaches it, then he must return to his own terminal before beginning another trip.
2. The goal is to earn more money than the other player.
3. Player A begins, then each player moves his own lorry in turn.
4. Each lorry can move only in the forward direction.
5. Each move may be 0,1, or 2 numbered squares.
6. The gates A and B are controlled respectively by players A & B.
7. Each player can move freely through his own gate, but must ask for and receive permission of the other player before passing through his gate, in either direction.
8. The lorries cannot move toward one another on the same road; this causes collision. If collision occurs, both lorries must return to their respective terminals and begin again.

Appendix B. The rules and playing surface of the game used in the GAM period,P2.(modified from DEUTSCH and KRAUSE, 1960).

FRIENDS

		X LK 1	X TK 2	X+Y LK 3	X+Y TK 4	X LK+TK 5	X LK+Y TK 6
PRE n=9	1	.538					
	2	.595	.333				
	3	.865	.522	1.000			
	4	.405	.943	.612	1.000		
	5	.622	.400	.793	.352	.338	
	6	.253	.868	.591	.859	.802	.202
		1	2	3	4	5	6
GAM n=11	1	-.068					
	2	.120	-.146				
	3	.268	.510	1.000			
	4	.413	.676	.273	1.000		
	5	.042	.187	.889	.097	.038	
	6	.256	.719	.885	.360	-.228	-.263
		1	2	3	4	5	6
POS n=11	1	.260					
	2	.340	-.570				
	3	.593	.208	1.000			
	4	-.003	.549	.018	1.000		
	5	.283	-.115	.701	-.085	-.040	
	6	.041	.779	.675	.305	.724	-.186

Appendix C. Correlations between the cumulative duration of 6 interpersonal events for any subject X and the cumulative duration of these events for his partner Y. Here, the members of each dyad are friends.

STRANGERS

		X LK 1	X TK 2	X+Y LK 3	X+Y TK 4	X LK+TK 5	X LK+Y TK 6
PRE n=9	1	.662					
	2	-.192	-.190				
	3	.848	.631	1.000			
	4	-.161	.442	-.218	1.000		
	5	.747	.747	.956	-.034	.576	
	6	.627	.782	.834	.009	.449	.683

		1	2	3	4	5	6
GAM n=11	1	.725					
	2	.585	.080				
	3	.861	.510	1.000			
	4	.684	.310	.822	1.000		
	5	.796	.486	.975	.820	.875	
	6	.779	.667	.870	.519	.878	.586

		1	2	3	4	5	6
POS n=10	1	-.107					
	2	.662	-.682				
	3	.650	-.193	1.000			
	4	.224	-.121	-.093	1.000		
	5	.517	-.115	.926	.057	.623	
	6	-.590	.960	-.003	-.251	-.323	-.623

Appendix C, continued. Correlations between the cumulative duration of 6 interpersonal events for any subject X and the cumulative duration of these events for his partner Y. Here, the members of all dyads are strangers.

FRIENDS

		X LK 1	X TK 2	X+Y LK 3	X+Y TK 4	X LK+TK 5	X LK+Y TK 6
PRE n=9	1	.277					
	2	.498	.619				
	3	.858	.473	1.000			
	4	.155	.181	.199	1.000		
	5	.285	-.015	.279	.562	.159	
	6	.700	.697	.742	.216	.677	-.065
		1	2	3	4	5	6
GAM n=11	1	.410					
	2	.716	-.057				
	3	.728	.191	1.000			
	4	-.525	.374	-.493	1.000		
	5	.709	.082	.839	-.645	.188	
	6	.112	.855	.575	.057	.625	.070
		1	2	3	4	5	6
POS n=11	1	.571					
	2	.091	.047				
	3	.748	.232	1.000			
	4	.055	.438	-.057	1.000		
	5	.326	.253	.714	-.032	.591	
	6	.386	.764	.706	.152	.959	.554

Appendix C, continued. Correlations between the average duration of 6 interpersonal events for any subject X and the average duration of these events for his partner Y. Here, the members of each dyad are friends.

STRANGERS

		X LK 1	X TK 2	X+Y LK 3	X+Y TK 4	X LK+ TK 5	X LK+Y TK 6
PRE n=6	1	.462					
	2	.595	.688				
	3	.765	.822	1.000			
	4	.424	.826	.647	1.000		
	5	.195	.308	.447	-.043	.177	
	6	.710	.742	.809	.401	.249	.996
		1	2	3	4	5	6
GAM n=11	1	.734					
	2	.660	.341				
	3	.874	.364	1.000			
	4	.463	.655	.473	1.000		
	5	.812	.240	.937	.467	.768	
	6	.825	.572	.749	.519	.768	.786
		1	2	3	4	5	6
POS n=10	1	-.185					
	2	.037	-.252				
	3	.685	-.093	1.000			
	4	-.081	.544	-.131	1.000		
	5	.266	.254	.548	-.201	.607	
	6	-.199	.933	.042	.346	.143	.183

Appendix C, continued. Correlations between the average duration of 6 interpersonal events for any subject X and the average duration of these events for his partner Y. Here, the members of all dyads are strangers.

VIDEO-

Videotaperecorder: Ampex VR-7003, 625 line standard.

Camera (two-way blackboard: Philips plumbicon LDH 0151 and control unit

Cameras (videotelephones): Link 101 vidicon

Monitors (data preparation): Rank-Cintel 17" no. 28842

Monitors (videotelephone): Ampex VM-9A 9"

AUDIO-

Taperecorder: Tandberg Series 62 two-track stereo

Microphones (videotelephone): AKG D19C dynamic cardioid

Microphones (concealed): purpose-built crystal microphones with attached FET pre-amplifiers

Audio-mixer: Eagle MP7 microphone mixer

Audio-amplifier: Leak Stereo 30 Plus

Loudspeakers (videotelephone and data measurement): Goodmans 3"

DATA-

Tape punch: Digital Measurement DM 5021 punch drive unit, and Westrex 8-track paper-tape punch

Appendix D. List of equipment used in the experiment.

	VARIABLE	1 GAM/CON	2 CON/NOR	3 GAM/NOR
	X LK	*		
	X TK	*		
CUM.	X+Y LK	*	*	*
DUR.	X+Y TK			
	X LK+TK	*		*
	X LK+Y TK	*		
	X LK	*		
	X TK	*		*
AV.	X+Y LK	*	*	
DUR.	X+Y TK			
	X LK+TK	*		
	X LK+Y TK	*		*
	X LK			
	X TK		*	*
FRE.	X+Y LK	*		*
	X+Y TK		*	*
	X LK+TK	*		
	X LK+Y TK			

At the left is a sort of 'truth table' compres- the results shown in Tables 4.6,4.7 and 4.9. GAM= game behaviour,CON= conversation via television,NOR= face-to-face conversation. The 3 columns indicate the statistical tests comparing these three types of interaction; the asterisks mark those measures showing significant differences in the tests.

Only test 2 provided an unconfounded assessment of the effect of a relevant variable- namely,television as a medium of conversation. In test 3,the comparison of normal conversation with game behaviour was confounded by the fact that the former occurred face-to-face, but the latter was mediated by television. However,in the absence of data on face-to-face game-playing,test 1 helped to clarify the issue,since it compared the two types of interaction when both proceded via a television link.

The 'truth table' was interpreted in the following way. Where tests 1 and 3 both revealed significant differences,in the same direction,it was concluded that the differences were induced by the constraints of the game situation. Where test 2 alone revealed real differences,these were attributed to the television as a medium for normal conversation. Finally,where test 1 alone exposed differences,these were attributed to the differential effects of television and game-playing. Although television did not significantly increase these interpersonal events relative to the levels in normal,face-to-face conversation (test 2), and game-playing did not decrease them (test 3), test 1 indicated that the difference between the peak and nadir of each event was significant.

The results of this interpretation are presented in Figure 4.2 (a),(b),and (c).

Appendix E. The basis for the conclusions charted in Figure 4.2.

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